City of Longmont, Colorado

Public Improvement Design Standards and Construction Specifications

Original Publication – 1993
2007 Design Standards and Construction Specifications
(Ordinance Number O-2007-46)
Section 800 (Ordinance O-2025-03)
Sections 100 & 700 (O-2025-72)

City of Longmont Directory

Contact Information

Community Development Department - 385 Kimbark St

Building Inspection ..... (303)651-8332
Planning & Development Services ..... (303)651-8330

Public Works Department – 385 Kimbark Street

Public Works ..... (303)651-8304

Utilities Departments – 1100 South Sherman Street

Longmont Power & Communications (LPC) ..... (303)651-8386
Water/Wastewater ..... (303)651-8376

Utilities Locates

Remember to call for utility locates 72 hours prior to any excavation work

Utility Notification Center of Colorado..... (303)922-1987

Locates the following utilities:

Electric (LPC)
Gas (Xcel)
Telephone (Qwest)
Cable (Comcast)

Contact City of Longmont Departments directly for:

Water/Wastewater/Stormwater ..... (303)651-8468
Parks, Recreation and Open Space ..... (303)651-8446

CITY OF LONGMONT
PUBLIC IMPROVEMENT
DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

TABLE OF CONTENTS

SECTION 100 – GENERAL REQUIREMENTS (2025)

SECTION	PG #	SECTION TITLE
100.00	GEN-4	PURPOSE
101.00	GEN-7	ABBREVIATIONS AND DEFINITIONS
102.00	GEN-19	USE OF STANDARDS
103.00	GEN-22	PLAN REVIEW & SUBMITTAL PROCESS
104.00	GEN-30	CONSTRUCTION
105.00	GEN-34	CONTROL OF WORK
106.00	GEN-37	CONTROL OF MATERIALS
107.00	GEN-39	CONTROL OF SITE
108.00	GEN-42	ACCEPTANCE OF WORK
109.00	GEN-45	UTILITY TRENCHING

SECTION 100 – GENERAL REQUIREMENTS INDEX OF DETAILS (2025)

100-01	PLACEMENT OF UTILITY MAINS WITHIN PUBLIC ROW
100-02	PUBLIC UTILITY EASEMENT ON PRIVATE PROPERTY
100-03	WET UTILITY TRENCH
100-04	TRENCH LIMITS FOR ASPHALT REMOVAL AND PATCH-BACK
100-05	CONCRETE PAVEMENT PATCH-BACK
100-06	TYPICAL ASPHALT AND CONCRETE TRENCH PATCH-BACK
100-07	PIPE CROSSING SUPPORT PAD DETAIL
100-08	UTILITY CROSSING
100-09	CUT-OFF WALL
100-10	DITCH CROSSING
100-11	MARKER POST
100-12	TYPICAL RESIDENTIAL LOT GRADING DETAIL
100-13	TRACER WIRE SAMPLE SANITARY SEWER PLAN
100-14	TRACER WIRE SAMPLE STORM SEWER PLAN
100-15A	TRACER WIRE AT SEWER LATERAL DETAIL
100-15B	TRACER WIRE AT SEWER LATERAL DETAIL
100-16	TRACER WIRE AT INLET OR STORM MANHOLE DETAIL
100-17	SANITARY SEWER SERVICE UTILTIY LOCATING AND TEST STATION
100-18	CASING/SKID
100-19	CASING PIPE
100-20	WATER & SEWER SERVICE INSTALLATION IN THE SAME TRENCH

SECTION 200 – STREET IMPROVEMENTS (2007)

SECTION	PG #	SECTION TITLE
200.00	ST-1	MINIMUM DESIGN CRITERIA
201.00	ST-2	RIGHT OF WAYS AND STREET CROSS-SECTIONS
202.00	ST-3	HORIZONTAL ALIGNMENT
203.00	ST-4	VERTICAL ALIGNMENT
204.00	ST-6	RESERVED
205.00	ST-6	INTERSECTIONS
206.00	ST-11	CUL-DE-SACS
207.00	ST-12	STRUCTURAL CROSS-SECTION
208.00	ST-17	GENERAL - CONSTRUCTION
209.00	ST-18	CLEARING AND GRUBBING
210.00	ST-19	REMOVAL OF STRUCTURES AND OBSTRUCTIONS
211.00	ST-19	EXCAVATIONS AND EMBANKMENT
212.00	ST-24	AGGREGATE BASE COURSE
213.00	ST-25	PLANT MIXED BITUMINOUS PAVEMENT
214.00	ST-30	PORTLAND CEMENT CONCRETE PAVEMENT
215.00	ST-33	STREET RESTORATION (PATCHING AND MATCHING EXISTING)
216.00	ST-34	SIDEWALKS, CURB RAMPS, CURB AND GUTTER
217.00	ST-36	SIGNS CONSTRUCTION AND INSTALLATION

SECTION 200 – STREET IMPROVEMENTS INDEX OF DETAILS (2007)

200-01	Typical Street Section
200-01A	Typical Street Section
200-01B	Street Intersection Crosspan Approach Detail
200-01C	Street Intersection Approach Detail
200-02	Intersection Right-of-Way
200-03	Concrete Cross Pan
200-04	Detached Sidewalk Detail
200-05	Bikeway Detail
200-06	Vertical Curbwalk Detail
200-07	Vertical Curb and Gutter Type “B”
200-08A	Concrete Driveway (Type A) With Attached Walk
200-08B	Concrete Driveway (Type B) With Attached Walk
200-09	Concrete Driveway Offset Walk (Monolithic Pour)
200-10	Mountable Curbwalk
200-11	Curb Ramp Detail – Radial Curbwalk
200-12	Curb Ramp Detail – Mid-Block, Single
200-13	Curb Ramp Detail – Detached Sidewalk
200-14A	Curb Ramp Transition Detail for Detached Walk and/or Bikepath (Alt. A)
200-14B	Curb Ramp Transition Detail for Detached Walk and/or Bikepath (Alt. B)
200-15	Curb Ramp Detectable Warning and Construction Joint Detail
200-16	Traffic Circle Detail
200-16A	Mid-Block Neckdown with Detached Walk
200-16B	Speed Tables or Speed Humps with Crosswalk
200-17	Chase Drain Detail
200-18	Type R (Modified) (Chase)
200-19	Staking Detail, Mountable Curb Inlet
200-20	Survey Monument Box
200-21	Pedestrian Handrail Detail
200-22	Conduit Trench
200-23	Standard Pipe Underdrain (Raised Irrigated Medians)
200-24	Rotomill Detail (Final Overlay)
200-25	Core Drilled Pothole Patching Detail

SECTION 300 – STORM DRAINAGE IMPROVEMENTS (2007)

SECTION	PG #	SECTION TITLE
300.00	STDR-1	DESIGN CRITERIA
301.00	STDR-2	STORM DRAINAGE IMPROVEMENTS

SECTION 300 - STORM DRAINAGE IMPROVEMENTS IINDEX OF DETAILS (2007)

300-01 Typical Pipe Bedding
300-02 Standard Manhole
300-03 Standard Manhole Cover
300-04 Type “R” Inlet Access Location
300-05 Manhole Cover Location
300-6A Standard Flared End Section
300-6B Elliptical Flared End Section
300-6C Flared End Section Trash Rack (Circular Pipe)
300-6D Trash Rack Mounting (Circular Flared End Section)
300-6E Flared End Section Trash Rack (Elliptical Pipe)
300-6F Trash Rack Mounting (Elliptical Flared End Section)
300-07 Silt Fence Erosion Barrier
300-08 Straw Bale Erosion Barrier
300-09 Construction Staging Pad

SECTION 400 – WASTEWATER COLLECTION (2007)

SECTION	PG #	SECTION TITLE
400.00	WW-1	MINIMUM DESIGN CRITERIA
410.00	WW-4	MATERIALS
411.00	WW-5	POLYVINYL CHLORIDE PIPE (P.V.C.)
412.00	WW-6	DUCTILE IRON PIPE
413.00	WW-6	VITRIFIED CLAY PIPE
414.00	WW-6	ASBESTOS CEMENT PIPE (A.C.P.)
415.00	WW-7	FITTINGS FOR SEWER PIPE
416.00	WW-7	CLEAN-OUTS IN SERVICE LINES
417.00	WW-7	UNDERDRAINS
418.00	WW-7	MANHOLES
419.00	WW-7	CONCRETE AND REINFORCING STEEL
420.00	WW-8	PLUGS OR STOPPERS
430.00	WW-8	CONSTRUCTION INFORMATION
432.00	WW-8	CONNECTION TO THE EXISTING SYSTEM
433.00	WW-8	TAPPING
434.00	WW-9	GENERAL PIPE INSTALLATION
435.00	WW-9	SERVICE LINES
438.00	WW-10	SETTING OF MANHOLES AND FITTINGS
439.00	WW-12	TESTING
440.00	WW-14	UTILITY MARKER SIGNS
441.00	WW-14	LIFT STATIONS – GENERAL
442.00	WW-15	LIFT STATIONS – PRODUCTS
443.00	WW-32	LIFT STATIONS – EXECUTION

SECTION 400 - WASTEWATER COLLECTION INDEX OF DETAILS (2007)

400-01 Standard Manhole Detail
400-02 Manhole Raising Detail
400-03 Sewer Service Connection
400-04 Manhole Abandonment Detail
400-05 Inside Drop Manhole Detail
400-06 Sanitary Sewer Service Line Installation

SECTION 500 – WATER DISTRIBUTION (2007)

SECTION	PG #	SECTION TITLE
500.00	WATR-1	MINIMUM DESIGN CRITERIA
510.00	WATR-4	MATERIALS
511.00	WATR-4	DUCTILE IRON PIPE
512.00	WATR-6	POLYVINYL CHLORIDE PIPE
513.00	WATR-7	ASBESTOS CEMENT PIPE
514.00	WATR-7	CAST AND DUCTILE IRON WATER WORKS FITTINGS
515.00	WATR-8	VALVES
516.00	WATR-9	VALVE BOXES
517.00	WATR-9	CURB STOP BOXES
518.00	WATR-9	FIRE HYDRANTS
520.00	WATR-10	GENERAL INFORMATION
521.00	WATR-11	TAPPING
522.00	WATR-12	GENERAL PIPE INSTALLATION
523.00	WATR-13	RESTRAINT
524.00	WATR-14	SERVICE LINES
525.00	WATR-15	SETTING OF VALVES AND FITTINGS
526.00	WATR-16	SETTING OF VALVE BOXES
527.00	WATR-16	SETTING HYDRANTS
528.00	WATR-17	DISINFECTION AND FLUSHING
529.00	WATR-18	HYDROSTATIC TESTS
530.00	WATR-20	WATER METERS
531.00	WATR-24	BACKFLOW CONTROL
532.00	WATR-38	TEMPORARY WATER USE-PERMIT REQUIRED

SECTION 500 - WATER DISTRIBUTION - INDEX OF DETAILS (2007)

500-01	Valve Box Detail
500-02	Standard Blow-Off Installation for 12" & Smaller Pipe
500-02A	Temporary ¾“ & 1” Blow-Off Installation for 12" & Smaller Pipe
500-02B	Temporary 2” Blow-Off Installation for 12" & Smaller Pipe
500-03	Water Service Line Reconnects
500-04	Upper Vertical Thrust Block Detail
500-05	Horizontal Thrust Block Detail
500-06	Standard Fire Hydrant Installation Profile
500-07	12" or Smaller Waterline, Lowering Detail for Utility Crossings
500-08	Water Service and Outside Meter Installation (Attached Sidewalk Shown)
500-08A	Water Service and Outside Meter Installation (Detached Sidewalk Shown)
500-08B	Rural Water Service and Outside Meter Installation
500-09	1½” – 2” Domestic Meter in Vault
500-10	Ditch Crossing
500-11	Exothermic Weld Cap Installation
500-12	Joint Bond Installation
500-13	Cathodic Test Station - Type 1
500-14	Cathodic Test Station - Type 2
500-15	Cathodic Test Station - Type 3
500-16	Marker Post
500-17	Fire/Domestic Water Supply Combination Detail ¾” – 2” Multi Family
500-18	¾” – 2” Irrigation Meter in Vault
500-19	¾“ – 1” Domestic Meter in Vault

SECTION 600 – PARKS AND FORESTRY (2007)

SECTION	PG #	SECTION TITLE
600.00	PARK-1	REGULATED AREAS AND DEVELOPMENT PROCESS
601.00	PARK-11	CONCRETE PATHS, BRIDGES AND UNDERPASSES
602.00	PARK-20	GRADING AND FINE GRADING
603.00	PARK-25	IRRIGATION
604.00	PARK-43	SEEDING
605.00	PARK-48	SODDING
606.00	PARK-51	TREES, PLANTS AND GROUNDCOVER

SECTION 600 - PARKS AND FORESTRY INDEX OF DETAILS (2007)

601.01	Concrete Path Detail
601.02	Flood Gate
603.01	Backflow Preventer, Meter Pit and Downstream Assemblies
603.02	Winterization Assembly
603.03	Flow Meter Assembly
603.04	Master Valve Assembly
603.05	Controller, Satellite and Enclosure
603.06	Remote Control Valve Assembly
603.07	Quick Coupler Assembly
603.08	Drip Remote Control Valve Assembly
603.09	Manual Drain Valve Assembly
603.10	Gate Valve Assembly
603.11	Concrete Thrust Block Detail
603.12	Pop-Up Rotor Sprinkler Assembly
603.13	Pop-Up Spray Sprinkler Assembly
603.14	Flush Cap Assembly
603.15	Drip Detail in Shrub Beds
603.16	Drip in Open Turf Areas
606.01	Tree Planting Detail
606.02	Shrub Planting Detail

SECTION 700 – LONGMONT POWER AND COMMUNICATIONS (2025)

SECTION	PG #	SECTION TITLE
700.00	LPC-1	MINIMUM DESIGN CRITERIA
701.00	LPC-11	CUSTOMER INSTALLATIONS
702.00	LPC-20	INSTALLATIONS
703.00	LPC-25	METERING REQUIREMENTS
704.00	LPC-43	SMALL CELL FACILITIES

SECTION 700 – LONGMONT POWER & COMMUNICATIONS (LPC) - INDEX OF DETAILS (2025)

700-00	SERVICE LATERAL
700-01	TRENCH CLEARANCE
700-02	EQUIPMENT CLEARANCES
700-03	CUSTOMER INSTALLED SLEEVE
700-04	TRENCH DETAIL
700-05	EQUIPMENT ALIGNMENT ON TRENCH
700-06	TRACER WIRE INSTALLATION
700-07A	CABLE HANDLING AND STORAGE PROCEDURES
700-07B	CABLE HANDLING AND STORAGE PROCEDURES (CONTINUED)
700-08	COLD SHRINK INSTALLATION
700-09	SINGLE PHASE TRANSFORMER VAULT
700-10	THREE PHASE TRANSFORMER PAD
700-11	PRIMARY JUNCTION VAULT
700-12	SECONDARY JUNCTION BOX (J-BOX)
700-13	NOT USED (STREET LIGHT POLE; shown for reference only)
700-14	NOT USED (STREET LIGHT BASE; shown for reference only)
700-15	3 PHASE SERVICE LINE INDENTIFICATION
700-16	METERING SINGLE FAMILY
700-17	NOT USED (METERING COMMUNICATION LINE; shown for reference only)
700-18	BOLLARD INSTALLATION
700-19A	SECONDARY CONNECTION CABINET (SCC) PART 1
700-19B	SECONDARY CONNECTION CABINET (SCC) PART 2
700-20A	SMALL CELL FACILITIES LPC STREET LIGHT POLES
700-20B	SMALL CELL FACILITIES LPC STREET LIGHT POLES (CONTINUED)
700-21	BROADBAND J-BOX WITH LOCATE WIRE
700-22A	PRIMARY METERING CABINET CLEARANCES
700-22B	PRIMARY METERING CABINET CONSTRUCTION DETAILS
700-22C	PRIMARY METERING RESPONSIBILITY TABLE

SECTION 800 – URBAN DESIGN STANDARDS (2025)

SECTION	PG #	SECTION TITLE
800.00	URDE-2	GENERAL
801.00	URDE-3	TRANSPORTATION AND STREET DESIGN
802.00	URDE-XX	RESERVED
803.00	URDE-8	STORM DRAINAGE
804.00	URDE-10	WATER AND WASTEWATER UTILITIES
805.00	URDE-12	ELECTRIC AND COMMUNICATIONS
806.00	URDE-13	PUBLIC SAFETY

SECTION 800 – URBAN DESIGN STANDARDS- INDEX OF DETAILS (2025)

800-01 Local Residential Street Section 61 ft ROW
800-02 Local Residential Street Section 55 ft ROW
800-03 Local Residential Street Section 45 ft ROW
800-04 Local Residential Street Section 40 ft ROW
800-05 Local Residential Street Section 38 ft ROW
800-06 Urban Residential Street Section 54 ft ROW
800-07 Small Radius Curve
800-08 Tee Intersection/Private Drive
800-09 Emergency Access Mid-Block & Intersections
800-10 Alley Section 22 ft ROW
800-11 Alley Section 20 ft ROW
800-12 Alley Section 18 ft ROW
800-13 Attached Sidewalk 5 ft wide
800-14 – 800-20 Reserved
800-21 Typical Utility Layout 61 ft ROW
800-22 Typical Utility Layout 55 ft ROW
800-23 Typical Utility Layout 45 ft ROW
800-24 Typical Utility Layout 40 ft ROW
800-25 Typical Utility Layout 35 ft ROW
800-26 Typical Utility Layout Urban Street Section
800-27 Alley Utility Layout 20 ft ROW
800-28 Utility Easements

APPENDICES (2025)

APP-A	CONSTRUCTION PLAN REQUIREMENTS
APP-B	CONSTRUCTION PLAN NOTES
APP-C	REPORT TEMPLATE AND CHECKLISTS
APP-D	STORMWATER QUALITY (SEE LONGMONT STORM DRAINAGE CRITERIA MANUAL)
APP-E	ACCEPTANCE FORMS
APP-F	FLOODPLAIN INFORMATION (SEE LONGMONT STORM DRAINAGE CRITERIA MANUAL)
APP-G	MISCELLANEOUS
APP-H	KEN PRATT BOULEVARD LANDSCAPING GUIDELINES
APP-I	APPROVED MATERIALS LISTS

CITY OF LONGMONT
SECTION 100 – GENERAL REQUIREMENTS
TABLE OF CONTENTS

SECTION	PG #	SECTION TITLE
100.00	**4**	**PURPOSE**
100.01	4	TITLE
100.02	4	JURISDICTION
100.03	4	AUTHORITY
100.04	4	PURPOSE
100.05	4	INTERPRETATION
100.06	4	ENFORCEMENT RESPONSIBILITY
100.07	5	AMENDMENTS AND REVISIONS
100.08	5	EXCEPTIONS
101.00	**7**	**ABBREVIATIONS AND DEFINITIONS**
101.01	7	ABBREVIATIONS
101.02	9	DEFINITIONS
102.00	**19**	**USE OF STANDARDS**
102.01	19	GENERAL QUALIFICATIONS
102.02	19	USING THESE STANDARDS
102.03	20	PUBLIC IMPROVEMENT DESIGN
102.04	20	DESIGN APPROVALS
102.05	20	PROJECT RESPONSIBILITY
102.06	20	STANDARDS
103.00	**22**	**PLAN REVIEW & SUBMITTAL PROCESS**
103.01	22	INTRODUCTION
103.02	22	PLAN REVIEW
103.03	22	SUBMITTAL PROCEDURE & REQUIREMENTS
103.04	23	CONSTRUCTION PLAN GENERAL PROVISIONS
103.05	23	SURVEY REQUIREMENTS
103.06	24	UTILITY LOCATION REQUIREMENTS FOR DESIGN
103.07	24	ENGINEERING DESIGN SUBMITTALS
103.07A	25	DRAINAGE REPORT
103.07B	25	GEOTECHNICAL (SOILS) ENGINEERING REPORT
103.07C	25	PAVEMENT REPORT
103.07D	25	LONGMONT POWER & COMMUNICATIONS PROJECT INFORMATION
103.07E	26	TRANSPORTATION IMPACT STUDY
103.07F	26	WATER AND WASTEWATER PROJECT INFORMATION REPORT
103.07G	26	UNDERDRAIN REPORT
103.07H	26	FLOODPLAIN IMPACT ANALYSIS REPORT
103.08	26	EASEMENTS AND RIGHTS-OF-WAY REQUIREMENTS
103.09	27	UTILITY LINE SEPARATION AND CROSSINGS

SECTION	PG #	SECTION TITLE
103.09A	27	HORIZONAL SEPARATION
103.09B	28	VERTICAL SEPARATION AND CROSSINGS
103.09C	28	LANDSCAPE REQUIREMENTS
104.00	**30**	**CONSTRUCTION**
104.01	30	GENERAL INFORMATION
104.02	30	COMMENCEMENT OF CONSTRUCTION
104.03	30	PRE-CONSTRUCTION MEETING
104.04	31	PLANS ACCESSIBLE AT CONSTRUCTION SITE
104.05	31	PERMITS
104.06	31	STORMWATER QUALITY
104.07	32	SUSTAINABILITY
104.08	32	SAFETY AND PROTECTION
104.09	33	RESPONSIBILITY FOR DAMAGE
105.00	**34**	**CONTROL OF WORK**
105.01	34	CHANGES FROM APPROVED PLANS
105.02	34	NOTIFICATION OF DESIGN ERRORS
105.03	34	AUTHORITY OF THE CITY ENGINEER
105.04	34	AUTHORITY OF THE CITY INSPECTOR
105.05	35	INSPECTION REQUIREMENTS
105.06	35	TESTING
105.07	36	LIABILITY
106.00	**37**	**CONTROL OF MATERIALS**
106.01	37	GENERAL INFORMATION
106.02	37	CERTIFICATES AND WARRANTIES FROM MANUFACTURER
106.03	37	MANUFACTURER'S SPECIFICATIONS OR RECOMMENDATIONS
106.04	37	APPROVED MATERIALS LIST
106.04A	37	EVALUATIONS
106.04B	38	TESTING
106.04C	38	NOTIFICATION
106.04D	38	APPEAL
106.04E	38	LIMITATIONS ON REAPPLICATIONS
107.00	**39**	**CONTROL OF SITE**
107.01	39	UTILITY LOCATES
107.02	39	CONSTRUCTION WATER
107.03	39	RELOCATION OF EXISTING UTILITIES
107.04	39	INTERRUPTION OF WATER, WASTEWATER, AND STORM SEWER
107.05	40	SWEEPING AND CLEANING OF ROADS AND ROW DURING CONSTRUCTION
107.06	40	MATERIAL STORAGE AND HANDLING
107.07	40	LANDSCAPE PROTECTION
107.08	40	FINAL CLEANUP
107.09	41	SITE STABILIZATION

SECTION	PG #	SECTION TITLE
108.00	**42**	**ACCEPTANCE OF WORK**
108.01	42	GENERAL
108.02	42	RECORD DRAWINGS
108.03	42	CONSTRUCTION ACCEPTANCE
108.04	43	FINAL ACCEPTANCE
109.00	**45**	**UTILITY TRENCHING**
109.01	45	GENERAL
109.02	45	MATERIALS
109.02A	45	STABILIZATION MATERIAL
109.02B	45	BEDDING MATERIAL
109.02C	46	BACKFILL MATERIAL
109.03	47	EXECUTION
109.03A	47	GENERAL
109.03B	47	REMOVAL OF ASPHALT SURFACES
109.03C	47	REMOVAL OF CONCRETE STRUCTURES
109.03D	48	CARE OF SURFACE MATERIAL FOR REUSE
109.03E	48	EXCAVATION
109.03F	48	TRENCHING BY HAND OR MACHINE
109.03G	48	PILING OF EXCAVATED MATERIAL
109.03H	48	SPECIAL TRENCHES OR INSTALLATIONS
109.03I	48	ROCK EXCAVATION
109.03J	49	BORING
109.03K	49	TRENCH STABILIZATION
109.03L	49	DEWATERING OF TRENCHES
109.03M	49	UTILITY PIPE CROSSING
109.03N	50	CUT-OFF WALL CONSTRUCTION
109.03O	50	INSTALLATION OF BEDDING MATERIAL
109.03P	50	TRENCH BACKFILL
109.03Q	50	BACKFILLING IN FREEZING WEATHER
109.03R	50	COMPACTION REQUIREMENTS AND TESTING
109.03S	51	ASPHALT & CONCRETE PATCHING
109.03T	52	UTILITY MARKER POST
109.03U	52	TRACING FOR UTILITY LOCATION

SECTION 100 – GENERAL REQUIREMENTS
INDEX OF TABLES

TABLE	PG #	TITLE
TABLE 1-1	46	BEDDING MATERIAL GRADATION
TABLE 1-2	52	TRACER WIRE INSULATION COLORS
TABLE 1-3	54	WARNING TAPE COLORS TO UTILITY TYPE

100.00 PURPOSE

100.01 TITLE

These regulations, together with all future amendments, shall be known as the City of Longmont Public Improvement Design Standards and Construction Specifications, may be cited as such, and shall be referred to herein as the City Standards. Upon adoption of these City Standards by City Council, the previous manual is hereby repealed and replaced by these City Standards. Individual sections may be updated independently, in which case they will repeal and replace the relevant section. In these City Standards, any reference made in singular may be construed as plural.

100.02 JURISDICTION

These City Standards shall apply to all land within the incorporated boundaries of the City of Longmont, except in areas where the City's jurisdiction is superseded by Federal, State of Colorado, or other jurisdiction, but including those areas the City has identified as Municipal Service Areas that extend past the incorporated boundaries and within which the City currently provides, or intends to provide, utilities and urban services.

100.03 AUTHORITY

These City Standards have been adopted pursuant to the authority conferred within Article 4.9, Municipal Charter, City Code, and Chapter 15.07, City Code, and shall have the same force and effect as all other City ordinances.

100.04 PURPOSE

The purpose of the City Standards is to provide the minimum design criteria and technical specifications to be adhered to in the design and construction of public improvements and work in streets, rights-of-way, easements, floodplains, and properties located within the jurisdiction of the City of Longmont, Colorado. It is the intent of these City Standards to obtain high quality design and construction throughout the City, with the completed work complying with City Standards.

100.05 INTERPRETATION

In the interpretation and application of these standards, the following shall govern:

A. These provisions shall be regarded as the minimum requirements for the protection of public health, safety, comfort, convenience, prosperity, and welfare of the residents of the City of Longmont. While these provisions are minimum requirements, they do not preclude imposition of more restrictive standards by agreement or law.

B. Whenever the provisions of these City Standards are found to be inconsistent with any other regulations or code, the City Engineer shall determine the standard to apply.

C. Projects shall comply with all laws, regulations, codes, and ordinances applicable to the design, construction, and performance of the work, and anything related to such. Except where expressly required by applicable laws, regulations, codes, or ordinances, the City shall not be responsible for monitoring compliance with any law, regulation, code, or ordinance, but maintains the right to enforce such compliance as law.

100.06 ENFORCEMENT RESPONSIBILITY

It shall be the duty of the Director of Public Works ("City Engineer"), or assigned designee, to enforce the provisions of these City Standards.

100.07 AMENDMENTS AND REVISIONS

A. These City Standards may be amended as needed to ensure their purposes are met. Any technical modifications to these City Standards, including the standard details within each Section, information in the appendices, and the Approved Material Lists, shall be approved by the City Engineer, will be made annually, and published to the City of Longmont website in December of each year. Policy changes within these City Standards shall be approved by City Council following the recommendations of the City Engineer. Such policy changes that affect only one section of these Standards may be reviewed and approved by City Council individually as brought forward by the City Engineer or their designee.

B. Electronic copies of the currently adopted Standards shall be available to the public on the official City of Longmont website (www.longmontcolorado.gov). The electronic copy shall be the official version of the City Standards.

100.08 EXCEPTIONS

A. Any exceptions from, or modifications to, the City Standards shall be subject to review in accordance with Chapter 15.02, City Code.
   (1) Requests for exceptions shall be submitted to the City at the time of plan submittal. The request shall state the exception requested, the justification and supporting data for the exception, and the requested change to the City Standards for the specific project. The City will require that exceptions be signed and sealed by a registered Professional Engineer licensed to do work in the State of Colorado.
   (2) Variances to Street Design Standards located within Chapters 15.05 and 15.07, City Code, shall meet the requirements for either the Administrative Modification, Exceptions, or Variances Sections in Chapter 15.02, City Code, depending on project designation.
   (3) Exceptions to City Standards for Utility Trenching (City Standards Section 100), Transportation (City Standards Section 200), Storm Drainage (City Standards Section 300), Wastewater Collection (City Standards Section 400), Water Distribution (City Standards Section 500), Landscape and Irrigation (City Standards Section 600), and Longmont Power & Communications (City Standards Section 700), as outlined in these City Standards, shall be reviewed by the City Engineer in conjunction with the relevant city departments. Requests for exceptions shall demonstrate compliance through the following criteria for approval:
      a. Special circumstances or conditions exist that are outside of the control of the applicant and that limit the ability of the design to meet the relevant City Standards. Financial difficulties, loss of prospective profits, and previously approved exceptions in other developments shall not be considered special circumstances.
      b. The exception represents an alternative design that mitigates the special circumstances or conditions while meeting the intent of the City Standards.
      c. The exception shall not: be detrimental to the public interest or other property, conflict with Envision Longmont or any applicable provision of the City Code, or other applicable laws, rules, and regulations, or endanger public safety, health, or welfare.

B. All exceptions to City Standards shall be reviewed and acted on prior to the commencement of construction or alteration of the relevant improvement or part of the relevant improvement. Exceptions occurring as part of the Development Review Committee process shall be submitted in conjunction with design plans and prior to Final Approval. The submittal process shall include the Request for an Exception to City Standards form located in the Appendices of these City Standards.

C. Exceptions occurring during public improvement construction due to unforeseen site conditions or other changed conditions require the Contractor and / or Engineer of Record to submit the exception request in writing to the City Engineer. The City shall respond promptly and in writing to the exception request, but reserves a minimum of ten (10) business days for review and response. When additional review time is required, the City shall notify the Contractor and / or Engineer of Record of the need for additional time within five (5) business days of the submittal.

D. Approval of construction plans containing elements not in compliance with these City Standards, and for which an exception has not been specifically requested and approved, does not imply approval of an exception from these City Standards. Only those exception requests formally submitted in writing and approved by the City Engineer are granted.

101.00 ABBREVIATIONS AND DEFINITIONS

101.01 ABBREVIATIONS

For the purposes of these City Standards, the following abbreviations shall mean the following phrases, except where the context clearly indicates otherwise. For words, terms, and phrases used in these City Standards that are not abbreviated below, or elsewhere in the Longmont Municipal Code, the City Engineer shall interpret or define the abbreviations of such words, terms, and phrases.

AA – Aluminum Associates
ACP – Asbestos Cement Pipe
AASHTO – American Association of State Highway and Transportation Officials
ACI – American Concrete Institute
ADAAG – Americans with Disabilities Act Access Guidelines
ADT – Average Daily Traffic
ANSI – American National Standards Institute
ASCE – American Society of Civil Engineers
ASME – American Society of Mechanical Engineers
ASSE – American Society of Sanitary Engineers
ASTM – American Society for Testing and Materials
APWA – American Public Works Association
AWWA – American Water Works Association
CDPHE – Colorado Department of Public Health and Environment
CDPS – Colorado Discharge Permit System
CDOT – Colorado Department of Transportation
CLOMR – Conditional Letter of Map Revision
CLOMR-F – Conditional Letter of Map Revisions based on Fill
CP – Colorado Procedure
CPPA – Corrugated Plastic Pipe Association
CPTED – Crime Prevention Through Environmental Design
CPW – Colorado Parks and Wildlife
CUHP – Colorado Urban Hydrograph Procedure
DRC – Development Review Committee
DWR – Division of Water Resources
EPA – Environmental Protection Agency
ECS – Erosion Control Specialist
EOR – Engineer of Record
EURV – Excess Urban Runoff Volume
FEMA – Federal Emergency Management Agency
FHWA – Federal Highway Administration
FPP – Floodplain Development Permit
FIA – Floodplain Impact Analysis
HDPE – High Density Polyethylene Pipe
HI – Hydraulic Institute
IBC – International Building Codes

IFC – International Fire Code
IGA – Inter-governmental Agreement
IPC – International Plumbing Code
IRC – International Residential Code
ISO – Insurance Services Office or International Organization for Standardization
LABCAT – Laboratory for the Certification of Asphalt Technicians
LAPC – Longmont Area Comprehensive Plan
LDC – Land Development Code, Longmont Municipal Code Title 15
LID – Low Impact Development
LOMR – Letter of Map Revision
LOMR-F – Letter of Map Revision based on Fill
LPC – Longmont Power & Communications
LSDCM – City of Longmont Storm Drainage Criteria Manual
MGPEC – Metropolitan Governments Pavement Engineers Council
MHFD – Mile High Flood District
MS-2 – Asphalt Institute's "Mix Design Methods for Asphalt Concrete" manual
MS4 – Municipal Separate Storm Sewer System
MUTCD – Manual of Uniform Traffic Control Devices
NACTO – National Association of City Transportation Officials
NCSPA – National Corrugated Steel Pipe Association
NEC – National Electric Code
NEMA – National Electrical Manufacturers Association
NESC – National Electric Safety Code
NIST – National Institute of Standards and Technology
NPDES – National Pollutant Discharge Elimination System.
NSF – National Sanitation Foundation
OSHA – Occupational Safety Health Administration
PIA – Public Improvement Agreement
PPI – Plastic Pipe Institute
PROWAG – Public Rights-of-Way Accessibility Guidelines
PSC – Permanent Stormwater Control
PSCM – Permanent Stormwater Control Measure
PVC – Polyvinyl Chloride
RCP – Reinforced Concrete Pipe
RPZ – Reduced Pressure Zone
ROW – Right-of-Way
SCAP – Stormwater Construction Activities Permit
SWMP – Stormwater Management Plan
UDFCD – Urban Drainage and Flood Control District
UMC – Uniform Mechanical Code
UNCC – Utility Locates Center of Colorado
UPW – Utilities and Public Works
USACE – US Army Corps of Engineers
WEF – Water Environment Federation

WQCV – Water Quality Control Volume
WSE – Water Surface Elevation

101.02 DEFINITIONS

A. For the purposes of these City Standards, the following terms shall have the following definitions. For words, terms, and phrases used in these City Standards that are not defined below, or elsewhere in the Longmont Municipal Code, the City Engineer shall interpret or define such words, terms, and phrases.

B. Wherever the words "as directed," "as required," "as permitted," or words or phrases of similar meaning are used, it shall be understood that the direction, requirements, or permission of the City Engineer is intended. Similarly, the words "approved," "acceptable," and "satisfactory" shall refer to the approval of the City Engineer. References made to City Standards, methods of testing materials, codes, practices, and requirements are understood to be the latest revision of said references and shall govern unless a specific revision is stated.

APPLICANT – Any of the following parties that has submitted an application pursuant to Title 15, City Code:

A. The record owner(s) of the subject property or the owner of subsurface oil and gas or leasehold interest therein;
B. The city or other quasi-governmental entity;
C. The developer of the subject property;
D. A purchaser of the subject property under a sale;
E. The duly authorized agent of the owner(s).

APPROVED MATERIALS LIST – The latest revised list of materials approved for construction in the City of Longmont.

APPROVED PLAN – The latest revised construction plan approved by the City Engineer.

AREA UNDERDRAIN – Pipe installed to intercept or drain groundwater, but not located around the footing, foundation or basement of a building, dwelling, or structure.

BUILDING – Any structure utilized or intended for supporting or sheltering any use or occupancy.

BUILDING PERIMETER UNDERDRAIN – A pipe installed around a footing, foundation, or basement to drain groundwater away from a building, dwelling, or structure.

CAPITAL IMPROVEMENT PROJECT – A new, replacement of, or improvements to city infrastructure (buildings, roads, parks, water, and sewer lines, etc.) that has a minimum life expectancy of five years and a minimum cost of $10,000.

CITY – Shall mean the City of Longmont, a municipal corporation of the State of Colorado.

CITY CODE – Shall mean the official adopted City of Longmont Municipal Code.

CITY ENGINEER – Shall mean the Director of Public Works for the City of Longmont or designated representative.

CITY INSPECTOR – Shall mean an authorized representative of the City Engineer at the site of the work.

CITY STANDARDS – Shall refer to the City of Longmont Public Improvements Design Standards and Construction Specifications.

CLEAN WATER ACT – The federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), and any subsequent amendments thereto.

CLEARING – Any activity that removes vegetative surface cover.

COLORADO DISCHARGE PERMIT SYSTEM (CDPS) – The Colorado program based on the National Pollutant Discharge Elimination System (NPDES) framework that is required by the Environmental Protection Agency (EPA) under the Clean Water Act amendments of 1987 to regulate municipal and industrial stormwater discharges. The Water Quality Control Division has stormwater regulations (5CCR 1002-61) in place that require specific types of industrial facilities that discharge stormwater associated with industrial activities, including construction activities disturbing over one (1) acre of land, to obtain a CDPS permit for such discharge.

COMMON AREAS – Privately-owned open areas within or related to a development that are designed and intended for the common use or enjoyment of the residents of the development and their guests and may include such complementary structures and improvements as are necessary and appropriate.

CONSTRUCTION ACTIVITY – Earth-disturbing activities, such as clearing, grading, excavation of land, demolition, and other related activities (e.g., stockpiling of fill materials; placement of raw materials at the site), installation of utilities, assembly and completion of streets, sidewalks, and buildings, and other activities of a similar nature.

CONSTRUCTION SITE – Any location where construction activity occurs.

CONTRACTOR – Shall mean a person, partnership, or corporation duly licensed and insured to perform work in the City of Longmont, Colorado.

CONTRACTOR'S REPRESENTATIVE – Shall mean the owner, superintendent, foreman, or any person designated by the Contractor to be responsible for construction in the field.

CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN - A system for developing the built environment to reduce the possibility of opportunistic crime and limit the perception of crime in a given neighborhood.

CUL-DE-SAC – A street open at one end only, with a radius bulb for the turning around of vehicular traffic on the other end.

CURB – A stone, concrete, or other improved boundary usually demarcating the edge of a street, parking lot, or other paved area.

CURB CUT – An opening along the curb line at which vehicles or pedestrians may enter or leave the street, parking lot, or other paved area.

CUSTOMER – Shall mean a property owner, resident, or member of the municipal service area that is afforded the use or the availability of utility services from the City of Longmont.

DESIGN ENGINEER / ENGINEER OF RECORD – Shall refer to the engineering firm or Professional Engineer responsible for the design, plans, specifications, and the field surveys of a specific project.

DESIGN PROFESSIONAL – Shall refer to the person or firm responsible for the design, plans, specifications, and field surveys of a specific project.

DEVELOPER – Shall mean any person, firm, partnership, joint venture, limited liability company, association, corporation, or other entity, who participates as owner, promoter, sales agent, or a similar role, in the planning, platting, development, promotion, sale, or lease of a subdivision or development.

DEVELOPMENT PROJECT – Any manmade change to improved or unimproved real estate, including but not limited to: the alteration, construction, reconstruction, conversion, or enlargement of any structure; any change in use of a property, building, or structure; and any mining, dredging, filling, grading, paving, excavating, or drilling operation. The term "development" shall include the act of subdivision, unless otherwise expressly excluded.

DEVELOPMENT CODE – Title 15, City Code, entitled "Land Development Code."

DEVELOPMENT REVIEW COMMITTEE (DRC) – A committee responsible for staff review of development applications. This committee consists of representatives from: the Planning and Development Services, Fire, Public Works, Parks and Natural Resources, and Longmont Power and Communications departments of the City, along with any other applicable departments.

DEVELOPMENT REVIEW PROCESS – Shall be as outlined in Chapter 15.02, City Code, latest version.

DISTURBED AREA – That area of the land’s surface disturbed by any work or activity upon the property by means including but not limited to: grading; excavating; stockpiling soil, fill, or other materials; clearing; vegetation removal; removal or deposit of any rock, soil, or other materials; or other activities which expose soil. Disturbed area does not include the tillage of land that is zoned for agricultural use.

DRIVEWAY – An improved and maintained way providing vehicular access from the public street to a parking area, to dwellings, or other uses.

DRYLAND GRASS OR VEGETATION – Any live landscaping, including native grass and vegetation, but not including weeds, capable of growing in the local environment without supplementary watering once established.

EARTHWORK – The disturbance of soils on a site associated with clearing, grading, or excavation activities.

EASEMENT – An interest in real property that establishes the right of the easement holder to use the property for certain purposes, such as utilities installation, access, or maintenance. Fee ownership of the underlying land remains with the property owner, not the easement holder.

EROSION – The detachment and movement of soil or rock fragments by water, wind, ice, or gravity.

EROSION CONTROL – Measures that prevent erosion.

EROSION CONTROL SPECIALIST – An individual who has received training and is certified by an organization acceptable to the City Engineer to install, inspect, and maintain erosion and sediment control practices.

EXCEPTION – A deviation from the specific terms of the City Standards.

FINAL STABILIZATION – When all soil disturbing activities at the site have been completed and one of the following two conditions is met:

A. Uniform vegetative cover has been established with a density of at least seventy (70) percent of pre-disturbance levels. Establishment of a vegetative cover capable of providing erosion control equivalent to pre-existing conditions at the site is considered final stabilization; or
B. Equivalent permanent, physical erosion reduction methods have been employed.

FLOODPLAIN DEVELOPMENT PERMIT – A permit that is required before any construction or development can begin within any 100-year floodplain in the City, including the placement of manufactured homes proposed within flood-prone areas. Permits are required to ensure that proposed development projects meet the requirements of the NFIP and the City of Longmont floodplain regulations.

GOVERNING AGENCY – means the applicable governmental agency, including the City of Longmont, the Counties of Boulder or Weld, or the State of Colorado, with authority to inspect and approve construction activities.

GRADING – Rearrangement of the earth's surface by stripping, cutting, filling, or stockpiling of earth or land, including the land in its cut or filled condition, to create new contours or grades.

GRADING PERMIT – See Stormwater Construction Activity Permit.

ILLEGAL DISCHARGE – any discharge to the storm drainage system that is not composed entirely of stormwater or any release of pollutants that potentially discharges to the storm drain system.

INFILL – The development of a parcel of land adjacent to platted lots or developed parcels along at least two-thirds of its perimeter, and where water, sewer, electric, gas, and phone utilities and street access are adjacent to the parcel and other public services and facilities are available nearby.

INFILTRATION – Refers to extraneous flow (excluding sewage) which enters a sewer system: at pipe connections to manholes, through joints in manholes or pipe, at breaks in pipe or joints, or because of corrosion of pipe, poor construction, or ground movement.

INFLOW – Refers to the extraneous flow in sewer systems from sources other than infiltration, such as basement drains, roof drains, manhole covers, etc.

LANDSCAPE ARCHITECT – A registered landscape architect licensed with the State of Colorado, with expertise and qualifications in the areas covering the scope of work.

LANDSCAPE AREA – An area comprising of any combination of living plants, inorganic material such as rocks or stones, and architectural features, including but not limited to fountains, pools, art works, screen walls, fences, street furniture, and ornamental concrete or stonework.

LANDSCAPING – Preserving, rearranging, modifying, or increasing the number of trees, shrubs, grass, and decorative materials, such as fences or walls, on a lot, tract, or parcel of land.

LOCAL STREET SYSTEM – The interconnected network of local and collector streets that provides access to a residential development from an arterial street.

LOW IMPACT DEVELOPMENT (LID) – Systems and practices that use or mimic natural processes that result in infiltration, evapotranspiration, or use of stormwater in order to protect water quality and associated aquatic habitat. LIDs are a comprehensive land-use planning and engineering design approach to managing stormwater runoff with the goal of mimicking the pre-development hydrologic regime. It emphasizes conservation of natural features and use of engineered, on-site, small-scale hydrologic controls that infiltrate, filter, store, evaporate, and detain runoff close to its source. Reference Chapter 14.26, City Code.

MAJOR STRUCTURE – For the purposes of these City Standards, a “major structure” is defined as a bridge or culvert(s) with a total length greater than twenty (20) feet measured along the centerline of the roadway between the inside face of abutments, inside faces of the outermost walls of culverts, or spring lines of arches. Major Structures also include culverts with multiple pipes where the clear distance between the centerlines of the exterior pipes, plus the radius of each of the exterior pipes, is greater than twenty (20) feet.

MINOR STRUCTURE – For the purposes of these specifications, a “minor structure” is defined as a bridge, culvert, or a group of culverts that have a length greater than or equal to four (4) feet and less than or equal to twenty (20) feet measured along the centerline of the roadway between the inside face of abutments, inside faces of the outermost walls of culverts, or spring lines of arches.

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) – A stormwater collection or conveyance system that is owned by a public entity that discharges to waters of the United States. To prevent harmful pollutants from being washed or dumped into MS4s, public entities are required to obtain NPDES permits and develop stormwater management programs (SWMPs) that include pollution prevention measures, treatment or removal techniques, monitoring, use of legal authority, and other appropriate measures to control the quality of stormwater discharged to the storm drains.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORMWATER DISCHARGE PERMIT – As authorized by the Clean Water Act (CWA), the NPDES Permit Program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or manmade ditches.

NATURAL AREA – Any of the following:

A. Streams, rivers, wetlands, and other bodies of water, including their associated riparian areas.
B. Areas characterized by significant stands of mature trees and vegetation.
C. Areas of topography characterized by steep slopes, erosion characteristics, geographic formations, high visibility from off-site locations, or the presence of rock outcroppings.
D. Any area identified as habitat, natural landmarks, or natural areas on the "Map of Wildlife and Plant Habitats, Natural Landmarks, and Natural Areas" included in Boulder County's Comprehensive Plan, as amended.

E. Any land that qualifies as a "wetland" under the Federal Clean Water Act, regardless of whether shown on any city or county map or inventory.
F. Other areas of a similar nature, as determined by the City Manager or designee.

OPERATOR – The individual who is responsible for day-to-day supervision and control of activities occurring at the Construction Site. The operator may be the Owner, Developer, Contractor, or an agent of one of these parties.

OWNER or PROPERTY OWNER – The owner or titleholder of any fee or possessory interest in property subject to the requirements of the development code, or any agent, representative, person, Developer, or entity duly authorized by the owner or titleholder to act on their behalf.

PARK – Land area owned by the City that is developed and maintained for active or passive recreational use and is open for the general public's use and enjoyment. A "park" may include, by way of example only: greenways, water features, picnic areas, natural areas, public playfields, public courts, and other recreation facilities.

PEDESTRIAN BRIDGE – A structure designed and constructed to provide means for pedestrian and light vehicle traffic to cross an obstacle such as a river, stream, ditch, road, railway, etc. The minimum span width over the obstacle shall measure at least five (5) feet.

PERMANENT STORMWATER CONTROL MEASURE – Long term techniques, processes, activities, structures, or treatment devices that, when used singly or in combination, prevent or reduce the pollutant content of a stormwater discharge.

PLANNER– Shall mean the City Planning and Development Services Director, or designated representative.

POLLUTANT – Any substance that is harmful to humans, animals, public health, the environment, or that can degrade the quality of receiving waters, cause the receiving waters to violate the stream standards established by the State of Colorado, or affect beneficial uses of water. The term includes, but is not limited to: sediment, dredged spoil, rock, sand, silt, incinerator residue or ash; solid waste; sewage; wastes from industrial, commercial, domestic, or agricultural sources; trash, litter, garbage, or food waste; landscaping materials, lawn clippings, leaves, branches or other landscaping and yard debris; medical waste; wrecked or discarded equipment; radioactive materials; wastes that contain bacteria, viruses, and other pathogens that pose a threat to human health; pet wastes; heat, surfactants, soaps, and cleaning products, wastes, and residues from washing operations, including those that are biodegradable; oil and grease, petroleum hydrocarbons and antifreeze; metals; and toxic or hazardous wastes as defined by Federal, State, or Local laws and regulations, including biocides and pesticides.

POLLUTION – The presence in waters of the State of any substances, contaminants, or manmade or man-induced impairment of waters or alteration of the chemical, physical, biological, or radiological integrity of water in quantities or at levels which are, or may be, potentially harmful or injurious to human health or welfare, animal or plant life, or property or which unreasonably interfere with the enjoyment of life or property, including outdoor recreation, unless authorized by applicable law.

PRIMARY GREENWAY – A public right-of-way consisting of linear strips of land adjacent to creeks, rivers, ponds, lakes, reservoirs, ditches, or roadways used for stormwater drainage, passive and scenic open

space and park purposes, and self-propelled transportation modes. Greenways provide connections between community and residential areas as described and designated by Envision Longmont.

PROFESSIONAL ENGINEER – A registered engineer licensed with the State of Colorado, with expertise and qualifications in the areas covering the scope of work.

PUBLIC IMPROVEMENT – Any facility that is within City rights-of-way, on City property, or otherwise maintained by the City after final acceptance including but not limited to: streets, alleys, sidewalks, primary greenways, parks, water and sewer lines, electric facilities, storm drainage facilities, arterial rights-of-way landscaping, and concrete trails.

PUBLIC IMPROVEMENT AGREEMENT (PIA) – An agreement executed by the City and an applicant during the Development Review Process guaranteeing the installation of, and participation in, specific public improvements. Financial security for the public improvements shall be submitted as required by Code. A Public Improvement Agreement is generally required before recording a Final Subdivision Plat or Final Plan.

RECORD DRAWING - A record drawing is the final, compiled drawing prepared by a design professional after construction is complete. These drawings demonstrate the on-site changes that the Contractor identified through field survey and red-line drawings. They are drawn and compiled as a 'design professional approved' set of on-site changes made specifically for the Owner.

RECEIVING WATER – Any water of the State of Colorado. These include any and all surface waters that are contained in, flow in, or flow through the State of Colorado. This definition includes all watercourses, even if they are usually dry, and irrigation ditches that receive municipal stormwater. It also includes storm sewer systems owned by other entities.

RIGHT(S)-OF-WAY – A strip of land for public purposes, including but not limited to: utilities, streets, pedestrian walkways, bicycle paths, and alleys.

RIPARIAN AREA – The land areas adjacent to a stream corridor, wetlands, or other body of water that contain vegetation, habitats, and ecosystems associated with bodies of water or dependent on the flow of water in the adjacent stream, wetlands, or other water body. A riparian area will vary in width depending on the particular stream, wetlands, or other body of water.

SANITARY SEWER – Refers to a sewer that carries wastewater from residential, industrial, and commercial facilities to the sewage treatment plant.

SECONDARY GREENWAY – Public rights-of-way consisting of an eight (8) foot wide pathway designed to provide open space connections between living areas, parks, schools, and primary greenways.

SEDIMENT – Soil (or mud) that has been disturbed or eroded and transported naturally by water, wind, or gravity, or mechanically by any person.

SERVICE CONNECTION – Privately-owned extensions from individual properties to the public electric, water, or wastewater facilities.

SIDEPATHS – Sidepaths are detached or attached paths that are a minimum of eight (8) feet wide to facilitate shared use by pedestrians and bicyclists.

SIDEWALK – Portion of a street between the curb line (or lateral line of the roadway) and the adjacent property line that are intended for pedestrian use.

SIGHT DISTANCE TRIANGLE – A triangular-shaped portion of land established at street intersections and street or driveway intersections in which nothing is erected, planted, or allowed to grow in such a manner as to limit or obstruct the sight distance of persons entering or leaving the intersections. Specifications for required sight distance triangles are found in Section 200 of these City Standards.

SITE PLAN – A specific development plan for a lot, use, or building specifying how the entire site will be developed. Final plans include, but are not limited to: building envelopes, uses, densities, open space, parking or circulation, access, drainage, building area, landscaping, and signs. Approval of a site plan means a proposed development complies with the standards and provisions of the Development Code and, consequently, the City may issue a building or grading permit to an applicant, assuming all other City Standards and regulations have been satisfied.

SLOPE – The ratio of horizontal distance (run) proportional to vertical distance (rise or drop) of a slope, such as a 4H:1V slope having a run of four (4) horizontal feet for every one (1) foot of rise.

STATE SPECIFICATIONS – Shall refer to the latest edition of the State Department of Transportation, Division of Highways, State of Colorado – Standard Specifications for Road and Bridge Construction.

STORMWATER – Any surface flow, runoff, and/or drainage consisting entirely of water resulting from any form of natural precipitation.

STORMWATER CONSTRUCTION ACTIVITY PERMIT (SCAP) – A permit allowing the discharge of stormwater from a construction site to the City's municipal MS4. This permit supports compliance with the MS4 permit and is required per Section 14.26, City Code.

STORMWATER CONTROL MEASURES (OR BMPS) – Any program, technology, process, siting criteria, operating method, measure, or device that controls, prevents, removes, or reduces pollution. Stormwater control measures include schedules of activities, prohibitions of practices, pollution prevention, educational practices, maintenance procedures and facilities, procedures, techniques, or practices to prevent or reduce the discharge of pollutants directly or indirectly to stormwater, receiving waters or stormwater conveyance systems. Stormwater control measures also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, wastewater or sludge disposal, or drainage from materials storage.

STORMWATER POLLUTION CONTROL PLAN – A set of plans prepared by or under the direction of a Professional Engineer that indicates the specific measures and sequencing to be used to control sediment and erosion on a development site during construction activity. Different types of stormwater pollution control plans include the State-required Stormwater Management Plan (SWMP) and the City-required Stormwater Pollution Control (SPC) Drawings submitted in support of the Stormwater Construction Activity Permit (SCAP).

STREAM OR RIVER CORRIDOR – The corridor defined by the ordinary high-water mark of a river or stream, plus associated riparian areas.

STREET – A public way dedicated for purposes of vehicular travel, including all area within rights-of-way. The street classifications for roadway design are as follows and as defined in the Multimodal Transportation Implementation Plan (MTIP):

A. Regional/Principal Arterials –These types of roads have the functional priority to provide mobility and access, as well as interconnectivity and continuity, within regions and metro areas. Principal arterials should be constructed with, or have the provision to include, four (4) or more through lanes. Principal arterials shall include bike lanes and bike paths.

B. Minor Arterials/Collectors – These types of roads have the functional priority to provide interconnections and continuity between or within neighborhoods. Minor arterials should be constructed with, or have the provision to include, two (2) to four (4) through lanes and one bi-directional center turn lane. They shall include eight (8) foot sidepaths and on-street bike lanes.

C. Local Streets – These types of roads have the functional priority to provide access and limited mobility. No continuity is required. They should be designed to include two (2) travel lanes, bicycle vehicle mixed traffic, parking lanes, and five (5) foot detached sidewalks.

TRANSPORTATION PLANNING – Focuses on the long-range planning issues for surface transportation in the City including pedestrian, bicycle, public transit, and future roadway planning. The primary guiding documents for transportation planning are listed below as part of Envision Longmont and the associated Multimodal Transportation Implementation Plan (MTIP) adopted together in 2016 and found on the City's website.

A. Arterial and Collector Street Master Plan – Envision Longmont Multimodal and Comprehensive Plan (2016) identifies planned Arterial and Collector streets.

B. Enhanced Multi-Use Corridor Plan – The Enhanced Multi-Use Corridor (EMUC) Plan identifies a set of corridors falling under this category and desirable design features. Developments within and or adjacent to the EMUC's route framework will be required to meet the Longmont Enhanced Multi-Use Corridor Plan and these City Standards.

C. Transportation Mobility Plan – The Longmont Transportation Mobility Plan (TMP) sets a vision for a connected, multimodal transportation system that meets Longmont's evolving needs.

TESTING AGENCY – Any individual, partnership, or corporation qualified and licensed to perform the required sampling, analysis, testing, and report-writing services.

TRAFFIC ENGINEER – Shall mean the Transportation Engineer or assigned designee with the Public Works Department.

TREATED WATER – Water processed by the City of Longmont Municipal Water Utility.

TREATMENT FACILITIES – Any plant, equipment, or other works used for the purpose of treating, separating, or stabilizing any substances found in water.

UNDERDRAIN COLLECTION SYSTEM – A privately-owned pipe system installed to collect the groundwater from building perimeter underdrains or area underdrains and carry the groundwater to a point of discharge on the surface, into a storm sewer, or into a drainage channel.

UNTREATED WATER – Water not processed by the City of Longmont Municipal Water Utility.

UTILITIES – Shall mean all infrastructure that provides services including but not limited to: water lines, sanitary sewer lines, drainage lines, electric lines, gas lines, and telecommunication lines.

WASTEWATER – Shall mean the water-carried and liquid wastes from dwellings, commercial buildings, institutions, and industrial facilities discharged to the Public Owned Treatment Works (POTW) and sewer system.

WATERCOURSE – A natural or artificial channel through which water can flow.

WATERS OF THE STATE OF COLORADO (WATERS OF THE STATE) – Refer to the Colorado Revised Statutes as amended.

WATERS OF THE UNITED STATES – Refer to the Clean Water Act and current definition from the Environmental Protection Agency.

VARIANCE – A deviation or exception from the specific terms of Title 15 of the Longmont Development Code.

VOLUME-TO-CAPACITY RATIO (V/C) – A measure of the operating capacity of a roadway or intersection in terms of the number of vehicles passing through divided by the number of vehicles that theoretically could pass through when the intersection or roadway is operating at its designed capacity. A V/C ratio of 1.0 means the roadway or intersection is operating at capacity; if the V/C ratio is less than 1.0, the traffic facility has additional capacity.

WELL – An oil-and-gas well or an injection well.

WELL SITE – The surface area of a proposed or existing well and its pumping systems.

WETLANDS – An area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

102.00 USE OF STANDARDS

102.01 GENERAL QUALIFICATIONS

A. The provisions of these City Standards apply to the construction, enlargement, alteration, removal, relocation, repair, trenching, restoration, and any other similar activity related to any public improvements, infrastructure, or common facilities regulated herein.

B. It is the intent of the City Standards to require a functionally complete project to be constructed in accordance with these City Standards. Any work, materials, or equipment that may reasonably be inferred as being required to produce the intended result shall be provided whether or not specifically called for. When words, that have a well-known technical or trade meaning in the development, construction, utility, and infrastructure realm are used to described work, materials, or equipment, such words shall be interpreted in accordance with that meaning. If there is confusion in the interpretation of a particular word or phrase, the City Engineer shall have the discretion to resolve the confusion.

102.02 USING THESE STANDARDS

A. These City Standards are to be used when designing and constructing all public improvements and infrastructure within the City and all City-owned public improvements and infrastructure outside of the City. For the purposes of these City Standards, public improvements and infrastructure includes, but are not limited to: streets, sidewalks, trails, sidepaths, curb and gutter, curb cuts, landscaping, water mains, fire hydrants, water services and meters, wastewater mains and services, manholes, stormwater mains, inlets, drainage swales and channels, and other improvements intended for public purposes or for the benefit of the community located within dedicated public rights-of-way and public easements.

B. These City Standards also provide design and construction requirements to be used when developing private lands that have an impact on public improvements, public rights-of-way, and/or public easements. The required private improvements associated with property development include, but are not limited to: landscape and irrigation standards per City Code, traffic mitigation, site access and driveway design, stormwater site drainage and detention facility improvements, water quality, and erosion control measures.

C. In addition, these City Standards provide design and construction requirements to be used when developing in the areas subject to flooding within the City's jurisdiction.

D. Reference to standard specifications, manuals, or codes of any technical society, organization, or association or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code, laws, or regulations in effect at the time of City approval. However, no provision of any referenced standard specification, manual, or code shall be effective to change the duties and responsibilities of the City or any of their consultants, agents, or employees. Work shall be done in compliance with the approved plans and to the satisfaction of the City.

E. Changes to approved plans based on standard specifications, manuals, or codes of any technical society, organization, or association or to the laws or regulations of any governmental authority, whether references be specific or by implication, may be needed if a later revision of such standards will immediately affect public safety, health, or welfare.

102.03 PUBLIC IMPROVEMENT DESIGN

A. These City Standards prescribe minimum requirements and specifications for designing adequate and functional public improvements. However, the design of public improvements also depends on the land use zoning and comprehensive planning requirements for the City, as well as the specific site geography of the land to be improved or developed.

B. The City review for approval of submitted design plans for public improvements occurs as part of the Development Review Process which distributes design applications to staff in multiple departments, divisions, and agencies. The City development review staff has the primary responsibility for the review and approval of construction plans for public improvements.

102.04 DESIGN APPROVALS

A. An applicant seeking approval to construct public improvements in the City shall develop engineering designs and construction plans that comply with the design and construction standards provided in these City Standards. To comply with these City Standards, an applicant will need to file the necessary applications and meet the requirements of the City's land use regulations, permit standards, fee assessments, and other relevant City requirements.

B. An applicant seeking construction approval will need to consult floodplain mapping, local master plans, and locate existing public and private infrastructure to develop specific project designs.

C. In order to develop project designs that comply with these City Standards, an applicant for construction approval will need to enlist the services of a Design Professional which may include but is not limited to a Professional Engineer and a Professional Land Surveyor to meet the requirements for certifying acceptable designs for public improvements.

102.05 PROJECT RESPONSIBILITY

Plans shall be signed and sealed by a Design Professional where required by these City Standards, applicable laws and regulations, or as part of the DRC process. The Design Professional shall be responsible for all plans and specifications. Approval by the City Engineer shall in no way relieve the Design Professional of the responsibility for errors or omissions in design, plans, specifications, or field surveys. Any errors shall be corrected by the Design Professional to the satisfaction of the City Engineer at no cost or expense to the City. Where required, plans shall be signed and sealed by a registered Professional Engineer licensed in the State of Colorado. Landscape plans shall be stamped by a registered Landscape Architect licensed in the State of Colorado.

102.06 STANDARDS

A. Utility Trenching: The trenching standards prescribed in City Standards Section 100 under "Utility Trenching" outline the excavation and backfill process required for installation of utilities, pipelines, manholes, vaults, diversion structures and other appurtenances.

B. Transportation Improvements: The transportation standards prescribed in City Standards Section 200 "Transportation" provide for the study, design, and construction of site accesses, streets, sidepaths, sidewalks, bicycle facilities, and trails.

C. Storm Drainage Improvements: The stormwater standards prescribed in City Standards Section 100, "Utility Trenching", City Standards Section 300 "Storm Drainage", the Longmont Storm Drainage Criteria Manual, and Mile High Flood District Volumes 1, 2, and 3 provide for the study, design, and construction of

stormwater drainage and flood management improvements. Detention facilities, storm sewer and drainageway systems, water quality, and erosion control measures may be required as part of construction approval to mitigate the impacts of increased runoff resulting from land development.

D. Wastewater Collection: The utility standards prescribed in City Standards Section 100, “Utility Trenching” and City Standards Section 400 “Wastewater Collection Design” provide for the study, design, and construction of sanitary sewer collection facilities. These City Standards detail required forecasting for sizing wastewater collection mains, specific construction requirements for ensuring public health standards, and requirements for installing sanitary sewer service lines.

E. Water Distribution: The utility standards prescribed in City Standards Section 100, “Utility Trenching” and City Standards Section 500 “Water Distribution Design” provide for the study, design, and construction of water distribution facilities. These City Standards detail required forecasting for sizing water distribution mains, specific construction requirements for ensuring public health standards, and requirements for installing domestic water service lines.

F. Landscape and Irrigation: The standards prescribed in City Standards Section 200 “Transportation” and City Standards Section 600 “Landscape & Irrigation” provide for the selection, design, placement, and protection of trees, landscaping, and irrigation along all City owned and/or maintained areas including public street rights-of-way, primary and secondary greenways, park sites, and other areas as addressed in the City Code or identified in the landscape and irrigation plan notes and checklists of these City Standards.

G. Longmont Power & Communications: The power and communications standards prescribed in City Standards Section 700 “Longmont Power & Communications” provide for the selection, design, and placement of electric and broadband service utilities.

H. Urban Neighborhood Design Section: The Urban Neighborhood Design Section’s standards prescribed in City Standards Section 800 “Urban Neighborhood Design Section” provide for the selection, design, and placement of infrastructure when the property meets the criteria outlined in Section 800.1 “Purpose”.

103.00 PLAN REVIEW AND SUBMITTAL PROCESS

103.01 INTRODUCTION

A. The procedures outlined in the following sections are guidance for any design submittals requiring the construction of public improvements. All public improvements constructed within the City shall be designed in conformance with these City Standards. These standards and specifications apply to all improvements as stated Section 15.07.010, City Code.

B. The City's review and approval will only determine if the plans, specifications, and construction conform to the City's requirements. The City's approval shall be in writing. The City's review and approval will not relieve the Design Professional and Contractor from responsibility for any disparity from City requirements or adequate design standards. The City's review and approval shall not constitute any assumption on the City's part of responsibility or liability for the design or construction, or otherwise.

C. All plans, specifications, and calculations submitted to the City for review shall be prepared by, or under the direct supervision of a Professional Engineer duly registered and licensed to practice engineering in the State of Colorado. The Professional Engineer shall sign and certify all plans, specifications, and calculations and shall include the Professional Engineer's registration number and seal.

103.02 PLAN REVIEW

A. The City utilizes a Development Review Committee (DRC) to provide a coordinated and integrated Planning, Public Safety, and Engineering staff review of development submittals. The Engineering development review staff has the primary responsibility for the review and approval of construction plans for Development Projects.

B. These City Standards apply to submittals for Capital Improvement Projects, Annexations, Final Subdivision Plats, Site Plans, Public Improvements Plans (PIPs), Stormwater Pollution Control Plans, Permanent Stormwater Control Plans, and all other development applications listed in Chapter 15.02, City Code. Additional guidance on the land development processes and the associated application forms can be found on both the City website and Title 15, City Code.

C. The requirement for Public Improvement Plans (PIPs) depends on the complexity of the public improvements required for a site to develop. Approval of PIPs is required prior to the Final Subdivision Plat being recorded. Any development submittal that meets the requirements of Section 15.02.110, City Code, will require a Public Improvement Agreement (PIA). The PIA identifies public improvements that are required to be constructed, stipulates the timing of improvements, warranties, and provides the requisite assurance that the public improvements shall be constructed to these City Standards.

103.03 SUBMITTAL PROCEDURE & REQUIREMENTS

A. Submittal procedures shall conform to Titles 15 and 20, City Code, these City Standards, and other project specific requirements in accordance with the appropriate City Divisions or Departments.

B. Design submittals are required to be submitted as electronic files to the City for review, including but not limited to Annexations, Capital Improvement Projects, Engineering Design Submittals & Reports, Master Utility Plans, Final Subdivision Plats, Public Improvement Plans, and Final Site Plans. All drawings are to be spatially correct, to allow information to be transferred to the City's geographic information system (GIS).

C. The electronic drawing file(s) shall be in a (.dxf), (.dwg) or (.dgn) drawing format and a PDF format submitted to longmont.planning@longmontcolorado.gov or by other means acceptable to the City Engineer. The file shall be an overview of the entire project at a minimum.

103.04 CONSTRUCTION PLAN GENERAL PROVISIONS

A. All construction plans will be checked for conformance to the City Standards prior to acceptance and shall be submitted to the City for review via electronic submission. All sheets shall be drawn to scale including plan sheets, profile sheets, and detail sheets. The only exceptions allowed will be for City Standard details; however, they shall be placed on the drawings without modification.

B. Checklists that outline design requirements are provided in appendices to assist in the preparation of construction plans to be submitted to the City for review, including but not limited to ALTA Surveys, Public Improvements Plans (PIPs), Stormwater Pollution Control Plans, Permanent Stormwater Control Plans, Floodplain Impact Analysis, FEMA submittals, and Record Drawings. The checklists shall be considered the minimum information required for plan preparation; however, the City Engineer may waive some of the requirements outlined in the checklist based on the complexity of the project. Construction plans shall include all the necessary information required for the construction of all public improvements.

103.05 SURVEY REQUIREMENTS

A. Construction plans shall be designed in such a manner that conforms to the City's geographic coordinate system. Plans shall state whether coordinates are measured from the surface of the earth (ground measurements) or are based on the spatial data's coordinate system (grid measurements) and provide a scaling factor for conversion. Street center lines, property lines, and all other infrastructure shall utilize the City's geographic coordinate system for all aspects of the design.

B. All Land Survey Plats and Improvement Survey Plats submitted for project applications shall comply with the Colorado Revised Statutes and the Bylaws and Rules of the State Board of Licensure for Architects, Professional Engineers, and Professional Land Surveyors. Upon submittal of an Annexation Map, Preliminary Subdivision Plat, and/or Final Subdivision Plat, the Professional Land Surveyor shall include a location and a written description of coordinate values for monumentation on the Plat. At least two control points shall be labeled on the Plat using the state plane coordinate values. The two control points shall be section corners or 1/4 section corners.

C. The primary and secondary control points and other GIS land points, which may be used as initial starting values, are provided free through the Boulder County website. However, the information being provided by Boulder County does include a disclaimer, and as such Boulder County accepts no liability for the accuracy of data points. Please note that the GIS land points cannot be used for determining legal boundaries. The primary and secondary control point data can be found at the Boulder County Government website.

D. All topographic mapping, including contours and construction drawings, shall be based on the NAVD 1988 vertical survey datum (replaces NGVD 1929). The City shall neither accept any other datum nor shall an adjustment from some other datum to NAVD 88 be acceptable. Contours are required to be shown on plans a minimum fifty (50) feet beyond the project construction extents to adequately depict off-site drainage basins. Survey for floodplain modeling and mapping shall be a minimum of one hundred (100) feet beyond the property boundaries to adequately tie into existing mapping and to define off-site impacts.

E. The basis of bearing of the proposed development shall be in the Colorado State Plane Coordinate System, based on the 1992 HARN adjustment of the 1982 North American Datum (HPGN NAD 83/92).

F. Units of measurement shall be defined in U.S. Survey foot.

G. A Closure Report shall be submitted to the City with any Plat or easement drawing.

103.06 UTILITY LOCATION REQUIREMENTS FOR DESIGN

A. Architects, engineers, or other persons designing excavation shall follow the requirements of C.R.S. § 9-1.5-101 et seq. (referred to herein as the "Underground Utility Location Law"), except as more specifically identified herein.

B. Projects that meet all of the following criteria (subsurface utility engineering-required projects) are required to meet a minimum Quality Level B for design utility locations as identified in the subsurface utility engineering (SUE) standard ASCE 38:
   (1) Project involves a construction contract with a public entity;
   (2) Project involves primarily horizontal construction and does not involve the construction of buildings;
   (3) The Project:
      a. Has an anticipated excavation footprint that exceeds two (2) feet in depth and is a contiguous 1000 square feet (excluding fencing and signing projects); OR
      b. Involves utility boring.
   (4) The project requires the design services of a licensed professional engineer.

C. For all projects that fall under SUE, the following requirements shall be initiated as part of the project design:
   (1) A thorough subsurface utility engineering investigation that takes the results of comprehensive geophysical searches for known and unknown utilities and integrates the results of the geophysics with existing records and physical evidence in a risk-based depiction;
   (2) Test holes where needed for utility locations;
   (3) Utility location data that is transmitted to the Design Engineer in order to make informed design decisions and the Quality Level of each utility is marked on the plan set; and
   (4) All of the utility investigation shall take place under the direct responsible charge of a licensed Professional Engineer with training and a working knowledge of surface geophysics, engineering surveying, utility construction and design principles, utility conflict identification resolution, and utility risks as they pertain to the project.

D. The City Engineer may determine the same level of underground investigation is required even if all criteria listed above are not met, dependent on the existing site conditions. Please reference Section 109 "Utility Trenching" of these City Standards for specific information regarding utility installation requirements.

103.07 ENGINEERING DESIGN SUBMITTALS

(1) All engineering design submittals including reports and comprehensive plans shall include on the title page:
   a. The type of document (conceptual, preliminary, or final);
   b. The project name;
   c. The preparer's name, date, and firm

(2) All engineering design submittals including reports and comprehensive plans shall include on the title page:
   a. The type of document (conceptual, preliminary, or final);
   b. The project name;
   c. The preparer's name, date, and firm
   d. P.E. seal of preparer.

(3) The City Engineer may require one or all of the design reports listed in this section, depending on the circumstances of the project. These documents shall be submitted with initial submittal for review.

(4) All final reports shall be submitted as electronic documents.

(5) Reports shall be prepared (or supervised), signed, and stamped by a Professional Engineer and shall contain a certification sheet with the report statement and appropriate signatures per the requirements for each type of report located in the Appendices.

(6) Unless otherwise approved by the City Engineer, the report shall be dated within one (1) year of the plan submittal date.

A. Drainage report

(1) A drainage report shall be submitted to the City for review and approval prior to construction on any project or development. The drainage report shall comply with the requirements outlined in the Longmont Storm Drainage Criteria Manual and the City Standards Section 300 "Storm Sewer" and shall follow the Drainage Report Checklist included in the Appendices. All applicable elements in the checklist for each report shall be included or the study may be deemed incomplete prior to review.

(2) There are four levels of drainage reports that may be required during the review process, depending on the size and complexity of the project: drainage letter or technical memorandum, conceptual drainage report, preliminary drainage report, and/or a final drainage report. The level of report shall be determined by the City Engineer prior to the initial project submittal.

(3) The drainage report shall be a stand-alone document. When references are made to, or assumptions based on, previously submitted studies or reports, the drainage report shall include the appropriate excerpts, pages, tables, and maps containing the referenced information. Assumptions made in previous reports shall be verified and substantiated with each new report.

B. GEOTECHNICAL (SOILS) ENGINEERING REPORT

A geotechnical report shall be submitted to the City for review and approval prior to construction related to the installation of any public improvements. The geotechnical material design specifications shall comply with the requirements outlined in the City Standards Section 200 "Transportation". A checklist is provided in the Appendices to assist in the preparation of the report to be submitted to the City for review.

C. PAVEMENT REPORT

A pavement report shall be submitted to the City for review and approval for all proposed pavement within public rights-of-way or easements. The pavement design shall comply with the requirements outlined in City Standards Section 200 "Transportation". A checklist is provided in the Appendices to assist in the preparation of the report to be submitted to the City for review.

D. LONGMONT POWER & COMMUNICATIONS PROJECT INFORMATION

A PDF of an electrical one-line diagram, a CAD file including the site, utilities, landscape, and irrigation that identifies transformer locations, and an Electric Service Request Form shall be provided with the initial submittal of construction documents to the City for review by Longmont Power & Communications. The submittal will initiate the electric utility design by Longmont Power &

Communications. Further information on LPC submittal requirements can be found in the Appendices as well as City Standards Section 700 “Longmont Power & Communications”.

E. TRANSPORTATION IMPACT STUDY

Transportation Impact Studies are required in order to adequately assess the impacts of a development proposal on the existing and/or planned street systems. Unless waived by the City, a written Transportation Impact Study signed and sealed by the responsible Professional Engineer shall be required for all development proposals when trip generation is expected to exceed fifty (50) vehicles during the peak hour or five hundred (500) Average Daily Traffic (ADT) based on the traffic generation estimates of the current Institute of Transportation Engineers Trip Generation manual or in the case where a localized safety or capacity deficiency exists, as determined by the City Engineer. The Transportation Impact Study shall include at a minimum the proposed land use, trip distribution, traffic project years, intersections requiring analysis, signal timing assumptions, and background traffic assumptions and may require additional information, as determined by the City Engineer. The Transportation Impact Study shall comply with the checklist included in the Appendices.

F. WATER AND WASTEWATER PROJECT INFORMATION REPORT

On commercial, industrial, or mixed-use developments over five (5) acres, residential developments over fifty (50) acres, or areas of limited capacity, the City Engineer may request a project information report be submitted with the preliminary construction plans to analyze the ability to provide water and wastewater services to the proposed site. A checklist is provided in the Appendices to assist in the preparation of the report to be submitted to the City for review.

G. UNDERDRAIN REPORT

An underdrain report will be required for all projects or developments where an underdrain collection system or area underdrain is required to be installed per the recommendations made in the geotechnical engineering report. The purpose of the underdrain report is to identify and define solutions to groundwater problems on the site. The underdrain report shall be submitted to the City for review and approval prior to any construction on the project or development. The underdrain report shall comply with the requirements outlined in City Standards Section 303 Underdrains and the Underdrain Report Checklist in the Appendices.

H. FLOODPLAIN IMPACT ANALYSIS REPORT

A floodplain impact analysis (FIA) report shall be required for projects proposed in any 100-year floodplain within the City’s jurisdiction, unless it is a utility boring project that will not impact the floodplain. The FIA shall describe the changes to the floodplain from the proposed project, including filling in a floodplain with no mapped or defined floodway. The FIA report shall be submitted to the City for review and approval prior to approval of the Floodplain Development Permit. The FIA report shall comply with the requirements outlined in City Standards Section 301 Flood Risk Management and the FIA Report Checklist in the Appendices.

103.08 EASEMENTS AND RIGHTS-OF-WAY REQUIREMENTS

The following requirements apply to all sections of these standards.

A. Public utilities are required to be located in public rights-of-way or designated easements. Public utility mains shall be aligned in public rights-of-way per the alignment descriptions for City Standards Sections 300, 400, and 500 for storm sewer, sanitary sewer, and water distribution systems respectively. Reference Detail 100-01 “Placement of Utility Mains within Public ROW”.

B. Easement requirements for one public utility main shall include a minimum width of thirty (30) feet with a twenty (20) foot wide City of Longmont utility easement at the center and five (5) foot wide general utility or LPC easements on either side. Easement requirements for two public utility mains shall include a minimum width of thirty (30) feet with minimum five (5) feet of separation from the outside of each pipe to the easement boundary, ten (10) feet from the outside of each pipe to the outside of the adjacent pipe, and five (5) feet wide general utility or LPC easements on either side of the thirty (30) foot wide easement. Easement requirements for three public utilities shall include a minimum width of forty (40) feet with ten (10) feet of separation from the outside of each pipe to the easement boundary and from the outside of each pipe to the outside of the adjacent pipes. Reference Detail 100-02 "Public Utility Easements on Private Property".

C. Longmont Power & Communications easement information can be found in City Standards Section 700 "Longmont Power & Communications".

D. Maintenance and Access easements may be required in areas where the public sidewalks or sidepaths are adjacent to the edge of the right-of-way to allow for future repair and/or replacement.

E. Easements granted by means of a separate easement agreement shall be governed by the terms of that agreement.

F. Easements dedicated to the City by means of Final Subdivision Plat, according to Section 15.02, City Code, shall be governed by the general Plat Notes as found in Appendix B-1.

103.09 UTILITY LINE SEPARATION AND CROSSINGS

A. HORIZONTAL SEPARATION

Unless otherwise approved by the City Engineer, the following minimum separation or clearance requirements shall apply for all public and private improvements.

(1) A minimum of ten (10) feet separation is required from edge of pipe to edge of pipe for all existing or proposed water mains, sanitary sewer mains, and storm sewer mains. This may be increased due to the depth and size of existing and proposed utilities.

(2) All water mains, sanitary sewer mains, water service lines and sanitary sewer service laterals shall have a minimum of fifteen (15) feet of separation from any existing or proposed structures and/or foundations, except where the service line or lateral enters the building.

(3) A minimum of five (5) feet of separation horizontally from the lip of gutter to the utility is required during the placement of all existing or proposed wet utility lines.

(4) A minimum of five (5) feet radial clearance between any above ground infrastructure and a fire hydrant. No above ground installation shall block the view or accessibility of any fire hydrant.

(5) Horizontal utility crossings: A minimum of five (5) feet of separation between waterlines and sewer infrastructure (manholes, inlets, and appurtenances); exceptions may be considered when the waterline is higher than the elevation of the base of the sewer infrastructure.

(6) If it is not possible to achieve ten (10) feet of separation of the water and sewer service laterals due to the size, location, or other physical restraints of the lot, the lines may be installed in the same trench with the approval of the City Engineer and under the following conditions:

a. The water service shall be installed eighteen (18) inches above the sewer service on a separately excavated shelf of undisturbed soil in the common trench.

b. Cover of 4-1/2 feet shall be maintained as a minimum over the water service.

(7) Clearance from existing electric utility underground lines and vaults shall be three (3) feet when the exact location has been determined by pot holing the infrastructure. Maintain a minimum of three (3) feet of clearance on either side of proposed underground electric distribution facilities.
(8) Maintain a minimum of three (3) feet clearance between above ground infrastructure and the sides and back of any above ground electric distribution facilities and a minimum of ten (10) feet in front of doors or openings.
(9) Maintain ten (10) feet of clearance from overhead electric lines and ten (10) feet from poles and anchors. If this is not feasible, or conditions warrant additional protection or pole stabilization, the Contractor shall contact Longmont Power & Communications.
(10) Open trenches shall not be within a 1H:1V slope area of pavement, curbs, gutter, or sidewalks. Any pavement, curbs, gutters, or sidewalks that are undermined by excavation shall be removed and replaced.

B. VERTICAL SEPARATION AND CROSSINGS

In the event that a water main, sanitary sewer main, or storm sewer main cross each other, the following requirements apply:

(1) Water main crossings shall have an eighteen (18) inch vertical separation, minimum, from outside wall to outside wall with the sewer main being crossed.
(2) Where a sanitary sewer main or storm sewer main crosses a water line and the sewer main is above the water main or less than eighteen (18) inches clear distance vertically below the water main, then the water main shall be a full length of DIP or PVC pipe and centered on the sewer main crossing. Refer to pipe crossing support pad and utility crossing details.
(3) If the crossing is a sewer main made of concrete or vitrified clay pipe, it shall be replaced with a twenty (20) foot length of SDR-35 PVC pipe centered on the water main. Watertight transition couplings shall be used to join the PVC pipe to the existing sewer pipe. The transition couplings shall be solid sleeve and have an interior and exterior fusion bonded epoxy coating, stainless hardware and be externally wrapped with ten (10) mil thick polyethylene. Other requirements may be imposed by the City Engineer on a case-by-case basis.
(4) In all cases, bedding material or other approved structural protection shall be provided to preclude settling and/or failure of the higher pipe.
(5) Separation of sanitary sewer mains and storm sewer mains will be reviewed on a case-by-case basis.
(6) A minimum of eighteen (18) inches of vertical separation shall be maintained for lateral crossings of electric distribution facilities. Dry utilities with vertical separation less than eighteen (18) inches will be reviewed on a case-by-case basis, depending on the circumstances of the project.

C. LANDSCAPE REQUIREMENTS

(1) Trees shall be located a minimum of ten (10) feet away from all underground utilities measured from the edge of utility pipe. Shrubs shall be located a minimum of five (5) feet away from all utility infrastructure, including above ground appurtenances.
(2) No trees, shrubs, ground cover, boulders, berms, fences, or other improvements exceeding thirty-six (36) inches in height, measured from surface of travel lane adjacent to planting area, shall be planted within the site distance triangle or within six (6) feet of a vehicle travel lane.
(3) Trees shall be planted in the center of the tree lawn area between edge of sidewalk and back of curb when space is less than twelve (12) feet wide. No trees are to be planted in areas narrower than eight (8) feet in width without approval from the City Forester and an approved Exception from the City Engineer, unless otherwise allowed in the City Standards.

(4) There shall be a minimum distance of eight (8) feet between trees and adjacent vertical surfaces and structures unless an exception is obtained. Trees shall be spaced to accommodate the full canopy of the mature tree and proper root zone. Reference City Standards Section 605 for more information.

(5) Minor trimming and branch removal for street trees shall be performed to maintain a minimum clearance of fifteen (15) feet above roadways or eight (8) feet above sidewalks and sidepaths.

(6) For required clearances between landscaping and existing or proposed electrical cabinets, vaults or other infrastructure, refer to City Standards Section 700 Longmont Power and Communications for more information. Electrical facility clearance restrictions are as follows:

a. Residential metering pedestal or pit: six (6) inch maximum height within four (4) feet of the window (meter) side of the cabinet and forty (40) inches maximum height within two (2) feet elsewhere.
b. Climbing vines shall not be located adjacent to electric facility poles.
c. Electrical Vaults: no landscape material on top of the vault; vegetation shall have six (6) inch maximum height within four (4) feet of the vault.
d. Pad mount switchgear and cabinets: sod, cobble, mulch, or other low growing shrubs or groundcover only within ten (10) feet of the unit doors.
e. Residential pad mount transformers: no tree canopy over the transformer, landscape material on top of the pad, or in front of the transformer (street side) shall be used.

104.00 CONSTRUCTION

104.01 GENERAL INFORMATION

A. An approved set of plans and specifications shall be on file with the City prior to the Contractor beginning construction on a project. All applicable contracts, bonds, insurance, permits, and licenses shall be fully executed by the Contractor and all applicable parties before beginning work. Contractor shall have a copy of these City Standards on site at all times during construction.

B. The Contractor shall obtain written approval from any private property owner prior to commencing work on private property and provide this to the City.

104.02 COMMENCEMENT OF CONSTRUCTION

A. Construction shall commence within one (1) year of the approved date shown on the plans, or plans shall be resubmitted for review and approval. If construction is halted for more than one (1) year (12 consecutive months), plans shall be resubmitted to the City for review and approval. Modifications to the design may be required to bring the improvements up to current standards.

B. If construction does not commence within six (6) months of the approved date shown on the plans, Longmont Power & Communications reserves the right to modify the design or fees to reflect changes in standards or costs.

C. All improvements shall be accurately surveyed and staked in accordance with the approved plans prior to their construction. The Contractor shall be responsible for the preservation of all such staking and any necessary re-staking.

104.03 PRE-CONSTRUCTION MEETING

A. The Contractor shall be required to schedule a Pre-Construction Meeting to be held at least forty-eight (48) hours prior to the start of any construction. The Pre-Construction Meeting for development projects may not be scheduled until after the PIA has been approved and the City has received final plans. The Contractor, Owner, City Engineer, Design Professional, City Inspector, and all other applicable subcontractors shall be in attendance. At the time of the meeting, it shall be the Contractor's responsibility to assign one contact person to be responsible for coordinating all field changes and communications.

B. The Contractor shall be required to schedule a Pre-Paving Meeting to be held at least forty-eight (48) hours prior to paving. The Contractor, Owner, Soils Engineer, Design Professional, City Engineer, and City Inspector shall be in attendance.

C. The Contractor shall be required to schedule a Landscape and Irrigation Pre-Construction Meeting to be held at least forty-eight (48) hours prior to the start of any construction for these trades for these improvements. The Landscape and Irrigation Contractor, Owner, City Engineer, City Inspector, and all other subcontractors shall be in attendance. At the time of the meeting, it shall be the Contractor's responsibility to assign one contact person to be responsible for coordinating all field changes and communications related to the landscape and irrigation construction if different than the overall project contact.

104.04 PLANS ACCESSIBLE AT CONSTRUCTION SITE

The Contractor shall be required to have a set of plans approved by the City on site at all times during construction. The Contractor is also required to have Stormwater Pollution Control plans, updated to current conditions, on site at all times. The plans shall include any approved revisions and, where applicable, shall be signed and sealed by the Design Professional.

104.05 PERMITS

A. The Contractor shall obtain all necessary permits for construction unless otherwise directed by the City. All permits shall be in accordance with Federal, State, County, City, and other Local requirements. City review and approval of all permits shall be accomplished prior to the start of any construction. Examples of permits that may be required, and locations where initial contact is to be made, are as follows:

PARTIAL LIST OF PERMITS	**CONTACT**
Access Permit	CDOT, City of Longmont Public Works
Air Pollutant Emissions Notice Air Permit	CDPHE
Construction Dewatering Permit	CDPHE
General Purpose: Water Well Permit	Colorado DWR
Floodplain Development Permit	City of Longmont Public Works
Irrigation Ditch Crossings and Improvements	Ditch Company
Infrastructure Permit	City of Longmont Public Works
Permanent Stormwater Control Permit	City of Longmont
Railroad Use of Right of Way	Railroad Company
Railroad Work in Right of Way	Railroad Company
Section 404 Permit	USACE
Stormwater Construction Activity Permit	City of Longmont Public Works
Construction Stormwater Discharge Permits	CDPHE
Temporary Water Use Permit	City of Longmont Water & Waste
Use of Public Places Permit	Planning & Development Services
Utility and Special Use Permit	CDOT
Work in Right-of-Way Permit	City of Longmont Public Works

(1) This list is provided as an aid and shall not be interpreted as a complete list of all permits required. It shall be the responsibility of the Contractor to determine the type of permits required for the specific project. A copy of all permits shall be available for inspection on the job site at all times.

B. All required permit and LPC fees shall be paid in advance, prior to commencement of any construction. No construction work shall be started until the Contractor has obtained all appropriate permit(s) for the project and provided copies to the City.

104.06 STORMWATER QUALITY

A. The Contractor shall protect the environment, including the water quality of watercourses, waterbodies, and wetlands, and the health, safety, and welfare of the public by preventing the discharge of pollutants to the City municipal separate storm sewer system (MS4). Pollution control shall be implemented through regulation and control of public and private activities that are sources of pollutants to the MS4 as mandated under Chapter 14.26, City Code. The regulations in this chapter enable the City to comply with the requirements of the Federal Clean Water Act, the State of Colorado Water Quality Act, and other applicable Federal and State laws.

B. The Contractor is required to obtain City-issued stormwater quality permits per requirements outlined in Chapter 14.26, City Code. In addition, the Contractor is also required to obtain all Colorado Department of Public Health and Environment issued stormwater quality permits per State regulations.

C. As part of all construction activities, it is unlawful to cause materials to be deposited or remain in such a manner or location as to constitute an illegal discharge into the MS4 or Waters of the State. The Contractor shall be required to implement all necessary control measures to prevent any such illegal discharge of pollutants.

104.07 SUSTAINABILITY

A. It shall be the Contractor's responsibility to develop a waste management plan whose aim shall be a minimum fifty (50) percent, by weight, end-of-project rate for salvage/recycling of total waste generated by the Work.
   (1) The Contractor shall aim to recycle, reuse, or donate one hundred (100) percent of all clean concrete, asphalt, wood, metal, and cardboard waste.

104.08 SAFETY AND PROTECTION

A. Contractor shall comply with all applicable Federal, State, and/or local laws and regulations of any public body with jurisdiction. The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Development. Specifically, the Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
   (1) All workers at the construction site and other persons and entities that may be impacted by activities at the project site.
   (2) All buildings, structures, facilities, work, materials, and equipment to be used at or incorporated into the Development.
   (3) Other public property and private property not owned by the Developer/Owner at the site or adjacent thereto not designated for removal, relocation or replacement during construction, including but not limited to: trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and underground facilities.

B. Contractor shall notify owners of adjacent property, underground facilities, utilities, and other similar items, in writing, when progress of the Development work may affect them. The Contractor shall cooperate with these owners in the protection, removal, relocation, and replacement of their property, when needed.

C. All damage, injury, or loss to any property caused directly or indirectly by the Developer/Owner, Contractor, Subcontractor, Supplier, or any of their agents or employees, or any other person or organization directly or indirectly related to the Contractor, shall be the responsibility of the Contractor and shall be remedied by the Contractor within the limitations described in section 104.09 below. The Contractor's duties and responsibilities for the safety and protection of the work site, including everything identified in section 104.08(A) above, shall continue until such time as all the work is completed and accepted by the City.
   (1) If the City Engineer or designee deems a situation unsafe during the pendency of the project, the City Engineer shall notify the Contractor, and the Contractor shall take the necessary steps to correct the situation within the timeframe identified by the City Engineer. In addition, if there is a threat to the health, welfare, or safety of the public, the City may, at the expense of the Contractor, take immediate action to correct any hazardous or other such condition at any time during construction and up until Final Acceptance. Nothing within this provision shall be construed as

relieving the Contractor of responsibility for initiating, maintaining, or supervising all safety precautions and programs in connection with the work.

104.09 RESPONSIBILITY FOR DAMAGE

A. Should any public or private utility or public or private property be damaged during construction operations, the Contractor shall immediately notify the City and the Owner of such utility or private property of such damage and, unless authorized in writing by the Owner of the utility or private property, the Contractor shall not attempt to make repairs, except as otherwise identified herein in specific sections. If so authorized to make repairs, the Contractor shall repair or replace the property, and such replacement shall be of equal or better quality than the original. Any replacement shall meet the requirements of the City Standards. The determination of whether the property was adequately replaced shall be at the City's discretion. If the Contractor is not authorized to make repairs, the City or the property owner may make repairs themselves and bill the cost of such repairs to the Contractor to be reimbursed by the Contractor within a reasonable period of time identified by the City.

B. The City, its officers, agents, or employees, shall not be liable for any injury to persons or property occasioned by reason of the acts or omissions of Owner, Developer, Contractor or any of their agents, employees, contractors, and subcontractors for any activities related to the Development. The Owner, Developer, and/or the Contractor shall indemnify and save harmless the City, its officers, agents, and employees, against any and all claims, demands, causes of action, liabilities or losses of any sort, damages, fines, penalties, attorney fees, and costs arising during or after the term of the Development activities because of or arising from, in whole or in part, any actions or omissions attributable to the Owner, Developer, or Contractor, or their officers, employees, contractors, or agents, in the performance of or in any way associated with the Development, associated improvements, and any parts thereof. Acceptance by the City of the public improvements shall not constitute an assumption by the City of any responsibility for any damage or taking related to the Development.

105.00 CONTROL OF WORK

105.01 CHANGES FROM APPROVED PLANS

The Design Professional shall submit proposed changes to the approved plans, or specifications, related to public improvements to the City Engineer, and, once approved, distribute approved copies to the Contractor, City Inspector and Owner prior to construction. No work shall proceed on that portion of the project being revised until said revisions are submitted, approved, and distributed as required above. The City shall respond promptly and in writing to such requests. Approval of even minor changes from the plans or specifications shall require permission from the City Engineer. This procedure shall be followed for all changes whether requested by the City, the Design Professional, the Contractor, or the Owner. All plan changes shall be reflected on Record Drawings.

105.02 NOTIFICATION OF DESIGN ERRORS

Should any omissions or design errors be discovered after final approval of the plans, the person or agency discovering the omission or error shall notify the City Engineer, the Owner, and the Design Professional. If the Contractor is unaware, the Owner shall notify them, and no work shall be allowed in the affected area until revisions are made by the Design Professional and approved by the City.

105.03 AUTHORITY OF THE CITY ENGINEER

A. The City Engineer is authorized to enforce all provisions of these City Standards or may appoint an Engineer, City Inspector, any other related technical employee, or any consulting firm engaged specifically to act on the City Engineer’s behalf.

B. The City Engineer has the authority to order work to be stopped if it is contrary to the provisions of the City Standards. Notice of such will be presented to the Contractor, Design Professional, or Owner's representative in writing, and work shall be stopped until authorization to proceed is received from the City Engineer.

105.04 AUTHORITY OF THE CITY INSPECTOR

A. The City Inspector is authorized to check all work performed in connection with construction of the project. The City Inspector shall have the authority to reject defective or inferior materials, or workmanship in cases where it is judged to be unacceptable, substandard, defective, unsafe, or not in accordance with City Standards, sound construction practices, and/or sound engineering judgment. The City Inspector has the authority to suspend work until any questions can be resolved by the City Engineer and shall advise the Contractor in complying with the drawings and City Standards. If the City Inspector or City Engineer deems it necessary, any previously covered work shall be exposed at the Contractor's expense. The Contractor shall immediately correct any defective materials or poor workmanship as determined by the City Inspector. The City Engineer and City Inspector shall, at all times, have reasonable and safe access to the work whenever it is in preparation or progress and the Contractor shall provide proper facilities and precautions for such access and inspection.

B. The City Inspector shall not, in any case, act as foreman or perform duties for the Contractor, nor provide line and grade stakes, nor take an active part in the management of the work done by the Contractor. The presence or absence of the City Inspector shall not relieve any responsibility or obligation of the Contractor. The City Inspector is present on the site to advise Contractors on, and to enforce compliance with, these City Standards.

C. The City Inspector has inspection authority to inspect the following work:
   (1) Construction of public improvements.
   (2) Existing water and wastewater systems and connections to the existing water and wastewater system. Any water or sanitary sewer service line installation from the main to a point two (2) feet away from any building.
   (3) Existing and proposed electrical system and connections to the existing electrical system.
   (4) Construction of the underground service connection up to the building.
   (5) City maintained concrete trail layout, landscape, and irrigation construction performed in areas maintained and/or owned by the City.
   (6) The Stormwater Construction Activity Permit (SCAP) that ensures all permittees install and maintain sediment and erosion control measures to protect the Municipal Separate Storm Sewer System (MS4) from any and all illegal discharges.
   (7) Over any and all other items or processes during the work that the City deems necessary.
   (8) The Building Inspector (an authorized representative of the Building Official) has inspection authority over construction within two (2) feet of the building envelope and including within the building.

105.05 INSPECTION REQUIREMENTS

A. The City Inspector shall be notified at least twenty-four (24) hours in advance of any construction activity that required an inspection. Inspections are required as identified in these City Standards.

B. No pipes, joints, or service connections shall be covered until they have been inspected by the City Engineer or City Inspector.

C. The Contractor is to supply any inspection aids that are necessary for inspection, such as a pump system for hydrostatic testing and a compression system for air testing of sanitary sewer lines.

D. Regardless of when a deficiency is discovered during construction or the warranty period, it is the responsibility of the Contractor to meet the requirements of the City's Standards and the requirements of the Contract Documents.

E. If a project holds a Stormwater Discharge Permit for Construction Activities from CDPHE, the project is required to be inspected by the Contractor every fourteen (14) days and after each major storm event to ensure compliance with the approved Stormwater Management Plan. The City Stormwater Construction Activity Permit is a separate process that requires the City Inspector to perform on-going stormwater inspections to verify that erosion control measures are installed adequately and maintained regularly. All sites shall be assessed on how well their stormwater erosion control measures protect the City's MS4 from any and all illegal discharges. SCAP inspections continue until the permit is formally terminated.

F. This is a non-exclusive list; the inspector may impose other requirements as necessary.

105.06 TESTING

All tests required by the City Standards shall be performed by a testing agency approved by the City and paid for by the Contractor. If the materials or methods used do not comply with City Standards, the City Engineer may require that additional tests be performed to ensure compliance with City Standards. Testing methods and location shall be as specified herein or as required by the City Engineer. All testing results for testing required by the City Standards shall be made available to the City directly from the testing agency.

105.07 LIABILITY

The City, the City Engineer, or any authorized representatives charged with the enforcement of these City Standards, shall not be liable for any damage that may accrue to persons or property as a result of any act or by reason of any act or omission in the discharge of their duties. Nothing in these City Standards is intended to waive, eliminate, or modify the immunity, protections, and/or requirements of the Colorado Governmental Immunity Act, C.R.S. § 24-10-101 et seq.

106.00 CONTROL OF MATERIALS

106.01 GENERAL INFORMATION

All materials and equipment shall be of a quality acceptable to the City. As required by the City Engineer, the Contractor shall furnish satisfactory documentation (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned, conditioned, and any other required action performed in accordance with the instructions of the applicable supplier except as otherwise provided in the plans, the PIA, or any other relevant documents. No provision of any such instructions will be effective to assign to the City, or any of the City's representatives, any duty or authority to supervise or direct the furnishing or performance of the work.

106.02 CERTIFICATES AND WARRANTIES FROM MANUFACTURER

When deemed necessary by the City Engineer, the Contractor shall submit a certificate to the City Engineer, secured from manufacturer, of all the material used as a permanent part of the project, certifying that their product as used on the project conforms to all City Standards. No material shall be used until the certificates are approved by the City Engineer. Where materials, equipment, or other property are to be transferred to and accepted by the City, the Contractor shall assign all applicable warranties to the City (if such warranties are assignable), or, if not assigned to the City, the Contractor shall make all warranty claims on behalf of the City.

106.03 MANUFACTURER'S SPECIFICATIONS OR RECOMMENDATIONS

All manufacturer's recommendations, instructions, or specifications regarding installation and use of products shall be followed. Any conflict between the manufacturer's instructions and these City Standards shall be decided and settled by the City Engineer, whose determination shall be final. All manufacturer's instructions and submittals shall be presented to the City Engineer for approval prior to scheduling a pre-construction meeting.

106.04 APPROVED MATERIALS LIST

(1) The City shall maintain a list of approved materials for use in the construction of public improvements as outlined in these City Standards.
(2) Concerned parties may submit a request in writing for a material to be included in the current list of approved materials.
(3) The submittal shall include all of the manufacturer's specifications concerning the design, installation, intended use, and any other information that is requested by the City Engineer.
(4) If the submittal is determined to be appropriate by the City Engineer, the evaluation of the materials shall be made by a committee convened by the City Engineer. The committee shall be composed of a minimum of three (3) representatives from the City. The City Engineer shall act as chairperson and the remaining committee members will represent the City divisions affected by the proposed product or material.
(5) If an accepted product fails to perform as anticipated or if there is a change related to the availability of repair or replacement parts, the product may be excluded from the Approved Materials List.
(6) Materials or products not included in the Approved Materials List shall not be used in construction unless an exception is granted in accordance with the City Standards Section 100.08 "Exceptions".

A. EVALUATIONS

(1) The review committee members will give due consideration to the products or methods based upon their collective experience and any relevant documentation. The review committee members will

review existing criteria or will develop criteria by which the product or methods can be evaluated. If needed, the review committee may seek out subject matter expertise within and outside the City to determine whether the product is acceptable.

(2) If necessary, the committee chairperson will contact the concerned party for additional data, for product samples, and to arrange for testing.

B. TESTING

(1) A testing program for a proposed material may be undertaken at the discretion of the City Engineer and with the concurrence of the concerned party. The review committee shall arrange field testing procedures. The concerned party shall furnish samples to be tested, any special test equipment not already available to the review committee, any necessary appurtenant materials, pipe, gauges, charts, recording equipment, and, when necessary, a location to conduct the tests. In some instances, testing may consist of trial installations in the field. Determination of the nature of the testing shall rest with the City, and the City reserves the right to require full reimbursement for testing and evaluation expenses.

(2) Testing shall be undertaken with the objective of clearly determining the acceptability of the product. For some products where durability is in question, the test period may last for several years. The City's goal will be to make an adequate determination within a reasonable time frame. All costs and expenses of testing of the product shall be borne by the concerned party proposing the new product.

(3) Following completion of tests, the committee will meet with the concerned party to discuss results and any further testing or consideration. The committee will then discuss the product and reach a decision.

C. NOTIFICATION

The City Engineer shall notify the concerned party in writing of the committee's decision to either accept the product, and include it with the Approved Materials List, or reject the product as unacceptable. Notification shall be made within thirty (30) working days of the completion of any testing. If the product is identified for inclusion, the inclusion shall be made within six (6) months of notification.

D. APPEAL

If the product is rejected and if the concerned party has good reason to feel that their product did not receive an adequate or fair test or was otherwise improperly rejected, the concerned party may appeal in writing within thirty (30) days of notification to the City. The concerned party shall fully document their case and ask for reconsideration based on new facts, testing, late results, or other factual basis. If the City finds reason for further consideration, the City will arrange for a meeting with the concerned party, the City Engineer, and any other City employee who might contribute, to consider further testing or evaluation. A subsequent final decision shall be made in writing under the signature of the City Engineer. If the City does not find sufficient cause to further investigate the matter, the City Engineer shall advise the concerned party in writing, and that decision shall be final.

E. LIMITATION ON REAPPLICATIONS

If, after a product is rejected, significant changes are incorporated into its manufacturing that might render it acceptable, the concerned party may reapply to the City Engineer for reconsideration. In the absence of changed conditions, the product or method shall not be reconsidered for inclusion for a period of three (3) years after having been rejected.

107.00 CONTROL OF SITE

107.01 UTILITY LOCATES

A. It is the Contractor's responsibility to request utility locates in accordance with the 811 law (C.R.S. 9-1.5-101).

B. The Contractor shall notify all utility companies and locate all existing utilities on and near the site prior to construction in accordance with all State and Local requirements.

C. All affected parties shall be notified by the Contractor at least four (4) days in advance of the commencement of work in order to ensure that there will not be any unexpected interruptions of services during construction.

D. Standby requirements – any excavation or utility crossing within eighteen (18) inches of city infrastructure may require a utility standby. When a standby is requested, as reported as a response from a city locate to the 811 program, the excavator shall schedule a standby with the City of Longmont by calling (303) 651-8416.

107.02 CONSTRUCTION WATER

All water needed for approved construction use shall be obtained from either a private supply, an approved tank loading facility, or by a City Temporary Water Use permit (see City webpage). Use of an existing city service/water meter for construction water is not allowed. Temporary use of potable water from the City's water distribution system for construction purposes by means of fire hydrant or other devices shall require a permit from the City and is subject to availability. The permit shall include provisions for payment of water used, use of a bulk water fill station, or the installation of a meter and an approved backflow prevention assembly, deposit, and daily rental charge. Existing city services shall not be utilized for construction water needs.

107.03 RELOCATION OF EXISTING UTILITIES

During construction, if it is determined that any underground utility(ies) are required to be relocated or removed including, but not limited to, sanitary sewer mains, water mains, electric and communication lines, traffic signal loops, gas mains, drainage and ditch structures, irrigation pipes, and any other below grade or above ground facilities, the Contractor shall notify the utility owner and the City immediately so that any necessary arrangements can be made. Relocation of any such utilities shall be at the Contractor's and/or the Owner's sole expense and liability.

107.04 INTERRUPTION OF WATER, WASTEWATER, AND STORM SEWER

The Contractor shall obtain approval from the City Engineer four (4) working days in advance of any construction which shall result in the interruption of service to an existing City customer. Once approval is obtained, the following steps shall be completed:

A. With approval of the City Inspector, the Contractor shall give notice in writing forty-eight (48) hours in advance to all affected Customers. Notices shall include appropriate information concerning interruption of services and instruction on how to limit the Customer's inconvenience. An attempt shall be made to deliver the notice personally to the Customer, otherwise the notice shall be left at the Customer's door.

B. In commercial areas, any disruption of service shall be undertaken only after said disruption has been coordinated with the City and the private property owner. Coordination shall be required for both the

service change over and any connections made to the existing system. Interruptions of service to Customers shall be kept to a minimum length of time.

C. A normal interruption of service (outage) shall be a maximum of four (4) hours. If the outage is greater than four (4) hours, then work shall be done in a manner so as to minimize the inconvenience to the Customers as directed by the City Engineer or City Inspector.

D. If, in the process of installing a connection, there exists an industry or building that cannot be without utility services for any length of time, the Contractor shall be required to provide alternative means, approved by the City, of providing services to the affected Customer during the interruption of regular service.

107.05 SWEEPING AND CLEANING OF ROADS AND ROW DURING CONSTRUCTION

A. The Contractor shall be responsible for the removal and proper disposal of all construction debris, dirt, and mud from all the public land, rights-of-way, easements, private property or driveways, and parking lots within or adjacent to the project area, whether caused directly by the Contractor's construction operation or that of subcontractors or material suppliers, or indirectly due to the work site conditions in general. Failure to identify, remove, and dispose of pollutants by the Contractor as promptly as possible shall cause the City to issue a Notice of Violation which may include a Civil Penalty, a Stop Work Order (Orange Tag) and/or a Cost of Abatement in the event that the City must remove the pollutants and then make a claim against the Contractor and/or the Owner for any costs incurred by the City. Additional enforcement and/or penalties shall be in accordance with Section 14.26, City Code.
   (1) The Contractor shall be responsible for any damage caused due to maintenance or cleaning operations or the lack thereof.

107.06 MATERIAL STORAGE AND HANDLING

All materials shall be stored in a manner so as to preserve their quality and suitability for the work. All pipe, fittings, valves, hydrants, and accessories shall be loaded and unloaded by lifting with hoists, skidding, or by hand so as to avoid shock or damage. Under no circumstances shall materials be dropped. Pipe handled on skidways shall not be skidded or rolled against pipe already unloaded. Cast iron, ductile iron, and steel pipe shall be handled so that the coating or lining is not damaged. If any part of the coating or lining is damaged, repair shall be made to the satisfaction of the City Engineer by the Contractor and/or Owner at no expense to the City. Any material judged by the City Inspector to be damaged beyond repair or that is not in conformance with the City Standards shall be rejected.

107.07 LANDSCAPE PROTECTION

The Contractor shall avoid disturbing existing landscape and plant material not specified for removal. Unless otherwise stipulated in the approved plans, or addressed by other City regulations, areas of landscaping disturbed by construction shall be returned to original or better condition by the Contractor within a reasonable period of time identified by the City. All materials and workmanship for replacement of landscape and plant material shall be approved by the City and shall comply with the City's appropriate landscape requirements.

107.08 FINAL CLEANUP

A. All surplus materials, tools, and temporary structures furnished or used by the Contractor shall be removed from the site by the Contractor when the project is complete. All debris and rubbish caused by the Contractor's operations shall be removed by the Contractor and the areas occupied during operations shall be restored to their original condition within a reasonable period of time determined by the City, unless

otherwise directed by the City Engineer. All surplus supplies furnished and delivered by the City shall be returned to the City by the Contractor when the work is complete.

B. The burning of material is not permitted within the jurisdictional area of the City. The disposal of material is the responsibility of the Contractor and shall be done in a manner that is approved by the City and in compliance with applicable laws. The Contractor shall not dispose of material or debris within the project limits. The Contractor is responsible for obtaining an approved and legal site for the disposal of clearing and grubbing materials, debris, rubbish and trash, excavated rock, excess excavated materials, and materials not suitable for backfilling. Removed concrete material may be used to construct embankments only if approved by the City Engineer. All pavements, sidewalks, structures, curbs, gutters, etc. not designated to remain shall be disposed of as debris. If materials are disposed of on private property, written permission shall be obtained from the property owner and a copy of such shall be provided to the City Engineer.

107.09 SITE STABILIZATION

If no construction activities take place on-site for thirty (30) days or more, the Contractor is responsible for stabilizing the entire site including all landscaped portions of the site to achieve Final Stabilization with a landscape material consistent with the approved landscaping plan and all seeded areas stabilized with a seed mix identified in the Approved Material List in Section 600 or an equivalent approved by the City Engineer. Final Stabilization is a condition reached when all ground surface disturbing activities at the site have been completed and a uniform vegetative cover has been established with an individual plant density of at least 70% of pre-disturbance levels, or equivalent permanent, physical erosion reduction methods have been employed, as approved by the City Engineer.

108.00 ACCEPTANCE OF WORK

108.01 GENERAL

Acceptance of the Public Improvements is a two-step process which involves Construction Acceptance and Final Acceptance as outlined below.

108.02 RECORD DRAWINGS

A. Prior to Construction Acceptance and upon completion of the project, it shall be the responsibility of the Contractor to provide the City Engineer with one (1) set of digital Record Drawings at the same scale as the original construction plan set for all public improvements, including landscape and irrigation, that indicates any revisions to the aforementioned. Irrigation Record Drawings shall meet the requirements of the City Standards Section 602 Completion Services.
   (1) The format of Record Drawings shall be a plan set with 24 x 36-inch digital sheets (PDF) that are scalable to 11 x 17-inch size. A Certification Statement shall be signed and stamped by the Design Engineer and included on the cover sheet of the digital PDF. Revisions shall be clouded, numbered, and lined out on the Record Drawings. Erasures are not allowed. A checklist of the information to be included on Record Drawings can be found in the Appendices.

B. There is a separate As-built Survey checklist for projects impacting the floodplain which require LOMR or LOMR-F FEMA submittals. The checklist is also included in the Appendices.

C. Record Drawings shall include geospatially referenced CAD files.

108.03 CONSTRUCTION ACCEPTANCE

A. Construction Acceptance will be granted when all capital and public improvements are approved by the City Engineer as detailed in the construction plans and, if applicable, the Public Improvement Agreement.

B. Minimum requirements for Construction Acceptance of public improvements are as follows:
   (1) Utilities. All utility lines and services shall be installed, backfilled, compacted, and have passed required testing, and all valves, fire hydrants, and manholes shall be brought to grade.
   (2) Streets. All concrete and paving, except the final top lift of asphalt for development projects, shall be complete.
   (3) Landscape and Irrigation. All concrete trails, irrigation, and landscape shall be installed and have passed all inspections.
   (4) Permanent Stormwater Control Measures. All post-construction permanent stormwater control measures shall be installed and have passed all inspections.

C. Public improvements shall be completed in strict compliance with the approved plans. Upon completion of all capital improvement projects and public improvement installations on development projects, the Contractor shall contact the City Engineer, and the City Engineer shall notify staff to perform inspections for construction acceptance to determine the acceptability of the work completed. If deficiencies are observed, the City Engineer shall issue a denial letter for development projects which shall include a construction acceptance punchlist, or a Notice of Substantial Completion for capital improvement projects, outlining the repairs required. The Contractor shall repair all deficiencies identified to obtain Construction Acceptance.
   (1) The construction acceptance inspection for landscaping and irrigation improvements shall occur during the growing season between April and October. City Inspector shall not inspect the landscape and irrigation portions during the dormant season between the months of November and April. If the

Contractor is not able to obtain Construction Acceptance from the City for outstanding items prior to October, then Construction Acceptance for all public improvements may be delayed.

D. For capital improvement projects, once all capital improvements are found acceptable and complete, including final clean up and the Contractor is no longer on-site, the City Engineer shall issue the Notice of Construction Acceptance.

E. For development projects, the Owner shall submit a repair schedule for the review and approval of the City Engineer, within thirty (30) days of receipt of a denial letter and construction acceptance punchlist. If Owner does not meet the schedule, the City may use the project's financial securities to complete the required repairs. If the Owner's proposed repair schedule extends beyond the current life of the financial securities, the securities shall be extended to cover the repair period. Once public improvements are found acceptable, a letter of Construction Acceptance shall be issued by the City Engineer. Notice of Construction Acceptance initiates the warranty period, and the Owner shall guarantee all work free of defects in workmanship or materials for a minimum of one (1) year and until Final Acceptance is issued. The Owner shall be responsible for maintenance during the warranty period and shall be responsible for correcting any deficiencies that occur prior to Final Acceptance.

F. The applicant shall submit a Stormwater Facility Certification as part of the record drawings for Construction Acceptance. Please refer to the appendix for additional requirements for the record drawings. Chapter 2, of the LSDCM, also provides additional, high-level guidance for record drawings associated with drainage.

G. The applicant shall submit an Operations and Maintenance Manual for any permanent stormwater control measures as part of the record drawings for Construction Acceptance.

108.04 FINAL ACCEPTANCE

A. CAPITAL IMPROVEMENT PROJECTS

A warranty claim can be made at any time during the warranty period by the City. The City Engineer shall complete the Notice of Warranty Work for all claims and send it to the Contractor for signature. The executed copy shall be sent to the Purchasing department. At the end of the Warranty Period the Purchasing department shall issue Final Acceptance to the City Engineer for execution. At this time the Contractor's financial securities shall be released.

B. DEVELOPMENT PROJECTS

A warranty claim can be made at any time during the warranty period by the City. Prior to the end of the warranty period the Owner shall request a final acceptance inspection from the City Engineer a minimum of thirty (30) days before the end of the warranty period. The City shall inspect the installed public improvements to determine compliance with City Standards, approved plans, specifications, and materials. If deficiencies are observed, the City Engineer shall issue a denial letter for development projects including a final acceptance punchlist outlining the items not in compliance. Any construction not meeting City Standards shall be brought into compliance within a reasonable period identified by the City.

C. An extended warranty may be accepted for portions of a project that do not fully meet City Standards at the time of inspection, at the City's discretion, to facilitate Final Acceptance. Securities for any extended warranty periods shall be required.

D. For City-owned landscaped areas it is the Contractor's responsibility to schedule Final Acceptance inspections during the growing season between April and October when plants are not dormant. Failure to do so may result in the delay of Final Acceptance until the following growing season.
   (1) If the landscape area is to be maintained by the City, the maintenance responsibilities shall transfer upon Final Acceptance. If it is to be maintained by the Owner, Contractor, or Homeowner's Association, the appropriate entity shall continue maintenance after Final Acceptance.

H. For Permanent Stormwater Controls, the Owner shall be required to identify a responsible party for all ongoing operations and maintenance of the facility or facilities associated with the development prior to the issuance of Final Acceptance.

I. Until Final Acceptance is granted, all maintenance and repair of improvements shall remain the responsibility of the Owner. If identified deficiencies are not corrected and finally accepted within 120 days after a warranty claim, the City may cause the required corrections to be made at the expense of the Owner. In addition, the City may suspend building permits or certificates of occupancy until the corrections are made and the work is completed in a satisfactory manner.

J. Final Acceptance shall be granted when requirements have been met for all public improvements and securities shall be released per the City Code.

109.00 UTILITY TRENCHING

109.01 GENERAL

A. The minimum trench width for wet utilities is eighteen (18) inches, unless otherwise approved by the City Engineer. Approval of trench widths less than eighteen (18) inches shall be based on the demonstration of the Contractor that suitable mechanical means of backfill compaction is available, and compaction is being obtained, or an approved non-shrinkable Flow-Fill material is being used for trench backfill.

B. Generally, the edge of the trench shall not be allowed closer than twelve (12) inches from concrete structures (i.e. curb and gutter, sidewalks, driveways, inlets, etc.) The actual distance shall be dependent upon the characteristics of the soil, the type of equipment that is used for trenching, and the methods used for excavation and backfill. If, as determined by the City Engineer, concrete structures are endangered by undermining of the structure or settlement, the structure may require replacement, special construction methods, or an increase in the distance of the trench from the structure.

C. All new underground facilities including utility mains and service laterals shall be installed with the means to be electronically locatable per state law. When designing and installing non-conductive underground utility facilities, the use of a tracer wire or an equivalent method is required as part of the design and installation. This allows for the facilities to be identified, located, and marked prior to future excavation activities.

D. Tracer wire shall be able to transmit on all eight frequencies: 512 Hz, 640 Hz, 8 kHz, 33 kHz, 65 kHz, 83 kHz, 131 kHz, and 200 kHz.

E. See City Standards Section 700 for LPC trench requirements.

109.02 MATERIALS

A. STABILIZATION MATERIALS

Stabilization material shall be 1-1/2 inch washed rock. A layer of geotextile fabric shall be placed between the stabilization material and the bedding material. Reference the Approved Materials List in the Appendices for types of geotextile fabric that are allowed. Under severe conditions, where the bottom of the trench is found to consist of material that is unstable to a degree that, as determined by the City Engineer, it cannot be removed and replaced with 1-1/2 inch rock and support the pipe properly, the Contractor shall construct a foundation for the pipe, consisting of piling, timbers, or other methods as approved by the City Engineer.

B. BEDDING MATERIALS

Bedding material shall conform to coarse aggregate gradation #8, #89, or #9 from the American Association of State Highway and Transportation Officials (AASHTO) Standard Specification for Sizes of Aggregate for Road and Bridge Construction (M 43). The coarse gradations #89 and #9, consisting of smaller aggregate sizes, are not to be utilized in instances where groundwater is present in the trench and for underdrain installations, unless otherwise approved by the City Engineer.

Table 1- 1 Bedding Material Gradation

Sieve Size	#8	#89	#9
1”	----	----	----
3/4”	----	----	----
1/2”	100	100	----
3/8”	85-100	90-100	100
#4	10-30	20-55	85-100
#8	0-10	5-30	10-40
#16	0-5	0-10	0-10
#50	----	0-5	0-5
#100	----	----	----

(1) The Contractor shall provide sieve analysis for on-site bedding material conforming to ASTM D422 for every 500 lineal feet of pipe installation to demonstrate that the bedding material conforms to the approved gradation. The sampling, testing, and reporting shall be performed by a qualified firm. The sample shall be taken from the on-site stockpile from which the material is being placed in the trench. The Contractor shall not place bedding material until the results of the sieve analysis are reported and shall remove material that does not meet the specified gradation. If, in the determination of the City Engineer, the stockpile has been compromised or does not meet gradation or material specifications of these City Standards, additional soils analysis shall be required.

C. BACKFILL MATERIAL

(1) All backfill material shall be free from frozen material, vegetation, or other organic material, cinders or other corrosive materials, debris, broken asphalt and concrete, and any other material that is not suitable in the determination of the City Engineer. Trench backfill material shall be free from any rocks or stones which are larger than six (6) inches, in any dimension. Rocks or stones which are larger than three (3) inches in any dimension shall not be placed within one (1) foot of pavement subgrade, or within one (1) foot of the finished surface of unpaved areas. Rocks or stones larger than two (2) inches in diameter may not be used for trench backfill of irrigation lines. Use of rocks, stones, or boulders within allowable size limits shall not interfere with proper compaction.

(2) Masses of moist, stiff clay and washed rock shall not be used as backfill material.

(3) When the type of backfill material is not indicated on the drawings or specified, the Contractor may backfill with the excavated material, provided that such material consists of loam, clay, sand, gravel, or other materials that, in the determination of the City Engineer, are suitable for backfilling. If excavated material is indicated on the drawings or specified for backfill, and there is a deficiency due to a rejection of part thereof, the Contractor shall furnish the required amount of approved material.

(4) If imported backfill is not required on the drawings and, in the determination of the City Engineer, should be used in any part of the work, the Contractor shall furnish and backfill with an approved material as directed by the City Engineer.

(5) Flow-Fill shall be a self-leveling, low strength concrete material composed of cement, fly ash, aggregates, water, chemical admixtures, and cellular foam for air entrainment that does not require compaction. Flow-Fill shall meet CDOT "Standard Specifications for Road and Bridge Construction,” Section 206 Structure Backfill (Flow-Fill) Specifications and the following requirements unless otherwise required by the City Engineer:

a. Slump of seven (7) to ten (10) inches (ASTM C143) or minimum flow consistency of six (6) inches (ASTM D6103)

b. Minimum 28-day strength: 50 psi (ASTM D4832)

c. Maximum 28-day strength: 100 psi
d. Removability Modulus (RM): 1.5 or less in areas requiring future excavation.

109.03 EXECUTION

A. GENERAL

Per City Standards Section 107.01 “Utility Locates”, the Contractor is required to perform utility locates prior to starting trench work. Utility installation shall be in compliance with approved construction plans and specifications. Trench construction for wet utilities shall be in compliance with Detail 100-03 “Water and Wastewater Utility Trench”. Trench construction for Longmont Power & Communications distribution system infrastructure shall be in compliance with City Standards Section 700.

B. REMOVAL OF ASPHALT SURFACES

(1) The Contractor shall remove and properly dispose of pavement and road surfaces as a part of trench excavation. The Contractor shall make an initial sawcut for trench width, then re-cut one (1) foot beyond trench excavation at time of patching. If the limits of the asphalt removal are within three (3) feet of the edge of pavement, the pavement shall be removed and replaced completely to its edge, per Detail 100-04, “Trench Limits for Asphalt Removal and Patch-Back". The width of pavement removed along the trench for the installation of pipe shall not exceed the width of the trench specified by more than one (1) foot on each side of the trench without approval of the City Engineer.

(2) The Contractor shall use full depth cutting or milling to ensure the removal of pavement in a straight line. The face of the remaining pavement shall remain approximately vertical. If the edge is damaged during construction, it shall be re-cut prior to final asphalt paving.

C. REMOVAL OF CONCRETE SURFACES

(1) The Contractor shall remove and properly dispose of pavement, sidewalks, and curb and gutter as a part of trench excavation.

(2) The Contractor shall use methods such as full depth saw cutting to ensure the removal of pavement in a straight line. The minimum area removed on road surfaces shall be one-quarter (1/4) of a panel section for panels no smaller than 12 x 10 feet otherwise the entire panel shall be removed. Remainder portions of a panel cannot be less than 6 x 5 feet per Detail 100-05, “Concrete Pavement Patch-Back".

(3) The minimum removal section for sidewalks and curb and gutter shall be five (5) feet in length, if the remaining section is a minimum of five (5) feet long. If the remaining section is less than five (5) feet long, the entire panel shall be removed and replaced.

(4) In order to allow for forming and patch-back, when removing curb and gutter or curbwalk abutting asphalt pavement, the Contractor shall remove the adjacent asphalt pavement and base course eighteen (18) inches wide and six (6) inches deep if any of the following conditions exist:
   a. The length of the removal is greater than thirty (30) feet.
   b. The asphalt at the edge of the existing concrete gutter lip is higher or lower than the lip of the concrete by one-half (1/2) inch or more.
   c. The edge of the existing asphalt pavement varies more than three-eighths (3/8) inch horizontally or vertically.
   d. The existing asphalt is cracked or distressed.
   e. Upon removal of the concrete the asphalt is chipped, deformed, undermined, or raised more than three-eighths (3/8) inch vertically or horizontally.

(5) If the removal of curb and gutter abutting asphalt does not meet any of the above conditions and, per the approval of the City Engineer, is allowed to be replaced without the removal of the adjacent asphalt, it shall meet the following criteria or it shall be removed and replaced along with the adjacent asphalt pavement:

a. No voids exist between the concrete and asphalt.
b. The fall in the lip of the gutter section shall meet the required cross-section within +/- one-quarter (1/4) inch.
c. All other requirements of the construction have been met in accordance with City Standards.

D. CARE OF SURFACE MATERIAL FOR REUSE

All surface materials that, in the determination of the City Engineer, are suitable for reuse in the restoring of the surface shall be stockpiled separate from the general excavation materials. Surface materials as used herein are intended to include items such as gravel surfacing, landscape materials, topsoil, etc. It is not intended to include asphalt or concrete surfacing.

E. EXCAVATION

The trench shall be excavated to the depth required to provide proper bedding and support for the pipe. Any part of the bottom of the trench excavated below the specified grade shall be corrected with approved material as directed by the City Engineer. The subgrade shall be stable.

F. TRENCHING BY HAND OR MACHINE

When a Contractor excavates within eighteen (18) inches horizontally from the exterior sides of any marked underground facility, the Contractor shall use nondestructive means (either hand digging or hydro-excavation) of excavation to identify underground facilities. When utilizing trenchless excavation methods such as boring, the excavator shall expose underground facilities and visually observe the safe crossing of publicly owned, marked underground facilities.

G. PILING OF EXCAVATED MATERIAL

Unless otherwise approved by the City Engineer, all excavated material shall not be piled in a manner that endangers the work and shall not obstruct sidewalks, roadways, or driveways. Excavated material shall not be piled in a manner that obstructs the sight distance at driveways or intersections. This shall be determined in accordance with the sight distance criteria set forth in City Standards Section 207 “Intersection Design Criteria”. Hydrants under pressure, meter pit covers, valve boxes, electrical apparatus, manholes, inlets, and other utility controls shall be left unobstructed and accessible during construction, unless otherwise approved by the City Engineer. If an emergency access is needed to any utility which is blocked, whether previously approved or not, the Contractor shall be responsible for removing the obstruction. Curb and gutters and drainage swales shall be kept clear or other satisfactory provisions shall be made for street drainage and natural water courses shall not be obstructed.

H. SPECIAL TRENCHES OR INSTALLATIONS

Special trenches or installations, such as railroad, highway, or irrigation ditches, and utility crossings shall conform to the specifications and instructions of the authority whose facility, right-of-way, easement, or utility is involved. The Contractor shall confer with the representatives of the agency concerned to arrange the details for construction. The Contractor shall be responsible for all costs for repairing all damage incurred to property during construction. All work shall be completed to the satisfaction of the agency involved as well as the City Engineer.

I. ROCK EXCAVATION

Large rock, boulders, and large stones shall be removed from the trench to provide six (6) inches of clearance to each side of the pipe and below all pipe accessories. Excavations encountering rock or boulders below subgrade shall be refilled to subgrade with compacted material approved by the City Engineer. Blasting shall not be allowed without approval of City Engineer.

J. BORING

The requirements for boring and jacking of a line shall be determined on a case-by-case basis to enable coordination with the Owners and Agencies involved. Boring of utilities, whether service lines or main utility lines, shall be done in such a manner as to ensure that there is no settlement of the soil or surface improvements. The Contractor is responsible for all settlement and damage that occurs due to boring or jacking operations. Tunneling, resulting in voids under surface improvements, shall not be permitted.

K. TRENCH STABILIZATION

Where the trench subgrade is found to be soft, wet, unstable, or to include ashes, cinders, refuse, vegetable or other organic materials, or large pieces of inorganic materials that in the judgment of the City Engineer should be removed, the Contractor shall excavate and remove such unsuitable material to the width and depth determined by the City Engineer. Over excavated areas shall be backfilled with foundation material as specified under the Trench Backfill section below.

L. DEWATERING OF TRENCHES

Pipe trenches shall be kept free from water in an adequate and acceptable manner during excavation, fine grading, pipe laying and joining, and pipe bedding operations. Where the trench bottom is saturated or otherwise unstable because of the presence of groundwater, and in all cases where the static groundwater elevation is above the bottom of any trench or bell hole excavation, the groundwater shall be lowered by means of well points and pumps or by other means acceptable to the City Engineer, to the extent necessary to keep the trench free from water and the trench bottom stable at all times during construction. Surface water shall be diverted and otherwise prevented from entering trenches to the greatest extent practical without damage to the adjacent property from dikes, ditches, or impounded water. The Contractor shall clean the storm sewer system as part of site cleanup at completion of projects. It is the responsibility of the Contractor to obtain a Colorado Department of Public Health and Environment Water Quality Control Division “Construction Dewatering Permit” and be in compliance with all Federal, State, and Local laws and regulations.

M. UTILITY PIPE CROSSING

Utility pipe crossings shall be centered over any utility pipe being crossed and crossing utility pipes shall be aligned perpendicular (90°) where possible. The Contractor must provide minimum horizontal separation between pipes based on requirements in City Standards Section 103.09, “Utility Line Separation and Crossings”. If clearance is limited and spacing between pipes is less than eighteen (18) inches, utility pipes shall be supported per Detail 100-07, “Pipe Crossing Support Pad”, with approval of the City Engineer. Pipe crossing support pads for pipe sizes larger than twenty-four (24) inches require design submittal by a Professional Engineer and approval by the City Engineer. Bedding material for pipe crossing unable to meet clearance spacing is required to extend eight (8) inches below the lower pipe and twelve (12) inches above the upper pipe. The concrete forms for the support pads are designed to extend six (6) inches on either side of the outside pipe diameter and either be twelve (12) inches or eighteen (18) inches long, depending on the pipe size. The concrete form is required to cradle the upper pipe to the spring line of the pipe. A bond break shall be placed between concrete and the pipe being supported. For situations approved by the City Engineer where there are less than four (4) inches of vertical separation between the utility pipes in a crossing, or the crossing involves a water line, fiber board insulation in accordance with ASTM-C578, or an approved equal, shall be required to be installed between the pipes. The board should extend two (2) inches beyond the outside edges of the pipes.

N. CUT-OFF WALL CONSTRUCTION

In the situation that excessive groundwater is encountered, and no provisions have been made for groundwater drainage, clay or flow fill walls shall be required per Detail 100-08, “Cut-off Wall”. Cut-off walls shall be two (2) feet thick spanning the full width of the trench horizontally and extend vertically one (1) foot below the bottom of the trench to six (6) inches above the bedding material. Cut-off walls are to be located a minimum of every four hundred (400) feet along the trench. Cut-off walls shall also be located within twelve (12) feet on each side of open drainage ways and irrigation ditches as shown in the Detail 100-09, “Ditch Crossing”. These requirements will be reviewed on a case-by-case basis.

O. INSTALLATION OF BEDDING MATERIAL

(1) After completion of the trench excavation and proper preparation of the foundation, bedding material shall be placed in the trench for pipe support in the limits indicated on Detail 100-03, “Wet Utility Trench”. Bell holes shall be dug deep enough to provide a minimum of two (2) inches of clearance between the bell and bedding material. All pipes shall be installed in such a manner as to ensure full support of the pipe barrel over its entire length. After the pipe is adjusted for line and grade, and the joint is made, the bedding material shall be carefully placed and compacted uniformly under the haunches of the pipe in the previously dug bell holes and on each side of the pipe to prevent settlement or lateral displacement. The bedding material shall be compacted by vibrating, rodding, or slicing with a shovel.

(2) Bedding is required on all service lines. A layer of geotextile material shall be installed around the bedding material whenever the results of the soil testing of the native material, in the opinion of the City Engineer, result in the migration of the bedding material into voids in the existing trench bottom.

P. TRENCH BACKFILL

(1) Trench backfill consists of the backfill above the bedding zone and below the base course as indicated in Detail 100-03, “Wet Utility Trench Construction”.

(2) Unless approved by the City Engineer, or unless specified for hydrostatic test purposes, all trenches and excavations shall be backfilled within the same day after the pipe is laid therein, but not before the pipe has been inspected by the City Inspector. The length of open trench shall be approved by the City Engineer on a case-by-case basis. Unless otherwise approved by the City Engineer, cleanup shall be performed after a maximum of six hundred (600) linear feet of pipe installation. No trench shall be left open overnight without proper protection and approval of the City Engineer. These requirements apply for all mains and service lines. Backfilling of trenches shall comply with these City Standards, and with applicable design and soils reports.

Q. BACKFILLING IN FREEZING WEATHER

Backfilling shall not be done in freezing weather, except by permission of the City Engineer, and it shall not be done with frozen material. No backfill shall be placed when the material in the trench is frozen.

R. COMPACTION REQUIREMENTS AND TESTING

(1) It is the responsibility of the Contractor to provide the proper means and equipment for obtaining compaction within the specified ranges. If the City Engineer determines that the means or equipment is not adequate to obtain the desired results, the City Engineer may require specific measures to ensure the desired results. One such measure may be the use of non-shrinkable Flow-Fill for trench backfill.

(2) The Contractor shall retain a private, approved testing agency regularly involved in soils testing to perform required Proctor and compaction tests at the Contractor's expense. Two copies of all Proctor curves and test results showing the exact location of sample collection and test sites shall be furnished to the City Engineer for approval. Only actual test information shall be submitted, estimated values will

not be accepted. The City Engineer shall be informed before any tests are performed and may designate areas to have checked for compaction. The results of the tests shall be given to the City Engineer before any compaction is accepted.

a. Standard Proctor Tests (ASTM D698): The Contractor shall provide Standard Proctor results to develop compaction testing parameters for backfill. A sufficient number of Proctor tests shall be taken so as to, in the determination of the City Engineer, adequately represent all types of soil encountered along the trench. Said tests are intended only to aid the verification of the quality of the work.
b. Field Density Tests: The Contractor shall provide field compaction tests conforming to ASTM D2922 and D3017 for every one (1) foot of trench over two hundred (200) lineal feet of pipe installation unless otherwise specified by the City Engineer. The Contractor shall provide one field compaction test per every one hundred (100) lineal feet of sidewalk and shall demonstrate that the subgrade passes a wheel test. The Contractor shall provide two field compaction tests for each water and sewer service line. For the sewer service, the tests shall be required at varying depths per the direction of the City Inspector and shall be located a minimum of ten (10) feet from the end of the service line. For the water service, the test shall be taken when the fill is at a level of two (2) feet below the final grade; one test shall be located five (5) feet from the water main and one test shall be located two (2) feet from the curb stop (between the curb stop and the sidewalk). The Contractor may be required to dig up portions of the trench to afford access for compaction tests below the top surface of the backfill material. Acceptable field compaction test results shall not relieve the Contractor from correction or repair of any substandard work before or during warranty period.

(3) Unless otherwise required on the plans, or by the City Engineer to prevent settlement or damage to existing or proposed public or private improvements, trench backfill compaction shall be to the following minimum densities indicated below:

a. All compaction shall be 95% of Standard Proctor, unless otherwise required by the City Engineer.
b. No ponding or jetting of trenches, use of a hydrohammer, or any impact type compaction is allowed. Compaction shall be done by mechanical methods.
c. All material shall be compacted within plus or minus two percent (2%) of the optimum moisture content as determine by the Standard Proctor Test. The Contractor shall be responsible for providing a stable non-pumping subgrade. If any portion of the subgrade is suspected of not being stable, the City Engineer may require that the subgrade be proof rolled. Proof rolling shall be performed with equipment and in a manner acceptable to the City Inspector. The Contractor shall provide any equipment required for proof rolling. Areas which fail shall be corrected and brought into compliance with City Standards by the Contractor.
d. If the required compaction is not obtained, it shall be the responsibility of the Contractor to re-compact the material. In cases where there is a failure to achieve the required compaction, the City Engineer may require that the backfill be removed and replaced with City approved backfill material. Any utilities within the trench that were tested prior to re-compaction shall be retested per the direction of the City Inspector after re-compaction.

S. ASPHALT & CONCRETE PATCHING

Surface material patch-back for trenches shall be consistent with the surface material removed prior to trenching i.e. asphalt or concrete and in accordance with Detail 100-06 “Typical Asphalt and Concrete Trench Patch-Back". Asphalt shall be patched back to a minimum thickness of eight (8) inches or to the existing full depth thickness if greater. Concrete pavement patching shall be patched back to a minimum thickness of ten (10) inches, unless the existing thickness is greater, and be in accordance with Detail 100-

05, “Concrete Pavement Patch-Back". The detail is not to be used for existing concrete panels that are less than eight (8) inches thick. Refer to the City Standards Section 200, Transportation, for additional information on asphalt and concrete patching.

T. UTILITY MARKER POST

When utility Appurtenances are installed where adequate physical reference points are not available or utility is located in a position where it requires additional protection, a utility marker post may be required to be installed per Detail 100-10, “Marker Post”. Flexible utility marker posts may be considered with approval from the City Engineer.

U. TRACING FOR UTILITY LOCATION

All City-owned sewer and water infrastructure, as well as any private or public utility, located in City ROW shall be electronically locatable. Refer to CRS 18-167 for locating requirements. Other utilities may be required to be electronically locatable at the discretion of the City Engineer.

(1) TRACING WIRE

All City-owned sewer and water infrastructure without joint bonding and non-metallic service lines, shall be installed with tracing wire. All new tracer wire installations and connections to existing shall be located using typical low-frequency (512 Hz) line tracing equipment, witnessed by the contractor, inspector, and city staff prior to acceptance, and shall be performed upon completion of rough grading and prior to final acceptance. Lines shall trace in every direction continuously from each trace location; tracing from one location is required to trace in all directions without having to connect in a different location. Continuity testing in lieu of actual line tracing shall not be accepted. Connections to existing systems shall be traceable to meet existing tracer configuration and shall connect to existing tracer wiring.

(2) TRACER WIRE & INSULATION

a. The tracing wire shall be a minimum 12 AWG solid copper wire with a High-Density Polyethylene (HDPE) or High-Molecular-Weight Polyethylene (HMWPE) coating, designated for direct burial, and shall be color-coded per APWA standards. Open trench or open cut installations shall have wire that has a minimum 450 lb. break load and a minimum 30 mil insulation. Directional drilling or boring installations shall have a minimum break load of 1,150 lb. with a minimum insulation thickness of 45 mil.

Table 1-2 Trace Wire Insulation Colors

Color	Utility Line
Red	Electric
Yellow	Gas
Orange	Communication
Blue	Potable Water
Purple	Non-potable Water, Storm
Green	Sanitary

b. All connectors used to connect tracing wire shall rated specifically for use in underground tracer wire installation. Wire splices shall be connected in a UL Standard 486D-approved splice kit for use in wet, damp, direct-bury locations. Connectors shall be dielectric silicone-filled to seal out moisture and corrosion and shall be installed in a manner that

prevents any uninsulated wire exposure. Non-locking, friction-fit, wire nut, or taped connectors are prohibited.

c. All trace wire shall be interconnected, including at all tees, crosses, valves, manholes, sewer laterals, etc. For open trench or open cut installations, the tracing wire shall be secured to the top of the pipe with a pipe-wrapping tape that adheres to metal and plastic and is approved for direct bury at intervals not to exceed five (5) feet.

d. Tracer wire shall be properly grounded at all dead-ends/stubs using 1.5 lb drive-in magnesium ground rods specifically designed for this purpose. Dead-ends include hydrants, service laterals, and fire lines. When grounding the tracer wire at dead-ends/stubs, the Ground Rod shall be driven into virgin soil directly beneath and in line with the utility.

e. Tracer wire installation shall be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512 Hz) signal, and distortion of signal caused by more than one wire being installed in close proximity to one another.

f. Tracer wire systems shall be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.

g. Any damage occurring during installation of the tracer wire shall be immediately repaired by removing the damaged wire and installing a new section of wire with approved connectors. Taping and/or spray coating shall not be allowed.

h. Mainline tracer wire shall not be connected to existing conductive pipes; it shall be treated as a mainline dead-end ground using an approved waterproof connector to a Ground Rod driven into virgin soil beneath and in line with the utility.

i. All service lateral tracer wire shall be a single wire, connected to the mainline tracer wire.

j. Where an existing tracer wire is encountered on an existing utility that is being extended or tied into, the new tracer wire and existing tracer wire shall be connected using approved connectors.

k. Tracer wire on all service laterals/stubs shall terminate at an approved tracer wire access point located directly above the utility, at the edge of the road right-of-way, but out of the roadway.

l. Twenty-four (24) inches of excess/slack wire is required in all tracer wire access points after meeting the final elevation.

(3) SANITARY SEWER SYSTEM

a. A mainline tracer wire shall be installed, with all service lateral tracer wires properly connected to the mainline tracer wire, to promote tracing/locating capabilities from a single connection point.

b. Mainline tracer wire shall be laid continuously, by-passing around the outside of manholes/structures on the north or east side.

c. Tracer wire on all sanitary service laterals shall terminate at an approved tracer wire access point, color coded green and located directly above the service lateral at the edge of the road right-of-way.

(4) WATER SYSTEM

a. A mainline tracer wire shall be installed, with all service lateral tracer wires properly connected to the mainline tracer wire, to promote tracing/locating capabilities from a single connection point.

b. Lay mainline tracer wire continuously, by-passing around the outside of valves and fittings on the north or east side.

c. A single tracer wire only shall be installed on all water service laterals and shall terminate at an approved tracer wire access point, color coded blue, and located directly above the service lateral at the edge of the road right-of-way.
d. Tracer wire access points will be installed at all fire hydrants. Tracing wire shall be brought to grade at all fire hydrants and designated locations in an approved test box. Test boxes shall have a lid with a terminal for direct connection to the tracer wire, a locking cover, and a cast-iron collar.

(5) STORM SEWER SYSTEM

a. If the storm sewer system includes service laterals for connection of private drains and tile lines, it shall be specified the same as a sanitary sewer application.
b. Mainline tracer wire must be laid continuously, by-passing around the outside of manholes/structures on the north or east side.

(6) WARNING TAPE

All utilities shall have a utility warning tape installed in the trench eighteen (18) to twenty-four (24) inches above the crown of the pipe. The warning tape shall be a six (6) inch wide, detectable, aluminum-foil-plastic-backed tape. The tape shall be APWA color coded (see table below) with a repeating warning message indicating that a utility is located below the tape.

Table 1-3 Warning Tape Colors to Utility Type

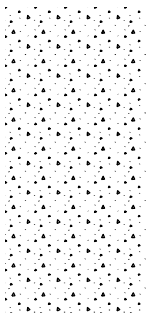
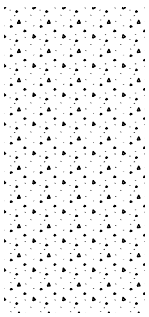
Color	Utility Line
Red	Electric
Yellow	Gas
Orange	Communication
Blue	Potable Water
Purple	Non-potable Water
Green	Sanitary
Green	Storm

(7) ELECTRONIC MARKER SYSTEM

For water mains, a buried, electronic marker shall be installed directly above all horizontal and vertical bends and casing pipe ends between two (2) and three (3) feet below the surface. The electronic marker shall be capable of receiving a signal from the manufacturer's locator and returning a signal with a unique serial number and accurately indicating the marker's horizontal position. Electronic markers shall be installed per manufacturer specifications. One electronic marker shall be installed directly above any fitting with a vertical bend and at each end of a casing. The marker shall be positioned two (2) to three (3) feet below the surface. The GPS coordinates of the marker must be submitted to the City Engineer.

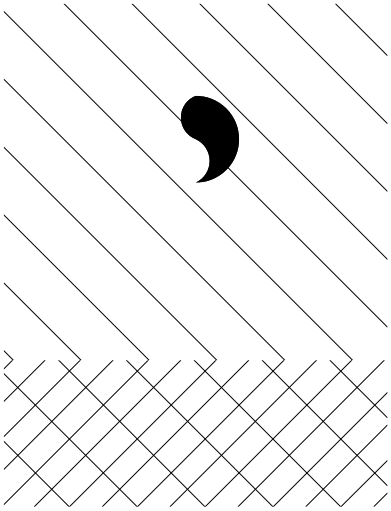
SECTION 100 – GENERAL REQUIREMENTS
INDEX OF DETAILS

100-01	HORIZONTAL PLACEMENT OF UTILITY MAINS WITHIN PUBLIC ROW
100-02	PUBLIC UTILITY EASEMENT ON PRIVATE PROPERTY
100-03	WATER AND WASTEWATER UTILITY TRENCH
100-04	TRENCH LIMITS FOR ASPHALT REMOVAL AND PATCH-BACK
100-05	CONCRETE PAVEMENT PATCH-BACK
100-06	TYPICAL ASPHALT AND CONCRETE TRENCH PATCH-BACK
100-07	PIPE CROSSING SUPPORT PAD
100-08	UTILITY CROSSING
100-09	CUT-OFF WALL
100-10	DITCH CROSSING
100-11	MARKER POST
100-12	TYPICAL RESIDENTIAL LOT GRADING DETAIL
100-13	TRACER WIRE SAMPLE SANITARY SEWER PLAN
100-14	TRACER WIRE SAMPLE STORM SEWER PLAN
100-15	TRACER WIRE AT SEWER LATERAL DETAIL
100-16	TRACER WIRE AT INLET OR STORM MANHOLE
100-17	SANITARY SEWER SERVICE UTILITY LOCATING AND TEST STATION
100-18	CASING/SKID
100-19	CASING PIPE
100-20	WATER & SEWER SERVICE INSTALLATION IN THE SAME TRENCH

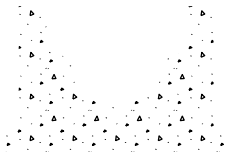





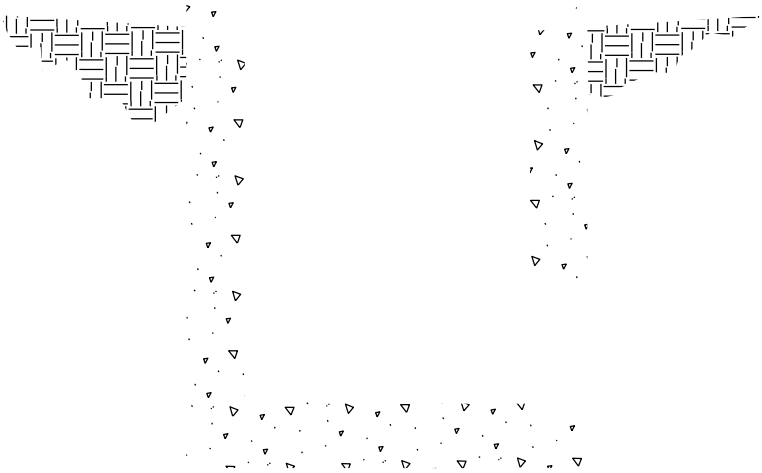








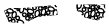
CITY OF
LONGMONT
COLORADO



CITY OF
LONGMONT
COLORADO







CITY OF
LONGMONT
COLORADO

CITY OF LONGMONT
SECTION 200 – STREET IMPROVEMENTS
TABLE OF CONTENTS

200.00 MINIMUM DESIGN CRITERIA 1

200.01 GENERAL 1

201.00 RIGHT OF WAYS AND STREET CROSS-SECTIONS 2

201.01 GENERAL 2
201.02 DESIGN CRITERIA 2

202.00 HORIZONTAL ALIGNMENT 3

202.01 GENERAL 3
202.02 DESIGN CRITERIA 3

203.00 VERTICAL ALIGNMENT 4

203.01 GENERAL 4
203.02 DESIGN CRITERIA 4

204.00 RESERVED 6

205.00 INTERSECTIONS 6

205.01 GENERAL 6
205.02 DESIGN CRITERIA 7
205.03 SPACING CRITERIA 9
205.04 AUXILLARY LANES 9

206.00 CUL-DE-SACS 11

206.01 GENERAL 11
206.02 DESIGN CRITERIA 11

207.00 STRUCTURAL CROSS-SECTION 12

207.01 GENERAL 12
207.02 DESIGN CRITERIA 12
207.03 MATERIALS 13

208.00 GENERAL - CONSTRUCTION 17

208.01 SEQUENCE OF CONSTRUCTION 17
208.02 FIXTURE ADJUSTMENT 18
208.03 PROTECTION AND CLEANING 18

209.00 CLEARING AND GRUBBING 18

210.00 REMOVAL OF STRUCTURES AND OBSTRUCTIONS 19

211.00 EXCAVATION AND EMBANKMENT 19

211.01 GENERAL 19

211.02 MATERIALS 20
211.03 SUBGRADE 21
211.04 EXCAVATION 21
211.05 BACKFILL, FILL AND EMBANKMENT 22
211.06 FINISH GRADING 23
211.07 COMPACTION AND TESTING 23

212.00 AGGREGATE BASE COURSE 24

213.00 PLANT MIXED BITUMINOUS PAVEMENT 25

213.01 GENERAL 25
213.02 MATERIALS 26
213.03 CONSTRUCTION REQUIREMENTS 27
213.04 TEST REQUIREMENTS/TOLERANCES 28

214.00 PORTLAND CEMENT CONCRETE PAVEMENT 30

214.01 MATERIALS 30
214.02 CONSTRUCTION REQUIREMENTS 30
214.03 TEST REQUIREMENTS 32

215.00 STREET RESTORATION (PATCHING AND MATCHING EXISTING) 33

215.01 AGGREGATE BASE COURSE 33
215.02 PAVEMENT REPLACEMENT 33
215.03 SURFACE TOLERANCES 34
215.04 TEMPORARY PATCHES 34
215.05 TIME LIMITS FOR PATCHING STREET CUTS 34

216.00 SIDEWALKS, CURB RAMPS, CURB AND GUTTER 34

217.00 SIGNS CONSTRUTION AND INSTALLATION 36

217.01 GENERAL 36
217.02 STANDARDIZATION 37
217.03 STREET NAME SIGNS 37
217.04 POST AND SIGN PLACEMENT 37

SECTION 200 – STREET IMPROVEMENTS
INDEX OF DETAILS

200-01	Typical Street Section
200-01A	Typical Street Section
200-01B	Street Intersection Crosspan Approach Detail
200-01C	Street Intersection Approach Detail
200-02	Intersection Right-of-Way
200-03	Concrete Cross Pan
200-04	Detached Sidewalk Detail
200-05	Bikeway Detail
200-06	Vertical Curbwalk Detail
200-07	Vertical Curb and Gutter Type “B”
200-08A	Concrete Driveway (Type A) With Attached Walk
200-08B	Concrete Driveway (Type B) With Attached Walk
200-09	Concrete Driveway Offset Walk (Monolithic Pour)
200-10	Mountable Curbwalk
200-11	Curb Ramp Detail – Radial Curbwalk
200-12	Curb Ramp Detail – Mid-Block, Single
200-13	Curb Ramp Detail – Detached Sidewalk
200-14A	Curb Ramp Transition Detail for Detached Walk and/or Bikepath (Alt. A)
200-14B	Curb Ramp Transition Detail for Detached Walk and/or Bikepath (Alt. B)
200-15	Curb Ramp Detectable Warning and Construction Joint Detail
200-16	Traffic Circle Detail
200-16A	Mid-Block Neckdown with Detached Walk
200-16B	Speed Tables or Speed Humps with Crosswalk
200-17	Chase Drain Detail
200-18	Type R (Modified) (Chase)
200-19	Staking Detail, Mountable Curb Inlet
200-20	Survey Monument Box
200-21	Pedestrian Handrail Detail
200-22	Conduit Trench
200-23	Standard Pipe Underdrain (Raised Irrigated Medians)
200-24	Rotomill Detail (Final Overlay)
200-25	Core Drilled Pothole Patching Detail

STREET IMPROVEMENTS

200.00 MINIMUM DESIGN CRITERIA

200.01 GENERAL

1. All street, alley, sidewalk, and concrete path systems will comply with these specifications, the State Specifications where applicable, and with the approved plans. Sidewalks and curb ramps shall comply with ADA accessibility requirements.

2. Street layout, alignment, and classification shall conform with the City of Longmont Subdivision Regulations and the Longmont Area Comprehensive Plan.

3. Consideration shall be given, within the established framework of local streets, to provide for, proper alignment, and conformity to existing street patterns. The street design shall be directly related to the traffic needs and the adjacent land uses. Street design for Local and Collector streets in residential areas shall specifically focus on creating a pedestrian friendly design avoiding excessively wide or long straight streets that encourage excess speed. Street design within such residential areas is intended to focus on developing a street system that can provide access to the adjacent properties, provide a safe transportation system for pedestrians, bicyclists, vehicles and minimize the impacts of traffic on adjacent residential property. The streets, intersections, driveways, and pedestrian facilities shall be designed to provide for the greatest safety for both pedestrians and motorists.

4. All alleys shall be paved to a full width and shall provide paved access to a paved street at both ends.

5. In situations where redevelopment occurs along an existing unpaved alley, and utilizes the alley as a primary access, the Developer shall be responsible for paving the alley along the frontage of the property, and extending the paving to the closest intersection of the alley with a public street.

6. Transportation Impact Studies are required in order to adequately assess the impacts of a development proposal on the existing and/or planned street system. Unless waived by the City Engineer, a written Transportation Impact Study will be required for all development proposals when trip generation is expected to exceed 50 vehicles during the peak hour or 500 Average Daily Traffic (ADT), or in the case where a localized safety or capacity deficiency exists as determined by the City Engineer.

   The Transportation Impact Study shall comply with the Criteria for Transportation Impact Studies included in Appendix A.

7. All developments shall have access in accordance with the requirements of the Longmont Municipal Code.

8. The City of Longmont will review variations to these criteria in accordance with Section 15.02.090.J of the Municipal Code.

9. Streets of less than the entire right-of-way and pavement width are not permitted.

201.00 RIGHT OF WAYS AND STREET CROSS-SECTIONS

201.01 GENERAL

1. Sufficient right-of-way will be provided as required for the traffic needs and cross-section and maintenance of the street including cut or fill slopes, auxiliary lanes, sidewalks, public landscaping, signing, utilities, and other aspects of the development. The right-of-way will extend to the back of the detached sidewalk. A sign easement will be required in situations where the right-of-way does not extend two (2) feet behind the curbwalk.

2. All new local and collector streets shall be constructed with a minimum eight (8) foot planting strip on each side of the street and detached sidewalks. All sidewalks shall be a minimum of five (5) foot wide. On-street parking shall be provided on both sides of all new residential streets, unless otherwise approved by the engineer. The standard for on-street parking shall be one (1) on-street parking space for each single-family residential unit. Multi-family units will be reviewed on a case-by-case basis.

3. All collector streets shall include an on-street bicycle lane.

4. The minimum right-of-way width for arterial streets shall be one hundred twenty (120) feet. Arterial streets shall include an eight (8) foot wide detached concrete path, a minimum 12' wide planting area between the curb and detached concrete path, and the right-of-way shall extend four (4) minimum behind the concrete path. The twelve (12) foot wide planting strip may be reduced at intersections where turn lanes are required. The concrete path shall be attached at intersections per Detail 200-14 Alternate (Alt.) A and Alternate (Alt.) B.

5. Additional right-of-way and roadway width may be required to accommodate traffic or other development needs such as turn lanes, accel/decel lanes, extra lanes, pedestrian or bicycle facilities, landscaping, all utilities, drainage requirements per the City Storm Drainage Criteria Manual, or construction requirements such as cut or fill slopes.

6. All streets shall maintain a minimum of twenty (20) foot pavement width free of parking and obstructions with all turns having no less than a fifty (50) foot outside or a thirty (30) foot inside radius.

7. All alleys shall have a minimum of a twenty (20) foot pavement width and a twenty two (22) foot right-of-way width.

201.02 DESIGN CRITERIA

1. The cross-section of streets shall be designed based on the specific needs of the street, taking into consideration the need for travel lanes (exclusive of gutter pans), turn lanes, bicycle lanes, parking and pedestrian facilities. For design purposes the following lane width standards shall be used:

Lane Width	Arterial	Collector	Local
Travel Lane – Residential	12'	10'	10'
Travel Lane – Commercial/ Industrial	12'	12'	12'

Turn Lane – Residential	12’	10’	10’
Turn Lane – Commercial/ Industrial	12’	12’	12’
Parking Lane – Residential	N/A	8’	7’
Parking Lane – Commercial/ Industrial	N/A	8’	8’
Bicycle Lane (Required on all Arterial and Collector Streets)	5’	5’	5’
Bicycle/Parking Combined	N/A	12’	12’

202.00 HORIZONTAL ALIGNMENT

202.01 GENERAL

1. Horizontal alignment shall provide for the safety of pedestrians, bicyclists, and motorists. On collector and local streets in residential areas, particular care shall be given to avoid design that encourages excessive speed

   On collector and local streets in residential areas, the design shall include “slow points” at no more than five hundred (500) foot spacing. Examples of slow points can include curves, medians, neckdowns, traffic circles, stop condition intersections (based on approved traffic conditions and meeting the criteria of the MUTCD), and other approved traffic calming techniques.

2. The street pattern in a subdivision shall be the most advantageous configuration to serve adjoining areas and the entire neighborhood or district. Where appropriate to the design, proposed streets shall be continuous and in alignment with existing, planned or platted streets.

3. Proposed streets shall be extended to the boundary lines of the subdivision, except where prohibited by topography or other physical conditions, or where such extension is not necessary for connection to adjacent properties. Where streets will be extended beyond the property line, sufficient engineering data shall be provided to establish feasibility of extension meeting city standards. Construction of the proposed streets may include grading and drainage transitions at the edge of the development.

4. Streets shall be placed in accordance with the Longmont Area Comprehensive Plan where applicable.

202.02 DESIGN CRITERIA

1. All proposed streets shall conform with the horizontal curve standards outlined as follows:

STREET TYPE DESIGN SPEED	MINIMUM CENTERLINE RADIUS (FT.)	MINIMUM TANGENT BETWEEN REVERSE CURVES (FT.)
Arterial 45 mph	*710*	300
Collector *30* mph	330	100

Local Industrial 30 mph	275	100
Local Commercial 30 mph	275	100
Local Residential Standard 25mph	100	100
Alley 20 mph	90	---
Emergency Access	---	---
Truck Route	---	---

a. These horizontal curve standards are for the design speeds shown assuming 4% superelevation for arterial streets and no superelevation on collector or local streets. The City may require curves designed for higher design speeds as conditions require.

b. Where curves are designed with superelevation, the superelevation shall be in accordance with the recommendations of A.A.S.H.T.O. and approved by the City. The rate of superelevation, the superelevation runout length, the crown runout length, and the point at which the full superelevation is reached shall be clearly shown on the construction plans. Superelevation shall not be permitted on local streets.

c. A.A.S.H.T.O. stopping sight distances must be maintained at all times. These horizontal curve standards are for situations where there will be adequate stopping sight distance on the curve. In areas where obstructions limit sight distance, curve lengths may need to be greater than listed.

2. There shall be a minimum tangent where a curvilinear street is approaching an intersection. This distance shall be a minimum of one hundred fifty (150) feet for a collector street approaching an arterial street. The minimum tangent distance for local street intersections and a local street approaching a collector street shall be one hundred (100) feet.

203.00 VERTICAL ALIGNMENT

203.01 GENERAL

1. Vertical alignment and grades shall take into consideration the existing topography, drainage needs, and shall provide for the safety of pedestrians and motorists. Unless modified in these Standards, vertical alignment shall be designed in accordance with A.A.S.H.T.O. criteria.

2. Continuous changing of grades that create a "roller coaster" effect shall not be permitted.

203.02 DESIGN CRITERIA

1. All proposed streets shall conform with the minimum and maximum allowable grade standards shown in the following table:

STREET	LAND	% GRADE
Arterial	All	0.5/4.0
Collector	All	0.5/5.0
Local	Industrial	0.5/4.0
Local	Commercial	0.5/5.0
Local	Residential High Volume	0.5/5.0
Local	Residential Standard	0.5/5.0
Cul-de-sacs	Residential	0.6/5.0
Alley	All	0.5/5.0
Emergency	All	0.5/6.0

2. Connections with existing streets shall be made in a way that will create a smooth transition. The higher volume street at an intersection shall govern the through grade, and cross-sections. The maximum allowable approach grade at an intersection shall be 4% for a distance as designated by the following table:

APPROACHING STREET	LOCAL	COLLECTOR	ARTERIAL
Local	50 feet	50 feet	75 feet
Collector	----	75 feet	150 feet
Arterial	----	----	200 feet (1)

Distances shown are measured from the flowline intersections.

Notes:

1. The maximum allowable approach grade at the intersection of two arterials shall be 2%.

2. In intersections where there will be crosspans, the transition of the crown into the crosspan shall occur in fifty (50) feet for areas where the approach grade is between 2% - 4%. The transition of the crown in the crosspan shall occur in thirty-five (35) feet for streets where the approach grade is less than 2%. There shall be no crosspans on collector and arterial streets. Unless otherwise approved by the City, there shall be no crosspans on local streets with an average daily traffic volume greater than five hundred (500) other than at stop conditions.

Crest vertical curves shall comply with the following criteria:

MINIMUM LENGTH OF CREST VERTICAL CURVES (IN FEET)			
Change In % Grade	Arterial (45 mph)	Collector (35 mph)	Other (25mph or less)
0.00 – 1.00	None	None	None
1.00 – 2.00	135	90	75
2.00 – 3.00	180	90	75
3.00 – 4.00	240	90	75
4.00 – 5.00	300	95	75
5.00 – 6.00	360	115	75
6.00 – 7.00	420	130	80
7.00 – 8.00	480	150	90
8.00 – 9.00	----	170	100
9.00 – 10.00	----	185	115

a. Lengths above do not allow passing on crest of vertical curves. Design may warrant a passing move on collectors or arterials, which would lengthen the vertical curves. The required lengths for passing will be provided on a case by case basis by the City.

b. These vertical curve lengths are for the design speeds as shown. The City may require curves designed for different design speeds as conditions require.

1. Sag vertical curves shall comply with the following criteria:

MINIMUM LENGTH OF SAG VERTICAL CURVES (IN FEET)			
Change In % Grade	Arterial (45 mph)	Collector (***30*** mph)	Other (***25*** mph or less)
0.00 – 1.00	None	None	None
1.00 – 2.00	160	90	75
2.00 – 3.00	240	110	80
3.00 – 4.00	320	150	110
4.00 – 5.00	390	190	130
5.00 – 6.00	470	220	160
6.00 – 7.00	550	260	180
7.00 – 8.00	630	290	210
8.00 – 9.00	----	330	230
9.00 – 10.00	----	370	260

a. These vertical curve lengths are for the design speeds as shown. The City may require curves designed for different design speeds as conditions require.

204.00 RESERVED

205.00 INTERSECTIONS

205.01 GENERAL

1. Intersections (which shall include all street access points - both public and private) shall be designed to provide for the safety of pedestrians and motorists.

2. At street intersections, property lines shall be truncated as shown in Detail 200-02 to provide adequate right-of-way for curb ramps and utilities.

3. Intersection design shall take into consideration auxiliary turn lanes as required by the approved Transportation Impact Study, or as required for site specific conditions.

4. Intersection spacing shall be in accordance with Section 205.03.

5. All proposed intersections shall be at right angles unless topography and other limiting factors of good design and safety otherwise require. No intersection shall be at an angle of less than 75 degrees.

205.02 DESIGN CRITERIA

1. The design criteria for all street intersections shall conform with the Horizontal Alignment Design Criteria outlined in this document.

2. All intersections shall be designed and constructed with pedestrian curb ramp access on all corners (Details 200-11, 200-14 Alt. A, 200-14 Alt. B, and 200-15).

3. Intersection Obstruction Free Areas - In order to preserve sight distance and the safety of pedestrians and vehicles, an unobstructed area shall be maintained with the following sight distance triangular areas. These areas shall be free from shrubs, ground covers, berms, fences, signs, structures, parking, or other material or items greater than three (3) feet in height, when measured from the grade of the roadway, which would block the intersection sight distance. Trees shall not be planted within the triangular area. Fences shall be excepted from the three (3) foot height limitation provided that the fence does not exceed three and one half (3½) feet in height, and is at least 50% open such that sight distance is not impaired.

    a. At the intersection of any two streets, or where a street intersects with an alley: A triangle measuring thirty (30) feet along each curb or edge of roadway from their point of intersection, the third side being a diagonal line connecting the first two. The City may require a greater distance in certain high volume or high speed traffic intersections.

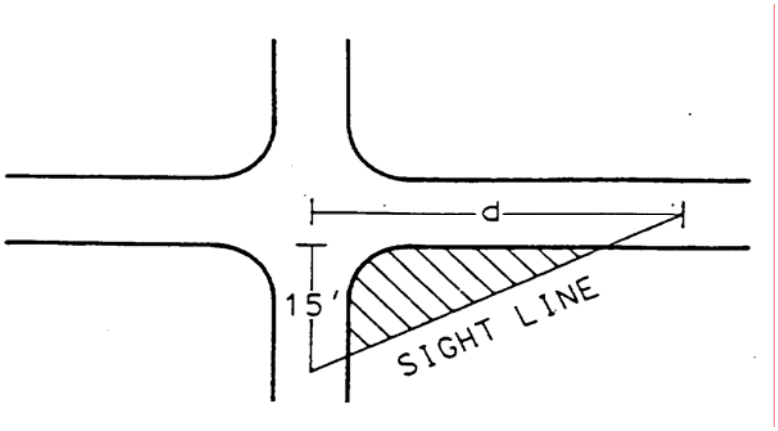
    b. At the intersection of a private access point and street: A triangle measuring fifteen (15) feet in length along the edge of the driveway and along the curb or edge of roadway from their point of intersection, the third side being a diagonal line connecting the first two (2).

4. Additional Intersection Sight Distance Criteria - For new development, and in situations where specific safety concerns exist, or on higher speed or volume streets, the City will require additional sight distance review, and an increase in the obstruction free areas outlined above. The criteria used will be as follows.

    a. Intersection sight distance shall be measured at a height of three and one half (3½) feet for the entering vehicle to a height of four and one quarter (4¼) feet for the oncoming vehicle. The entering driver's eyes shall be assumed to be at a point fifteen (15) feet back from the edge of the traveled way.

        The following table and figure shall be used to determine the area necessary for intersection sight distance. That area shall be free from shrubs, ground covers, berms, fences, signs, structures, parking, or other material or items greater than three (3.0) feet in height, when measured from the grade of the roadway, which would block the intersection sight distance. Fences shall be excepted from the three (3.0) foot height limitation provided that the fence does not exceed three and one half (3½) feet in height, and is at least 50% open such that sight distance is not impaired.

DESIGN SPEED STREET (FT.)	INTERSECTION SIGHT (D) 2-LNE THROUGH	INTERSECTION SIGHT (D) 4-LANE THROUGH
20	200	240
25	250	300
30	300	360
35	350	420
40	400	480
45	450	540
50	500	600
55	550	660



Note: Additional distance may be required where heavy truck traffic or other conditions warrant increased sight distance.

5. Determination of need for traffic control devices, including stop signs and traffic signals shall be made by the City in accordance with the MUTCD and other applicable City regulations.

6. Curb radii shall conform with the standards in the following table:

INTERSECTION TYPE RETURN RADIUS (FEET)	MINIMUM/MAXIMUM CURB
Arterial/Any Street	35-50
Collector/Collector	35-50
Collector/Local	25 minimum
Industrial/Any Street	35-50
Commercial/Any Street	35-50
Local/Local	15-25
Alley	20 minimum
Emergency Access	20 minimum
Truck Route/Any Street	35 minimum

205.03 SPACING CRITERIA

1. There shall be no direct access from any private property to an arterial unless no other alternative access is available or a variance to this section has been approved.

2. Intersections with no potential for signalization (as determined by the City) will be spaced in accordance with the following table:

ROADWAY	OFFSET
Arterial	660 feet
Collector	330 feet
Local	135 feet

3. Intersections with the potential for signalization (as determined by the City) shall be spaced no less than one half (½) mile from the nearest existing or planned signalized intersection. If an intersection that will potentially need a signal cannot meet this spacing requirement it may be limited to right turns.

205.04 AUXILLARY LANES

1. Left turn lanes will be installed on intersection approaches (where left turns are not prohibited) when any of the following criteria are met:

    a. The approach is at an intersection that is signalized or is planned to be signalized in the future.

    b. On an uncontrolled approach on an arterial street.

    c. On an uncontrolled approach on a collector street that is striped as a three lane street (with a continuous center turn lane.)

    d. At a four-legged intersection when the opposing approach requires a left turn lane.

    e. On a STOP sign controlled approach on a collector or arterial street with adequate width for more than one approach lane when an exclusive left turn lane minimizes the approach delay (as determined using the latest Highway Capacity Manual analysis techniques.)

    f. At an existing intersection where the accident history identifies an accident pattern that is susceptible to improvement by installing a left turn lane as determined by the City.

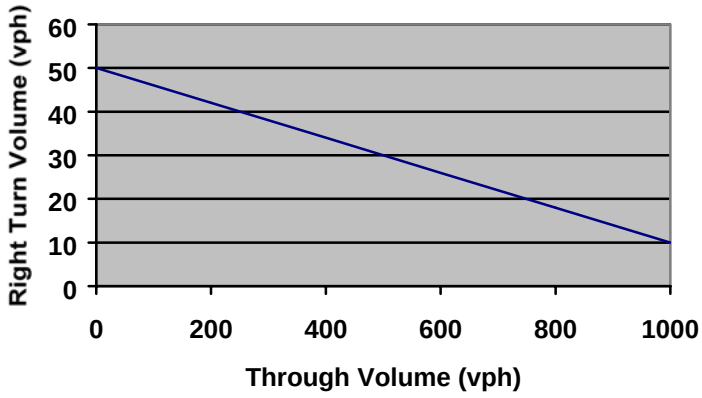
2. Right turn lanes will be installed on intersection approaches when any of the following criteria are met:

    a. The intersection is signalized or is planned to be signalized in the future.

    b. At an existing intersection where the accident history identifies an accident pattern that is susceptible to improvement by installing a right turn lane.

c. On a STOP sign controlled approach on a collector or arterial street with adequate width for more than one approach lane when an exclusive right turn lane minimizes the approach delay (as determined using the latest Highway Capacity Manual analysis techniques.)

d. The approach is uncontrolled and the traffic volumes estimated in the approved traffic impact study (see appendix A), when applied to the following graph, require a right turn lane. In the graph, when the plotted point representing the through traffic (or the through traffic in the outside through lane when more than one through lane exists) on the approach and the corresponding right turn volume on the approach fall above the line a right turn lane is warranted.



3. On arterial streets, when conditions allow, the total length of left and right turn lanes will be the sum of the taper length plus the deceleration length plus the storage length as shown in part 205.04.4 below. Where intersection spacing or other space constraints do not allow this lane length the taper length may be considered as part of the deceleration length. If further reduction is necessary the desirable deceleration length may be reduced to fit the turn lane in the available space.

   On uncontrolled approaches on collector streets the total length of left and right turn lanes will be the deceleration length plus storage length. The taper length will be considered as part of the deceleration length. If intersection spacing or other space constraints do not allow this lane length the desirable deceleration length may be reduced to fit the turn lane in the available space.

   On controlled approaches on collector streets the total length of left and right turn lanes will be the taper length plus storage length. If there is not adequate space to allow this lane length, the storage length may be reduced to fit the turn lane in the available space.

4. Turn lanes should have the following lengths:

   a. Taper length will be between one hundred twenty (120) feet and one hundred eighty (180) feet for all street classifications.

   b. The desirable deceleration length is three hundred seventy five (375) feet on arterial streets (design speed 50 mph); two hundred sixty (260) feet on collector

streets (design speed 40 mph) and one hundred eighty (180) feet on local streets (design speed 30 mph).

c. For left turn lanes, the desirable storage length (in feet) at signalized intersections is 1.1 times the left turn volume projected for the approach in the approved traffic impact study. For left turn lanes at unsignalized intersections, the desirable storage length is to be determined based on the results of the capacity analysis conducted as part of the approved traffic impact study. The 95th percentile queue calculated using the latest procedures in the Highway Capacity Manual will be used to determine the appropriate storage length assuming twenty five (25) foot per car in queue.

d. For right turn lanes, the desirable storage length (in feet) at signalized intersections is 0.6 times the right turn volume projected for the approach in the approved traffic impact study. On controlled approaches at unsignalized intersections, the desirable storage length for right turn lanes shall be based on the results of the capacity analysis conducted as part of the approved traffic impact study. The 95th percentile queue, calculated using the latest procedures in the Highway Capacity Manual, will be used to determine the appropriate storage length assuming twenty five (25) feet per car in queue. On uncontrolled approaches at unsignalized intersections, no storage length is required for right turn lanes.

206.00 CUL-DE-SACS

206.01 GENERAL

1. Permanent dead-end streets shall be in the form of a cul-de-sac. Dead-end streets without a cul-de-sac shall not be allowed unless designed to connect with a future street. If the temporary dead-end street is longer than eight hundred (800) feet, or serves as primary access to any lot, a paved temporary turnaround or a paved temporary connection to another street shall be provided.

206.02 DESIGN CRITERIA

1. Permanent dead-end streets in the form of a cul-de-sac shall have a maximum length of 500 feet, measured along the centerline, from the edge of right-of-way of the intersecting street to the center point of the bulb. The right-of-way for a cul-de-sac shall conform to the right-of-way requirements for the specific street classification of the cul-de-sac.

2. All cul-de-sacs shall have a minimum flowline radius of fifty (50) feet.

3. Sufficient right-of-way will be provided as required for the traffic needs and cross-section and maintenance of the cul-de-sac including cut or fill slopes, auxiliary lanes, sidewalks, public landscaping, signing, utilities, and other aspects of the development. As a minimum, right-of-way will extend two (2) feet beyond the back of the sidewalk.

4. Cul-de-sacs which have internal islands shall be subject to review and approval by the Fire Department and Public Works. In general, the circulation aisle between the island and the exterior curb shall have a fifty (50) foot outside radius and a thirty (30) foot inside radius. There shall be no parking within these circulation aisles.

5. Where cul-de-sac have internal islands with irrigated landscaping, adequate design measures shall be made to drain the landscaped area to avoid damage to the adjacent pavement.

6. All other design criteria shall be the based on the design criteria for the particular street classification.

207.00 STRUCTURAL CROSS-SECTION

207.01 GENERAL

1. The design of the pavement cross-section shall be performed by a Professional Engineer registered in the State of Colorado, whose expertise is soils engineering. The Engineer's report for the pavement thickness design and the soils report upon which it is based will be submitted for review and approval after the overlot grading has been completed and at least two weeks prior to the pre-paving conference.

207.02 DESIGN CRITERIA

1. The design of streets shall be based on the design period of twenty (20) years unless otherwise approved by the City Engineer.

2. The design of pavements shall be based upon the Roadway Design Manual of the Colorado Department of Transportation.

3. The Colorado Department of Transportation methodology is accepted for both rigid and flexible street pavement designs.

4. In no event shall pavement sections be less than the following minimum structural sections:

   Pavement Section. The minimum structural section shall be four and one half (4½) inches of hot bituminous pavement on eight (8) inches of class six (6) aggregate base course placed on compacted subgrade.

   Full Depth Asphalt. The Minimum full depth asphalt thickness shall be six (6) inches of hot bituminous pavement placed on compacted subgrade.

   Concrete Pavement. The minimum concrete structural section shall be six (6) inches of non-reinforced Portland cement concrete pavement placed on compacted subgrade.

5. If the minimum pavement section is to be used, the report must demonstrate the adequacy of the structural section for the soil conditions encountered.

6. If a single pavement design is used for all streets within the development, that pavement design shall be based on the worst soil encountered from the standpoint of subgrade support.

7. For streets, the top one and one-half inch of asphalt pavement shall be constructed in accordance with Detail 200-26 at the end of the one year warranty period unless otherwise identified in the public improvements agreement, or agreed to by the City.

8. The following table includes the standard design volumes, speed, percent truck, and EDLA requirements to be used in the design of all streets unless site specific conditions or the approved traffic impact study warrant different criteria:

STREET TYPE	ADT	DESIGN SPEED	% TRUCK	EDLA (MINIMUM)
Local Standard Residential	2,500	25mph	1%	10
Local Commercial	2,500	30 mph	7%	50
Local Industrial	2,500	30 mph	20%	85 (2)
Residential Collector	9,000	30mph	(1)	50
Non-Residential Collector	9,000	30mph	(1)	100 (2)
Arterial	9,000+	45 mph	(1)	200 (2)

Notes:

1. For Collector and Arterial Streets, the percent truck usage shall be determined on a case by case basis.

2. EDLA for Local Industrial, Non-residential Collector and Arterial streets shall be based on values obtained from a traffic study. The listed EDLA values are minimum requirements.

207.03 MATERIALS

All plant produced hot bituminous asphalt pavement (HBP), shall conform to the City Standard and Specifications and the approved plans. Where these Standards do not address situations, materials, or construction requirements, the City may utilize any applicable requirements of Item 9 of the most recent version of the Metropolitan Governments Pavement Engineers Council (MGPEC) Pavement Design Standards MGPEC Form #9 shall be submitted with the pavement thickness design report.

AGGREGATE: Aggregates for HBP shall be of uniform quality, composed of clean, hard, durable particles of crushed stone, crushed gravel, or crushed slag. Excess of fine material shall be wasted before crushing.

The material shall not contain clay balls, vegetable matter, or other deleterious substances and shall meet the following requirements.

AGGREGATE TEST PROPERTY	COARSE: RETAINED ON #4	FINE: PASSING THE #4
Fine Aggregate Angularity, CP-L 5113 Method A		
Traffic Level 1 & 2	----	40% Min.
Traffic Level 3 to 5	----	45% Min.

Two Fractured Faces, CP 45 Top and Middle Lifts Bottom Lifts	 80% Min. 70% Min.	 ---- ----
LA Abrasion, AASHTO T96	45% Max.	----
Flat and Elongated (Ratio 3:1) AASHTO M283	10% Max.	----
Adherent Coating (Dry Sieving) ASTM D5711	0.5% Max.	----
Sand Equivalent, AASHTO T176	----	45% Max.

Reclaimed Asphalt Pavement material (RAP) is allowed as follows:

a. It shall be of uniform quality and gradation with a maximum size no greater than the nominal aggregate size of the mix.

b. SG Mixes shall not contain more than 20% RAP.

c. RAP is prohibited in other mixes, except as approved by the Engineer.

The HBP gradation for the proposed mix design shall be wholly within the requirements (control points) of the gradation range table below. The allowable job mix gradation for production shall be the design job mix gradation with the production tolerances applied. The proposed design job mix and the final allowable job mix gradation for production shall report all sieves listed in the table:

GRADATION RANGE						
SIEVE SIZE	**SX (1/2" NOMINAL)**		**S (3/4" NOMINAL)**		**SG (1" NOMINAL)**	
	CONTROL POINTS	**RESTRICTED ZONE**	**CONTROL POINTS**	**RESTRICTED ZONE**	**CONTROL POINTS**	**RESTRICTED ZONE***
1½"	----	----	----	----	100	----
1"	----	----	100	----	90 – 100	----
¾"	100	----	90 – 100	----	----	----
½"	90 – 100	----	----	----	----	----
3/8"	----	----	----	----	----	----
#4	----	----	----	----	----	39.5
#8	28 – 58	39.1	23 – 49	34.6	19 – 45	26.8 – 30.8
#16	----	25.6 – 31.6	----	23.3 – 28.3	----	18.1 – 24.1
#30	----	19.1 – 23.1	----	16.7 – 20.7	----	13.6 – 17.6
#50	----	15.5	----	13.7	----	11.4
#200	2.0 – 8.0	----	2.0 – 7.0	----	1.0 -7.0	----

* The restricted zone is a guideline only. It is recommended that the mix design gradation go above the restricted zone boundaries, on the "fine" side.

** These limits shall include the weight of lime at 1.0%

Voids in mineral aggregate (VMA) shall be based on tests of the Bulk Specific Gravity of the Compacted Mix (CP-L 5103) and Aggregate (AASHTO T84 & AASHTO T85), and calculated according to CP-48. All mixes shall meet the minimum VMA specified on Table below:

MIMINUM VMA, %			
Nominal Maximum Particle Size*	**Air Voids****		
	3.5%	4.0%	4.5%
1”	12.5	13.0	13.5
¾”	13.5	14.0	14.5
½”	14.5	15.0	15.5

* Nominal Maximum Particle Size is defined as one sieve size larger than the first sieve to retain more than 10%, but shall not exceed the 100% passing size. The nominal Maximum Particle Size can vary during mix production even when the 100% passing size is constant.

** Minimum VMA criteria applies to the mix design. The minimum VMA criteria shall be linearly interpolated based on actual air voids. See MIX DESIGN VERFIFICATION TOLERANCES section.

PERFORMANCE GRADED BINDERS - (ASPHALT CEMENT):

The Contractor shall provide acceptable ‘Certifications of Compliance’ of each applicable asphalt cement grade from the supplier. When production begins the Contractor shall provide a one quart can of each specified asphalt cement. Additionally, when requested, the Contractor shall provide the refinery test results that pertain to the asphalt binders used during production.

Asphalt Cement binder shall meet the requirements of the Superpave Performance-Graded Binders (PG) as presented below.

PROPERTIES OF PERFORMANCE GRADED BINDERS			
Property	**PG 58-28**	**PG 64-22**	**PG 76-28**
Traffic Level: Recommended Usage	1 & 2	2 to 5	3 to 5
Flash Point Temperature, °C, AASHTO T48	230 Min.	230 Min.	230 Min.
Viscosity at 135 ° C, Pas, ASTM D4402	3 Max.	3 Max.	3 Max.
Dynamic Shear, Temperature °C, Where C*/Sin? @ 10 Rad/Sec. ≥ 1.00 Kpa, AASTO TP5	58	64	76
Rolling Thin Film Oven Residue Properties, AASHTO T240			
Mass Loss, %, AASHTO T240	1.00 Max.	1.00 Max.	1.00 Max.
Dynamic Shear, Temperature °C, Where C*/Sin? @ 10 Rad/Sec. ≥ 2.20 Kpa, AASTO TP5	58	64	76
Elastic Recovery, 25° C, % Min.*	N/A	N/A	N/A
Pressure Aging Vessel Residue Properties, Aging Temperature 100 °C AASHTO PP1			
Dynamic Shear, Temperature °C, Where C*/Sin? @ 10 Rad/Sec. ≥ 5.00 Kpa, AASTO TP5	19	25	28
Creep Stiffness @ 60 Sec. Test Temperature in °C, AASHTO TP1	-18	-12	-18
S, Mpa, AASHTO TP1	300 Max.	300 Min.	300 Min.
M-Value, AASHTO TP1	0.300 Min.	0.300 Max.	0.300 Max.
Direct Tension Temperature in °C, @ 1.0 mm/min., Where Failure Strain > 1.0%, AASHTO TP3	-18	-12	-18

* Nominal Maximum Particle Size is defined as one sieve size larger than the first sieve to retain more than 10%, but shall not exceed the 100% passing size. The nominal Maximum Particle Size can vary during mix production even when the 100% passing size is constant.

** Minimum VMA criteria applies to the mix design. The minimum VMA criteria shall be linearly interpolated based on actual air voids. See MIX DESIGN VERFIFICATION TOLERANCES section.

Performance Graded Binders (Asphalt Cement):

The Contractor shall provide acceptable 'Certifications of Compliance' of each applicable asphalt cement grade from the supplier. When production begins the Contractor shall provide a one quart can of each specified asphalt cement. Additionally, when requested, the Contractor shall provide the refinery test results that pertain to the asphalt binders used during production.

Asphalt Cement binder shall meet the requirements of the Superpave Performance-Graded Binders (PG) as presented below.

SUPERPAVE MIXTURE PROPERTIES			
Traffic Level	**0**	**1, 2 & 3**	**4 & 5**
Traffic Loading, Total 18,000 pound equivalent single axle loads (18K ESAL's). Over design life (usually 20 years)	Non-Vehicular or Paths	1) < 300,000 2) 300,000 to < 1.0 Million 3) 1.0 to < 3.0 Million	4) 3.0 to 10.0 Million 5) >10.0 Million
Initial gyrations, $N_{initial}$ for information only	6	7	8
Air voids, $N_{initia,}$ for information only	>8.5	>9.5	>11.0
Design gyrations, N_{design} (air void: 3.5% to 4.5%) (see note 1, 2)	50	75	100
Hveem stability (minimum) CP-L 5106 (grading S and SX only) (see note 1, 2)	N/A	28	30
Voids filled with asphalt, %, MS-2	70-80	65-78	65-75
Moisture susceptibility (Lottman), Tensile Strength Ratio, % retained, CP-L 5109, method B	80 Min.	80 Min.	80 Min.
Moisture susceptibility (Lottman), CP-L 5109 Dry Tensile Strength, psi	30 Min.	30 Min.	30 Min.
VMA % CP-48 (see note 1, 2)			

Note 1: Maximum Theoretical Specific Gravity of mix by CP-51.

Note 2: Also refer to production tolerances.

Aggregate Grading for the hot bituminous asphalt shall be as follows:

Bottom and intermediate lifts of full depth paving - Grading SG (Minimum lift shall be 3 times the maximum nominal particle size)

Bottom lifts of composite sections - Grading S

Final surface wearing course - Grading SX (one and one half (1½) inch minimum lift)

208.00 GENERAL - CONSTRUCTION

1. The purpose of this standard is to set forth the minimum criteria to be used in the construction of all streets within the City of Longmont.

2. "Streets" as used in this specification shall include the pavement section, right-of-way, sidewalks, driveways, concrete paths, alleys and alley approaches.

3. All materials and construction shall be done in conformance with the City of Longmont Standard Specifications and the approved plans. Where these Standards do not address situations, materials, or construction requirements the City of Longmont shall utilize the requirements of the Colorado Department of Transportation, "Standard Specifications for Road and Bridge Construction" and any applicable HBP mix design and material requirements of Item 9 of the most recent version of Metropolitan Governments Pavement Engineers Council (MGPEC) Pavement Design Standards. Requirements contained in the "Standard Specifications for Road and Bridge Construction" are intended to supplement these City standards.

    a. The term "State Specifications" and "CDOT" in these standards refers to State Department of Transportation, Division of Highways, State of Colorado "Standard Specifications for Road and Bridge Construction". Sections 100 through 109 and measurement and payment provisions of the "State Specifications" shall not apply. Reference in these specifications to the "Division" shall be understood to refer to the City of Longmont and its authorized personnel.

    b. The City of Longmont standards and specifications shall take precedence over conflicting provisions in the CDOT standard specifications and other referenced standards.

4. Where new construction ties into existing improvements, such as edges of pavement, sidewalks, curbs, etc., the Contractor shall line out and cut or saw the existing improvements to a true line and to an approved depth with a vertical face at the line of removal. Where the existing improvements are damaged, the Contractor shall remove the damaged improvements and shall tie-in to improvements which are in good condition as determined by the Inspector.

208.01 SEQUENCE OF CONSTRUCTION

1. All installation and proper compaction of buried utilities shall be completed prior to the construction of the subgrade, base course, pavement, curb, gutter, crosspans, sidewalks, concrete paths and driveways. However, with approval of the Engineer, in situations where a water service line has been added, modified, or inadvertently missed, water service lines may be installed after the curb, gutter and sidewalks have been placed at least seven (7) days, providing no damage is done to the street improvements. The Contractor shall adjust valve boxes and manholes to final grade after installation of the curb and gutter as described below. Electrical services Dry utility road crossing sleeves shall be installed after the water services but prior to the installation of curb radii. except where previous arrangements for use of conduit have been made and approved by the Engineer.

2. Prior to commencing paving operations, a pre-paving meeting shall be held.

3. After lower lift paving is installed, no cuts shall be made without the approval of the Engineer. If utility installation is required after installation of curb, gutter, sidewalk, concrete path or pavement, boring, jacking, or other alternative means of construction will be utilized.

4. If a pavement cut is permitted after installation of the top lift of pavement, the City may require heater scarifying of patch joints, overlaying of the street, or other techniques approved by the City to avoid any reduction in the useful life of the pavement.

208.02 FIXTURE ADJUSTMENT

1. The Contractor shall adjust all manholes, valve boxes and other fixtures encountered within the area to be paved to conform to the finished surface of the pavement to be built as per the street plans and details and in accordance with all requirements outlined in these specifications. Clean the outside of the fixtures of loose, foreign material for the depth of the pavement prior to the paving. The Contractor shall adjust manhole castings, valve boxes and other fixtures outside the paved areas, but within the street right-of-way, to conform with the finished cross section after construction. Inspect valve boxes by placing a valve key on the operating nut to assure a proper alignment. All adjustments shall be to proper alignment and grade to the satisfaction of the Engineer.

2. Manholes, valve boxes and other fixtures shall be adjusted to the interim street grade after the installation of the lower lift of pavement to produce a safe and rideable surface around the fixture. Prior to placing the final lift of asphalt, manholes, valve boxes, and other fixtures shall be adjusted to the final street grade.

208.03 PROTECTION AND CLEANING

1. The Contractor shall take proper precautions for the protection of all existing improvements which are to remain in place and all other identifiable installations that may be encountered during construction which are to remain and not be replaced.

2. The Engineer shall be the sole judge as to whether items may be reset and reused. If, in the opinion of the Engineer, items that were allowed to be reused and reset are damaged during construction the items shall be replaced by the Contractor.

3. The Contractor is responsible for site cleaning during the entire construction period. After paving operations have been completed, the Contractor shall clean and remove all leftover and waste materials. All curbs shall be properly backfilled and the adjacent ground left in a neat and uniform condition, acceptable to the Engineer.

209.00 CLEARING AND GRUBBING

1. This work shall consist of clearing, grubbing, removing and disposing of vegetation and debris within the limits of the right-of-way, easement areas, and such other areas as may be indicated on the drawings or required by the work, except such vegetation and objects designated to remain.

2. The Contractor shall remove and dispose of protruding obstructions, stumps, roots and matted roots over 4 inches in diameter to two feet below the finished grade. Backfill all holes resulting from the removal of obstructions, stumps, and roots and compact the backfill to 95% of Standard Proctor, ASTM D698. Undisturbed stumps, roots, and nonperishable solid objects located two feet or more below the subgrade may remain in place.

3. The Contractor shall clear and strip all surface vegetation, sod, and topsoil from subgrades for permanent construction, fills and embankments. Undisturbed stumps, roots, and nonperishable solid objects located two feet or more below the subgrade may remain in place.

4. The Contractor shall trim or remove and dispose of branches of trees extending over the roadway to a clear height of 15 feet above the roadway surface. All removal and trimming shall be done in accordance with good tree surgery practices.

210.00 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

1. This work shall consist of the removal, wholly or in part, and the satisfactory disposal of buildings, foundations, fences, signs, structures, old pavements, abandoned pipelines, and other obstructions which are not designated on the drawings to remain.

2. Where culverts or sewers are to be abandoned in place under local streets, the culvert and sewer ends are to be sufficiently filled or crushed to prevent the future settlement of embankments and backfills. Fill the ends of concrete, plastic or masonry culverts with concrete and crush the ends of metal culverts. The removal and plugging of culverts shall include the removal of head walls and other appurtenances that are necessary to accommodate the work.

   All culverts or sewers to be abandoned under collector and arterial streets shall be flow-filled where they are located longitudinally within the public right-of-way. Unless otherwise approved by the Engineer, the culverts or sewers that cross the public right-of-way under collector and arterial streets shall be removed.

3. The Contractor shall not remove sidewalks, concrete paths, streets, driveways, culverts, or other drainage structures in use by traffic or pedestrians until satisfactory arrangements acceptable to the City have been made to accommodate traffic and drainage.

4. Culverts designated to remain shall be cleaned at the end of construction by removing all sediment and debris from within the culvert and appurtenant structures.

5. All structures designated to partially remain within the right-of-way shall be removed to a depth of two (2) feet below the proposed subgrade.

211.00 EXCAVATION AND EMBANKMENT

211.01 GENERAL

1. This section covers excavation, hauling, disposal, placement, subgrade preparation, shaping, backfill, compaction, and embankments.

2. For these specifications "Roadbed" is defined as the graded portion of a road within top and side slopes, prepared as a foundation for the pavement structure, gutters, sidewalks.

3. The Contractor shall complete all necessary clearing and grubbing and removal of obstructions prior to beginning grading operations.

4. The Contractor shall not begin site grading until the work has been properly staked. The Contractor shall not excavate beyond the dimensions and elevations established.

5. Completed or partially completed areas of work that are disturbed by subsequent construction operations or by adverse weather shall be scarified, reshaped, and recompacted to the required density.

211.02 MATERIALS

1. Generally, soil materials for roadway construction shall be as recommended in the approved soils report. The following soils materials are the minimum requirements for the materials to be used in the construction of roadways.

2. Embankment and fill material shall consist of soil, granular sand, gravel, cobble and boulder material, free from frozen material, organic material, trash, glass, broken concrete, other corrosive or deleterious material. The Contractor shall import approved material as necessary. Prior to placement of any imported material, the Contractor shall submit test results to the City for review and approval indicating compliance with the requirements of the soils report and design standards.

   Approval of embankment and fill material is contingent on the material having a resistance value when tested by the Hveem Stabilometer, or equivalent resilient modulus value, of at least that specified in the approved plans and a maximum dry density of not less than 90 pounds per cubic foot. The material must be stable and have a liquid limit less than 40 and a plastic index less than fifteen (15) when tested in accordance with AASHTO T-89 and T-90, respectively. Size restrictions are as follow:

   a. No material shall have a dimension larger than six (6) inches. In the top eighteen inches of fill, no material shall have a dimension larger than four (4) inches.

   b. These size restrictions are contingent upon the material being evenly distributed in finer material such that uniform soil consolidation is achieved. If uniform soil consolidation is not being achieved the Engineer may reduce the size of materials allowed or change the embankment and fill material requirements.

3. Where unstable subgrade is encountered, the Contractor shall take steps necessary to stabilize the material by techniques such as over excavation and backfill with imported material, use of geotextile fabrics, or other combinations. The contractor shall notify the Engineer of the proposed solution to stabilize the subgrade. If required by the City, the Developer's Design Engineer will make recommendations on stabilization techniques and materials.

211.03 SUBGRADE

1. The Contractor shall scarify the subgrade to the depth specified in the approved soils report and compact to the density specified within the approved soils report. In no case shall the depth be less than twelve (12) inches, or the compaction less that specified in these specifications.

2. The Contractor shall not place any embankment, fill, base course, pavement or other permanent improvements on frozen or muddy subgrade. Compact and consolidate subgrades such that they are free from mud and sufficiently stable to remain firm, dense and intact.

3. Wherever material is encountered that is wet or otherwise unstable and is incapable of supporting structures or the roadbed the material shall be over excavated to a depth suitable for construction of a stable subgrade. The Contractor shall backfill over excavated areas with a stabilization material approved by the Engineer. An approved filter fabric shall be used where required by the Engineer around the Stabilization Material and on the subgrade to stabilize the subgrade and prevent fines from migrating into the Stabilization Material.

4. Level and roll the subgrade so the materials will be uniformly compacted and bond well with the first layer of the base course, backfill, fill or embankment.

5. Shape the surface of the subgrade under areas of base course, and pavement surfaces so that they are not more than one quarter (¼) inch above or one half (½) inch below the required subgrade elevation. Shape the surface of the subgrade under structures such that they are not more than zero inches above or one and one quarter (1¼) inches below the required subgrade elevation. Fill areas of the subgrade that are low with the material to be placed upon the subgrade. Shape the subgrade to prevent the ponding of water from drainage and rain.

6. Where pipe will pass through backfill, embankment or fill the Contractor shall place and compact the backfill, embankment or fill to an elevation at least one foot above the top of the proposed pipe prior to beginning trenching.

7. Remove exposed cobbles, stones or boulders greater than four (4) inches in size that create an irregular surface at the subgrade under base course material. Backfill the resulting voids with base course material and compact to the specified density.

211.04 EXCAVATION

1. The Contractor shall remove and dispose of excess excavated materials and materials that are not suitable for use within the public right-of-way.

2. Foundations and the pavement structure shall be founded on original, undisturbed soil or on structural backfill extended to the undisturbed soil. Unless otherwise approved by the Engineer and stipulated in the approved soils report, Foundations and the pavement structure shall not be founded on existing fill if encountered at the project site. If existing fill is encountered at the subgrade, the Contractor shall excavate to original undisturbed soil and bring the grade to the required elevation with approved material. Existing fill material if encountered at the site shall be removed. Existing fill may be stockpiled for

reuse in backfills and embankments if it meets the requirements of the specifications. The Contractor shall remove unsuitable soil material as directed by the Engineer. The disposal of unsuitable soil material is the responsibility of the Contractor.

3. Excavate rock that is encountered at the site to a minimum depth of six (6) inches below subgrade within the limits of the roadbed.

4. The Contractor shall blend the intersection of cut slopes with the slopes of adjacent natural ground surfaces in a uniform manner. The tops of cut slopes shall be flattened and rounded in accordance with the approved plans. Slopes shall be graded as shown on the Approved Plans, shall not exceed a 4:1 slope unless otherwise approved by the Engineer, and shall be graded to drain.

211.05 BACKFILL, FILL AND EMBANKMENT

1. The Contractor shall import approved material if compaction cannot be obtained with job excavated material, or if job excavated material does not meet the criteria in Section 211.02, or the requirements of the geotechnical report. The Contractor shall provide the proper documentation showing that the existing and imported materials meets the appropriate criteria.

2. Place the backfill, fills and embankments on suitably prepared subgrades. Distribute material so as to preclude the formation of lenses of material differing from the surrounding materials. Lifts shall have uniform thickness prior to compaction and shall not exceed eight (8) inches in uncompacted thickness. Spread and level material that is deposited in piles or windrows prior to compaction. Continuously mix, level, and manipulate the material as compaction progresses to assure uniform moisture and density.

3. The Contractor shall insure that the methods of compaction shall not overturn or place excessive pressure against structures such as retaining walls, abutments, wing walls, or culvert head walls where backfill, fills or embankment is placed on only one side of structures. When backfill, fill or embankment is placed on all sides of a concrete structure, the embankment shall be brought up equally on all sides of the structure. The fill adjacent to the abutment of a bridge shall not be placed higher than the bottom of the backwall until the superstructure is in place.

4. Where embankments encroach on stream channels, ponds or lakes, the largest available rock from the excavation shall be placed along the toes of slopes to protect the embankments against erosion from water action. The Engineer may require the use of riprap along channels, ponds and lakes. All environmental and grading permits shall be obtained from the US Army Corps of Engineers, Colorado Department of Public Health and Environment and City of Longmont Public Works Division prior to construction adjacent to stream channels, ponds or lakes.

5. Rock embankment, if allowed, shall not be constructed above an elevation two feet below the finished subgrade. The balance of the embankment shall be placed in layers not to exceed eight inches loose thickness and compacted as specified for embankments. When rock fill is placed over any structure, the structure shall be covered with a minimum of two (2) feet of compacted earth or other approved material before the rock is placed.

6. Cross hauling or other action as appropriate will be required by the Engineer when necessary to insure that the best available material is placed in critical areas of embankments.

7. The Contractor shall use equipment suited to the soil being compacted. Compaction by use of water ponding or jetting or use of a hydro-hammer is strictly forbidden.

211.06 FINISH GRADING

1. After the pavement, permanent surface improvements, structures, backfills and fills have been completed the Contractor shall grade non-paved areas to slopes, contours or elevations indicated on the Drawings. Finish grading shall ensure proper positive flow and drainage. Conduct final rolling operations to produce a stable, uniform and smooth cross-section. Provide effective drainage with slopes of at least 1% unless otherwise indicated.

2. Where topsoil is to be placed in the non-paved areas the Contractor shall provide allowance for topsoil placement. Finish grade areas to receive topsoil to within not more than 0.1 feet above or below the required subgrade elevations. Compact areas to receive topsoil as specified and grade such that they are free from irregular surface changes.

211.07 COMPACTION AND TESTING

1. The requirements for Compaction and Testing, Construction Water, and Compaction Test Failure are the same as those required under their respective sections for trenching as specified in the General Requirements section of these Standard Specifications, except as modified herein.

2. The Contractor shall test the subgrades, fills, backfills and embankments for compliance with the requirements for thickness and compaction density. Provide, as a minimum, one (1) density test for each one hundred fifty (150) linear feet of subgrade, one (1) density test for each 100 lineal feet of curbwalk or concrete path and one (1) density test for each five hundred (500) cubic yards of embankment, fill or backfill. The Engineer may designate the locations for testing. The Engineer may require more tests when in their opinion they are required. Remove and replace unacceptable materials and repair unacceptable areas of thickness or compaction as required by the Engineer. Compaction tests do not relieve Contractor of the requirement for a firm, stable surface.

3. Field compaction densities shall be as indicated in the soil report but not less than the following minimum Standard Proctor densities, reference ASTM D698.

    a. All compaction within the public right-of-way shall be equal to 95% compaction at plus or minus 2% optimum moisture content.

    b. Do not compact topsoil.

4. Proof roll the subgrade and base course prior to the placement of the subsequent course after the specified compaction densities have been obtained. Proof rolling shall be done with an approved vehicle having an average minimum axle load of 18,000 pounds per axle. Use of graders or front-end loaders is not acceptable. Areas that show movement and unstable areas shall be corrected. Proof rolling shall be done within twenty four (24)

hours of the compaction density testing and within twenty four (24) hours of placement of any asphalt or concrete surface.

212.00 AGGREGATE BASE COURSE

1. The Contractor shall mix the aggregate by methods that insure a thorough and homogenous mixture.

2. The subgrade and base course shall be free from standing water during construction. Remove any water encountered during construction to the extent necessary to provide a firm and stable subgrade and base course. Divert surface runoff or use other means necessary to accomplish the above. Do not deposit, tamp, roll or otherwise mechanically compact the aggregate base course in water. Do not construct aggregate base course with frozen material or on frozen subgrade.

3. Aggregate base course shall be crushed stone or crushed gravel conforming to of Section 703.03 of "State Specifications" with an minimum "R" value of 70. The soils report shall identify areas that in the soils engineer's opinion need to be treated with mineral filler or hydrated lime. Commercial mineral filler if required shall conform to Section 703.01 of the "State Specifications". Hydrated lime shall conform to section 712.03 of the "State Specifications".

4. If the required compacted depth of the aggregate base course exceeds six (6) inches, it shall be constructed in two or more layers of approximately equal thickness. The maximum compacted thickness of any one layer of aggregate base course shall not exceed six (6) inches. The surface of each layer shall be maintained during the compaction operations so that a uniform texture is produced and the aggregates are firmly keyed. Water shall be uniformly applied during compaction in the quantity necessary for proper consolidation of the material, or the material shall be harrowed, disked, bladed, or otherwise worked to insure a uniform moisture content. Immediately prior to paving, proof roll the aggregate base course as described in the General Section of these Street Construction Specifications to verify the base course stability. Correct areas that are not stable.

5. Herbicides, conforming to the requirements of Section 217 of the "State Specifications", shall be applied to the aggregate base course and/or subgrade no more than one (1) day prior to paving. The rate of application shall be as recommended by the herbicide manufacturer. Herbicides shall not be used where they may contaminate water used for irrigation or drinking purposes.

6. As a minimum, the Contractor shall provide one field compaction test for each lift of aggregate base course for every one hundred fifty (150) linear feet of base course placed. The Engineer may designate the locations for testing. The aggregate base course shall be compacted to 95% minimum density, Modified Proctor, ASTM D1557 or AASHTO T180. All compacted aggregate base course shall be within 2% (+) of the optimum moisture content of the soil as determined by ASTM D1557. The Engineer may require more tests when in their opinion they are required due to visibly unstable areas. Remove and replace unacceptable materials and repair unacceptable areas of thickness or compaction as required by the Engineer. Compaction tests do not relieve Contractor of the requirement for a firm, stable surface.

7. The in-place compacted thickness of aggregate base course shall be no more than one quarter (¼) inches less than the thickness shown on the approved drawings.

8. Test the finished surface of the compacted aggregate base course for smoothness using ten foot straightedge applied parallel with, and at right angles to centerline of the paved area. Any deviation in excess of one quarter (¼) inches shall be corrected to the satisfaction of the Engineer.

213.00 PLANT MIXED BITUMINOUS PAVEMENT

213.01 GENERAL

1. Prior to beginning paving each calendar year, the Contractor shall submit to the Engineer for review and approval a mix design for each mix. The Engineer may also require mix designs from the Contractor during the year because of changes in the physical properties of the aggregate, source of the aggregate, or other changes in the mix.

2. The job mix formula for each mixture shall establish a single percentage of aggregate passing each required sieve size, a single percentage of bituminous material to be added to the aggregate and a single temperature for the mixture at the discharge point of the plant. The job mix formula shall also identify all additives, optimum asphalt content and the final gradation shown on 0.45 power graph. Mix designs shall also provide the results of a moisture susceptibility test (Lottman) performed at optimum oil content in accordance with CP-L 5109, method B. Where reclaimed asphalt is used in the job mix, the design report shall address the use of reclaimed asphalt and the percent of asphalt in the reclaimed asphalt. Submit the following with the job mix formula.

    a. The proposed job mix gradation for each mixture which shall be wholly within the Gradation Range Table before the production (job mix) tolerances are applied.

    b. The aggregate source, gradation, additive blending, aggregate physical properties, and percentage of each element used in the production of the final mix.

    c. The name of the refinery supplying the asphalt cement, source and grade of performance graded binder, source of lime, and the source and type of anti-strip additive.

3. After the job mix formula is established, all mixtures furnished for the project shall conform to the approved job mix formula within the range of production tolerances.

4. Mix design (production) verification shall occur prior to the start of the project. Mix design (production) verification shall be performed by LABCAT Level C accredited technicians to verify the volumetric properties of the mix. If the mix has been produced for another project within the last ninety (90) days, data from that project can be submitted for verification. The mix verification test reports shall be submitted to the City prior to mix placement.

    Volumetric properties shall be within the following tolerances. The tolerances in the following table are for mix design verification only (from plant produced material from the specified mix design). See Job Mix (Production) Formula Tolerances table for production tolerances.

MIX DESIGN (PRODUCTION) VERFIFICATION TOLERANCES	
Air Voids	±-1.2%
VMA	± -1.2%
Asphalt Cement Content	± -0.3%
Stability	Applicable Minimum

Change in Source or Grade

Should a change in the source of Lime occur, or more than one temperature grade change on either the high or low end of Asphalt Binder (AC) occur, a one point verification test (at optimum asphalt content) of the mix must be performed to verify that the applicable criteria is still met. If this testing shows noncompliance, a new Design Job Mix shall be established before the new AC or Lime source is used. Any change in aggregate type or source will require a new mix design. The one point verification test may be performed on lab mixed samples or on Plant mixed samples.

Production test results shall comply with the following table:

JOB MIX (PRODUCTION) FORMULA TOLERANCES	
Passing No. ¾" and Larger	6%
Passing No. 4 and No. 8	5%
Passing No. 30	4%
Passing No. 200	2%
Air Voids	1.2%
VMA	1.2%
Hveem Stability	See Footnote #3
Asphalt Content	0.3%
Asphalt Content, Mixes with >10% RAP	0.4%

1. There is 1.0% tolerance for the maximum sieve size.

2. Mixes with -No.200 sieve material produced over 7.0% is allowed only when Air Voids are kept within 1.2% of the Air Voids at mix design optimum and VMA still meets requirements.

3. Hveem Stability must meet the minimum value specified in Superpave Mixture Properties table.

4. Hot bituminous pavement Gradation SG may contain up to 20% reclaimed asphalt pavement where approved by the Engineer. Hot bituminous pavement Gradation SX shall not contain any reclaimed asphalt pavement. Reclaimed asphalt pavement where allowed shall meet the requirements of Section 703.04 Gradation SG of the "State Specifications" and must meet all the requirements for hot bituminous pavement.

213.02 MATERIALS

1. Hot plant mixed bituminous pavement aggregate shall conform to the material requirements of Item 9 of the most recent version of Metropolitan Governments Pavement Engineers Council (MGPEC) Pavement Design Standards. Use Grade SG aggregate mix

for the bottom lift of full depth asphalt sections, aggregate mix S for the bottom lift of composite sections, and use Grade SX for the surface course and overlays.

2. Joint and crack sealant shall conform to Section 408.01 through 408.03 of the "State Specifications".

213.03 CONSTRUCTION REQUIREMENTS

1. Before starting the paving, the Contractor shall insure that utility lines, piping, general grading and heavy trucking are complete so such operations will not damage paving work. No less than one day prior to paving, the Engineer MUST receive all test results stating that the subgrade and/or aggregate base is approved.

2. Prior to placing the pavement, the Contractor shall adjust manhole frames, valve boxes and other fixtures.

3. Weather limitation requirements for construction of hot bituminous pavement shall be in accordance with the following table:

MINIMUM AIR AND SURFACE TEMPERATURE LIMITATIONS FOR MIX PLACEMENT				
Compacted Layer Thickness	Top Layer of Pavement*		Lower Layers	
	PG 58-28 PG 64-22	PG 76-28	PG 58-28 PG 64-22	PG 76-28
< 2 inches	60 degrees F	75 degrees F	N/A	N/A
2 inches to < 3 inches	50 degrees F	65 degrees F	40 degrees F	50 degrees F
> 3 inches	50 degrees F	50 degrees F	40 degrees F	40 degrees F

* Air temperature is taken in the shade. Surface temperature is taken on the subgrade or base.

* Do not place the mixture at a temperature lower than 245 degrees Fahrenheit or 290 degrees Fahrenheit for mixes containing polymer modified asphalt.

4. Requirements for construction of hot bituminous pavement shall be in accordance with Section 401.08 through 401.19 of the "State Specifications", except as modified herein.

5. Apply a tack coat, prior to bituminous paving, to the contact edges of previously constructed bituminous layers, Portland cement concrete surfaces, and metal surfaces abutting or projecting into the bituminous pavement. Tack coat the surface of the previously constructed bituminous layer when more than eight hours passes between paving of lifts. Distribute the tack coat at rate of 0.10 gallons per square yard or as otherwise directed. Allow the tack coat and prime coat to dry until tacky to touch prior to bituminous paving. Paving equipment shall be in accordance with Section 407.05 and surface preparation shall be in accordance with Section 407.06 of the "State Specifications".

6. Unless approved otherwise by the Engineer, bituminous pavement shall be placed in ribbons 12 foot wide. After the first ribbon is placed and rolled, place succeeding ribbons and extend screen to overlap previous strips by not less than six (6) inches. The

Contractor shall arrange paving operations so there will be no exposed longitudinal joints between adjacent travel lanes at the end of a day's run for all local roadways. Longitudinal joints for collector and arterial roadways shall be constructed in accordance with all applicable CDOT Specifications.

7. After final rolling, do not permit vehicular traffic on pavement until pavement has cooled sufficiently to avoid damage to the surface.

8. In areas where the Engineer allows patching the Contractor shall cut out the old bituminous pavement and clean, fill and compact the area with fresh, hot plant mix bituminous pavement. Remove the deficient areas the full depth of bituminous pavement to one foot outside the entire area of the failure or as marked in the field by the Engineer. Cut the sides of the patched area vertically, perpendicular and parallel to the direction of traffic flow. All subgrade material shall be compacted to 95% of standard proctor. All aggregate base course shall be compacted to 95% minimum density, Modified Proctor, ASTM D1557 or AASHTO T180. Remove and dispose of the spoiled material and clean the area thoroughly. Apply tack coat to exposed surfaces and base course before placing new pavement. Replace the bituminous pavement in the patched area with full depth hot plant mixed bituminous pavement in lifts not exceeding three (3) inches in compacted thickness. Compact the lifts to between 92% and 96% of Maximum Theoretical (Rice) density.

213.04 TEST REQUIREMENTS/TOLERANCES

1. Density, Gradation and Extraction - Test and monitor the bituminous pavement compaction density with a nuclear gauge on a continuous basis during the paving operation. The Engineer may require that core samples of the compacted bituminous pavement be taken by the Contractor at random locations on the project for testing of compaction and compliance with the design mix. Where the core samples have been taken, new material shall be placed and compacted into the holes by the Contractor to conform with the surrounding areas.

   Compaction density shall be to between 92% and 96% of Maximum Theoretical (Rice) density. One test per 150 L.F. of pavement shall be required per day with a minimum of six tests per project. Tests shall also be taken by the Contractor to indicate the aggregate gradation, percent of air voids, and percent asphalt to verify compliance to approved pavement design. The Contractor shall perform, as a minimum, Rice test and gradation and extraction test per day of paving operation, unless the paving for the day is less than 100 tons. The test results shall be signed by a Professional Engineer employed by an independent testing company. The in-place pavement shall be tested for compliance with the requirements for surface smoothness. The Engineer may order additional testing at the Contractor's expense if the Engineer feels it is necessary to determine that the pavement is acceptable or to determine the extent of unacceptable pavement. Repair or remove and replace unacceptable pavement as required by the Engineer.

SCHEDULE FOR MINIMUM HBP MATERIALS SAMPLING AND TESTING		
Test	**Standard**	**Minimum Frequency**
Density	ASTM D2950, CP-44, CP-81, CP-82	One Test for Each 150 Lineal Feet/Lane
Thickness (Core)		One Test for Each 1,000 Lineal Feet/Lane

Air Voids and VMA	CP-44 & CP-48	One for Each Day
Gradation	AASHTO T27	One for Each Day
Hveem Stability	CP-L 5106, T 245	One for Each Day
PG Binder – AC Content	CP-L 5120 or AASHTO T164	One for Each Day
Moisture Susceptibility (Lottman)	CP-L 5109, Method B	One For Each 3rd Day
Maximum Theoretical Specific Density (Rice)	CP-51	One for Each Day

The City may check pavement temperatures, segregation, rolling patterns and other construction means and methods, which affect the performance of the pavement system. The Contractor shall provide assistance in sampling and testing at all facilities and at the job site.

HBP Compaction

The temperature of the mixture immediately behind the screed shall be at least 245° Fahrenheit (290° Fahrenheit for polymer modified asphalt) and breakdown compaction shall be completed before the mixture temperature falls 20° Fahrenheit.

Rolling: Both steel wheel and pneumatic tire rollers are required. The number, weight, and type of rollers furnished shall be that which is sufficient to obtain the required density while the mixture is in a workable condition.

Compaction shall begin immediately after the mixture is placed and be continuous until the required density is obtained.

If the required density is not achieved and the surface temperature falls below 185° Fahrenheit, or there is obvious surface distress or breakage, no further compaction effort will be permitted unless approved by the Engineer. The criteria for mixtures containing polymer modified asphalt cements shall be 235° Fahrenheit.

Suspend pavement operations when density requirements are not met.

Remove all roller marks with the finish rolling. Use of vibratory rollers with the vibrator on will not be permitted during surface course final rolling and will not be permitted on any rolling on bridge decks covered with waterproofing membrane.

Compact all HBP paving to between 92-96% of Maximum Theoretical (Rice) Density (CP 51: Maximum Specific Gravity of Bituminous Paving Mixtures) with the average of five random and consecutive density tests equaling at least 93% of T209.

Compaction of less than 92% of maximum theoretical (Rice) density will be cause for removal and replacement.

Use the most recent maximum theoretical (Rice) density in calculating Relative Compaction according to CP-44.

Core the pavements for field density tests in accordance with Colorado Procedure 44, Method B (AASHTO T230), or for field calibration of nuclear density equipment in accordance with the Appendix of Colorado Procedure 81 (ASTM D2950).

At a minimum, take cores for nuclear density equipment calibration at the beginning of placement of each pavement layer or change of mixture materials or gradation.

Untested areas during placement will also require cores to be taken to verify compaction.

1. Thickness - The in-place compacted thickness for hot plant mix bituminous pavement shall not vary from the required design thickness by more than 1/4 inches less than the required design thickness and shall have no limitation on the greater thickness.

2. Tolerances - The surface tolerance for pavement shall not be greater than three sixteenths (3/16) inch, as measured with a ten (10) foot straight edge. If 10% or more of the final pavement surface fails to meet these tolerances, or requires repairs in the form of patching, the Developer shall be required to overlay the entire surface prior to final acceptance.

214.00 PORTLAND CEMENT CONCRETE PAVEMENT

214.01 MATERIALS

1. Concrete pavement shall conform to the requirements for Class "P" concrete as specified in Section 601.02 and 601.03 of the "State Specifications". All concrete shall be ready mixed concrete. No concrete shall be field mixed. The proposed mix shall be tested in accordance with ACI code requirements. Two copies of the certified test reports shall be submitted to the Engineer, for acceptance, prior to ordering of concrete.

2. Proportioning of the concrete shall conform to Section 601.05 of the "State Specifications". The Contractor shall include Class F fly ash in concrete for paving. The quantity of Class F fly ash shall be equal to 20% of the weight of cement shown in Table 601-1 and shall be included in addition to the full weight of cement shown in the Table. The voluntary substitution of fly ash as permitted in Section 601.05 is not permitted.

3. Additives for concrete, other than those specified in the mix design, shall not be used without prior approval of the Engineer. When approved for use, chemical admixtures or additives shall comply with applicable ASTM or AASHTO standards. Calcium chloride or admixtures containing chloride shall not be allowed in reinforced concrete.

4. The batching of concrete shall conform to Section 601.06 of the "State Specifications".

5. The mixing of concrete shall conform to Section 601.07 of the "State Specifications".

6. Equipment used for concrete mixing, conveyance and placement shall conform to Section 412.07 of the "State Specifications".

214.02 CONSTRUCTION REQUIREMENTS

1. Before starting the paving, the Contractor shall insure that utility lines, piping, general grading and heavy trucking are complete so such operations will not damage paving work.

2. Prior to placing the pavement, the Contractor shall adjust manhole frames, valve boxes and other fixtures.

3. Submit to the Engineer for approval a construction joint pattern showing types of each joint and joint spacing prior to paving operations. The pattern shall be based upon the Colorado Department of Transportation, M-Standard M-412-2, except that Expansion Joint Detail A shall be revised to a non-thickened section and shall include a smooth dowel sized one eighth (1/8) the concrete slab thickness at the mid-thickness of the slab, and fourteen (14) inches long placed at twelve (12) inch centers with an expansion cap on one side of the joint.

4. Construction requirements for concrete pavement shall be in accordance with Section 412.08 through 412.21 of the "State Specifications", except as modified herein.

5. The Contractor shall submit to the Engineer the ready mix delivery tickets for each load upon request by the Engineer indicating the following:

    a. Supplier's name and date.
    b. Truck number.
    c. Project number and location.
    d. Concrete class designation.
    e. Cubic yards batched.
    f. Mix design identification.
    g. Type, brand, and amount of cement and fly ash.
    h. Brand and amount of all admixtures.
    i. Weights of fine and coarse aggregates.
    j. Moisture content of fine and coarse aggregates.
    k. Gallons of batch water.
    l. Time at which water was added.
    m. Elapsed time between when water was added and concrete load was in place.
    n. Amounts of initial and supplemental water added.
    o. Name of individual authorizing supplemental water.
    p. Numerical sequence of delivery by indicating cumulative yardage delivered on each ticket.
    q. Provide the following titles with blank space to record discharge time, water-cement ratio, air content, slump, revolutions.

6. Prior to concrete placement the Contractor shall remove all construction debris and extraneous matter from within the forms. Stays, bracing and blocks, serving temporarily to hold the forms in correct shape and alignment, shall be removed as the concrete placement progresses. All concrete shall be placed on a clean damp surface, free from standing water, and properly consolidated subgrade. Concrete shall not be placed with a free fall greater than four (4) feet to prevent segregation of the concrete.

7. The time elapsing from the time water is added to the mix until the concrete is deposited in place at the site of the work shall not exceed the following time limits:

    a. Air temperature 45 degrees F. to 80 degrees F. - 90 minutes maximum.

b. Air temperature over 80 degrees F. with a retarder added to the mix - 90 minutes maximum.

c. Air temperature over 80 degrees F. without a retarder added to the mix - 60 minutes maximum.

8. The opening of concrete pavement to vehicular traffic, including the Contractor's vehicles, will not be permitted until the compressive strength of the concrete test cylinders, tested in conformity with the latest ASTM Standard Method of Test for "Compressive Strength of Molded Concrete Cylinders," Designation C-39 is at least 3,000 pounds per square inch. If permanent shoulders or curbs are not in place, a six (6) foot wide temporary earth shoulder shall be placed against the outside pavement edges before traffic is allowed on the pavement. Prior to opening to vehicular traffic all joints shall be properly sealed and the roadway shall be cleaned. The opening of concrete pavement to vehicular traffic shall not constitute a final acceptance of the pavement. No steel blades shall be used to clean concrete surface.

214.03 TEST REQUIREMENTS

1. The Contractor shall provide the necessary testing of concrete for acceptance by the City including the testing of concrete cylinders for compression testing and air and slump tests. Sample concrete test cylinders shall be made in sets of four. One cylinder shall be broken at seven (7) days, two cylinders shall be and broken at twenty eight (28) days, and one held on reserve for test if there is a failure on one of the twenty eight (28) day tests. If the twenty eight (28) day cylinders do not meet the specified minimum compressive strength then a representative number of concrete cores, as determined by the Engineer, shall be taken by the Contractor to determine if the in-place concrete meets the specified strength.

2. Concrete cylinders for strength tests shall be molded and cured in accordance with the "Practice for Making and Curing Concrete Test Specimens in the Field", ASTM C31 and tested in accordance with "Test Method for Compressive Strength of Cylindrical Concrete Specimens", ASTM C 39.

3. The following is the minimum number of sets of concrete test cylinders that are required for concrete used in the Work for each day's placement. Sets that are taken shall generally represent equal volumes of concrete that are placed within each day's placement.

Quantity of Concrete	Number of Sets of Test Cylinders
100 cubic yards or less	One
100 cubic yards or more	Four (4) sets plus one set for each additional 100 cubic yards of concrete

4. Conduct air and slump tests from one of the first three batches mixed each day and for each compressive strength test set, and whenever consistency of concrete appears to vary.

5. Mark or tag each sample of compression test cylinders with the date and time of day the cylinders were made. Identify the location in the Work where the concrete represented by

the cylinders was situated or stationed. Identify the delivery truck or batch number, air content, and slump. Submit to the Engineer two (2) copies of each test result.

6. Concrete shall meet the minimum acceptance standards of the State Specifications. Concrete that does not meet the acceptance criteria shall be removed and replaced.

7. The surface tolerance for Portland cement concrete pavement shall not be greater than three sixteenths (3/16) inch, as measured with a ten (10) foot straight edge. For collector and arterial streets, the City reserves the right to require a profilograph test with the specifications established by the CDOT standard specifications for the design criteria of the street.

215.00 STREET RESTORATION (PATCHING AND MATCHING EXISTING)

1. Proof rolling as described in Section 211 is required on subgrades and base courses prior to placement of subsequent courses. If the area is too small for a proof roll, field density tests shall be provided.

215.01 AGGREGATE BASE COURSE

1. Materials for aggregate base course shall conform to the requirements of Section 703.03 of the "State Specifications", Class 6 or Class 4.

215.02 PAVEMENT REPLACEMENT

1. All materials and construction techniques associated with pavement patches shall conform with the materials and construction requirements specified in these Standard

   Specifications for hot bituminous plant mix pavement and Portland cement concrete pavement.

2. Patching materials and construction requirements for bituminous pavement shall meet the requirements for hot plant mix bituminous pavement of this specification except as modified herein. Patching shall be for the full depth of the existing bituminous pavement in place.

3. Apply a tack coat to the contact edges of previously constructed bituminous layers, aggregate base course, Portland Cement concrete surfaces, and metal surfaces abutting or projecting into the bituminous pavement.

4. Patches for Portland cement concrete pavement shall consist of Portland cement concrete Class “P”. To increase the load transfer and protect the pavement against differential settlement the Contractor shall drill the existing concrete pavement and provide expansion dowels in accordance with Detail 100-03, minimum, distance on center at the mid-depth of the concrete. The dowels must be able to move from expansion and contraction of the concrete. To facilitate this movement, the dowels portion that protrude into the patch shall be painted and covered with a one sixteenth (1/16) inch coating of grease. The minimum size concrete patch allowed shall be as detailed under "Removal of Concrete Surfaces" in the general conditions.

215.03 SURFACE TOLERANCES

1. All patches shall be constructed true to grade with the existing pavement section. Variation from grade shall not exceed one-quarter (1/4) inch. If the variation exceeds one-quarter (1/4) inch, the pavement and backfill shall be repaired or replaced to the satisfaction and at the option of the Engineer.

215.04 TEMPORARY PATCHES

1. When weather limitations prevent the placement of pavement patches as defined herein, the Contractor shall obtain the approval of the Engineer to install a temporary patch of cold mix asphalt or other suitable material. As soon as conditions allow, the Contractor shall remove the temporary patch and install a permanent patch in accordance with these specifications. The Contractor shall be responsible for maintaining temporary patches in a manner satisfactory to the Engineer until they are replaced. In case of an emergency the Engineer may elect to repair the temporary patch and backcharge the Contractor for the repair of the patch.

215.05 TIME LIMITS FOR PATCHING STREET CUTS

1. All patches shall be made within the time frame stipulated in the appropriate permit.

216.00 SIDEWALKS, CURB RAMPS, CURB AND GUTTER, VALLEY GUTTER, CROSSPANS, CONCRETE PATHS, DRIVEWAY AND ALLEY APPROACHES

1. Sidewalks, curb ramps, curb and gutters, valley gutters, crosspans, concrete paths, driveway and alley approaches shall be Class B concrete unless approved otherwise by the Engineer. All concrete shall be ready mixed concrete. No concrete shall be field mixed. No admixtures or additives shall be field mixed unless approved by the Engineer.

   Fly ash shall not be used in concrete for sidewalks, curb ramps, curb and gutters, valley gutters, crosspans, concrete paths, driveway, storm drainage structures, and alley approaches.

   For concrete paths, the mix shall include one and one half (1½) pounds fiber mesh reinforcing fibers per cubic yard of concrete.

2. Additives for concrete, other than those specified in the mix design, shall not be used without prior approval of the Engineer. When approved for use chemical admixtures or additives shall comply with applicable ASTM or AASHTO standards. Calcium chloride or admixtures containing chloride shall not be allowed in concrete.

3. The Contractor shall submit to the Engineer the ready mix delivery tickets for each load upon request by the Engineer indicating the information specified under Section 215.02 (5) of these Specifications.

4. The weather limitations for the construction of sidewalks, curb ramps, curb and gutters, valley gutters, crosspans, concrete paths, driveway and alley approaches shall be the same as for Portland cement concrete pavement.

5. Subgrade requirements for the construction of sidewalks, curb ramps, curb and gutters, valley gutters, crosspans, concrete paths, driveway and alley approaches are the same as for Portland cement concrete pavement.

6. Where a section of a concrete sidewalk, curb ramp, curb and gutter, valley gutter, crosspan, concrete paths, driveway or alley approach has been disturbed, it shall be removed to a joint if the joint is situated within five (5) feet of the proposed or existing cut, otherwise a straight line shall be saw cut prior to replacement.

7. Construction requirements for concrete sidewalks and concrete paths shall conform to Section 608.03 of the "State Specifications" except as modified by these specifications. Construction requirements for concrete curb shall conform to Section 609.03 of the "State Specifications" except as modified by these specifications. Face forms for concrete curb, if used, may be removed for finishing curb face and fillets as soon as the concrete will retain its shape. Do not remove the back forms for concrete curbs until the concrete has been in place for at least six (6) hours.

8. Transverse joints shall be located at intervals of ten (10) feet in curbs, gutters, and crosspans. For curbwalks tooled joints shall be at ten (10) feet. Joints for concrete paths shall be zip strip or sawcut at eight (8) foot intervals, no tooled joints shall be allowed on any concrete path. Sawcutting of joints shall be performed as soon as the concrete surface is hard enough to allow the sawing operation without otherwise marring the concrete surface, prior to any development shrinkage cracks. Joints shall be continuous through gutter, curb and sidewalks. Joint depth shall be a minimum of one quarter (¼) the thickness of the concrete. Set joints at right angles to face, top, and flow line of curb and gutter, valley gutter, or crosspan. Provide expansion joints at a maximum spacing of two hundred (200) feet.

9. Round the back edge of curbs, lip of gutters adjacent to pavement, and edges adjacent to joints with an edger of one quarter (¼) inch radius.

10. Immediately after finishing all concrete surfaces such as curb ramps, curbs and gutters, sidewalks, concrete paths, valley gutters, driveways and alley approaches slightly roughen the concrete surface by brooming. Concrete paths shall be given a light broom finish. For sidewalks, concrete paths, and driveways broom the surface in the direction perpendicular to the main traffic flow. For all concrete surfaces that are designed to carry storm water such as curbs and gutters, valley gutters, and crosspans, broom the surface in the direction of flow.

11. Concrete for sidewalks, curb ramps, curb and gutters, valley gutters, crosspans, concrete paths, driveway and alley approaches shall be cured in the same manner as outlined in the Portland Cement Concrete Pavement Section.

12. The testing requirements shall be the same as outlined in the Portland Cement Concrete Pavement Section.

13. All sidewalks, curb ramps, curb and gutter, valley gutters, crosspans, concrete paths, driveways, and alley approaches shall be formed and placed true to line, grade, and cross section. All flowlines shall not vary by more than one eighth (1/8) inch in ten (10) feet.

14. Where sidewalk, curb ramp, or concrete path become adjacent to curb and gutter, the sidewalk, curb ramp, or concrete path must be poured monolithic with the curb and gutter, unless otherwise approved.

15. Curb ramps shall be designed and constructed in accordance with Details 200-11, 200-12, 200-13, 200-14 Alt. A, 200-14 Alt. B, and 200-15. Concrete used for the construction of curb ramps shall be CDOT Class B concrete unless otherwise approved by the Engineer. All curb ramps shall be constructed with truncated domes in accordance with the latest edition of the Americans With Disabilities Act Access Guidelines (ADAAG). The truncated domes shall be installed across the full width of the ramp as depicted in the details. Truncated dome sections shall be "wet set" in the concrete. Surface applied products or products that are installed on a sand bed will not be allowed in new construction. Truncated domes shall be brick red or tile red to provide color contrast with the adjoining walk surface as specified by Section 4.29.2 of the ADAAG. The type and color of truncated dome product shall be approved by the Engineer prior to construction.

217.00 SIGNS CONSTRUTION AND INSTALLATION

217.01 GENERAL

These specifications for traffic sign installation are intended to provide a minimum standard that shall be followed when traffic sign installation work is done for the City of Longmont. These specifications shall apply to all materials supplied and methods and procedures of work to be followed. Work shall conform to these specifications and the Colorado Department of Transportation Standard Specifications for Road and Bridge Construction (current edition). In situations where there is a conflict or question of interpretation, these specifications shall prevail.

1. Legal Requirements - All traffic control devices including signs and sign materials shall be incompliance with the Manual on Uniform Traffic Control Devices (MUTCD), the Colorado Supplement thereto, US Department of Transportation Federal Highway Administration (FHWA) Standard Highway Signs (current editions), and the Approved Materials List

2. Signing Plan - A complete signing plan shall be submitted as part of the design documents, which must be approved by the City prior to installation. The signing plan needs to specify the various types, combinations and locations of the signs and sign supports and any existing signs to be removed or replaced.

3. Conditions of Materials Furnished - All items furnished by the Contractor shall be new and in proper working order. For any items not recognized by the City, the Contractor shall submit a sample for approval.

4. Removal of Existing Traffic Signs and Posts - No signs and/or posts shall be removed by any Contractor or person unless authorized by the City. All signs and/or posts removed from the right-of-way will remain property of the City. Anyone removing signs and/or posts is responsible for the condition of the sign and post and will be responsible for the cost of replacing any damaged or missing items.

217.02 STANDARDIZATION

Each sign shall be displayed only for the specific purpose prescribed by the MUTCD. Each sign shall be displayed only in the proper location and at the proper height as prescribed by the MUTCD and the approved signing plan.

1. Symbols - Symbol designs shall in all cases be essentially like those shown in the Standard Highway Designs. All symbol signs, which are readily recognizable by the public may be erected without educational plaques. Whenever applicable, symbols shall be used in place of word messages.

2. Word messages - Where applicable, standard wording as shown in the Standard Highway Signs shall be used. Abbreviations should include only the following: AV, BLVD, ST, RD, DR, CIR, CT, LN, R.R. unless otherwise approved by the City.

3. Lettering - Sign lettering shall be in upper-case letters of the type approved by the FHWA with the exception of overhead street name signs on signal mast arms where the first letter shall be upper case and the remainder shall be lower-case lettering. All lettering shall follow the layout of signs shown in the Standard Highway Signs. For street name signs, the use of series C alphabet is the minimum size accepted. For any given legend, better legibility should be obtained by using a 20% increase in letter to letter space above spacing recommended by Standard Highway Signs.

4. Refelctorization - All signs shall be retro-reflectorized to show the same shape and color both day and night regardless of light conditions. Retro-reflectivity shall be achieved by using sheeting that conforms to the requirements of ASTM D 4956 and the Approved Materials List and shall be applied in accordance with the manufacturer's specifications.

5. Sign Border - Unless otherwise determined by the City, all signs shall have a border of the same color as the legend at or just inside the edge. A dark border shall be set in from the edge while a white border shall extend to the edge. The corners of the sign border shall be rounded. Borders shall be laid out on the sign as shown in the Standard Highway Signs manual for standard traffic signs.

217.03 STREET NAME SIGNS

For street name signs at non-signalized intersections, the sign panel shall be extruded aluminum, nine (9) inches in height by twenty four (24) inches to forty eight (48) inches in length, with approved sheeting on both sides of the sign panel. The legend shall be 6 inches in height, the exception being on numbered streets where the number shall be six (6) inches in height with "ND", "RD", "ST" and "TH" being three (3) inches in height and is to be held in line with the top of the number it follows. The legend shall be a minimum of series C alphabet approved by FHWA, all in upper-case letters. The legend shall be centered and placed on both sides of the sign panel.

217.04 POST AND SIGN PLACEMENT

1. Sign location, height and lateral clearance shall be in accordance with the MUTCD. Signs shall be placed no less than five (5) feet from any fire hydrant so that operation of the hydrant will not be impaired. For electrical equipment clearances, provide ten (10) feet from access doors and no less than three (3) feet from the sides and back and three (3)

feet from the underground electric lines. Where overhead utilities are found, maintain ten (10) feet separation from a wooden pole.

2. Signs should be mounted at right angles to the direction of and facing the traffic that they are intended to serve. Parking signs and Parking restriction signs shall be turned to a 45-degree angle toward the road in the direction of travel.

3. Signposts shall be two (2) inch, fourteen (14) gauge galvanized steel square tubing .with a three (3) foot long, two and one quarter (2¼) inch square base as per the approved materials list. The signpost shall be installed into the ground using the manufacturers specifications so that it is designed to break away, bend over or to fracture upon impact by an errant vehicle. The support system shall meet the criteria specified in the American Association of State Highway and Transportation Officials (AASHTO) publication, Standard Specifications for Structural Supports for Highway Signs, Luminars and Traffic Signals.

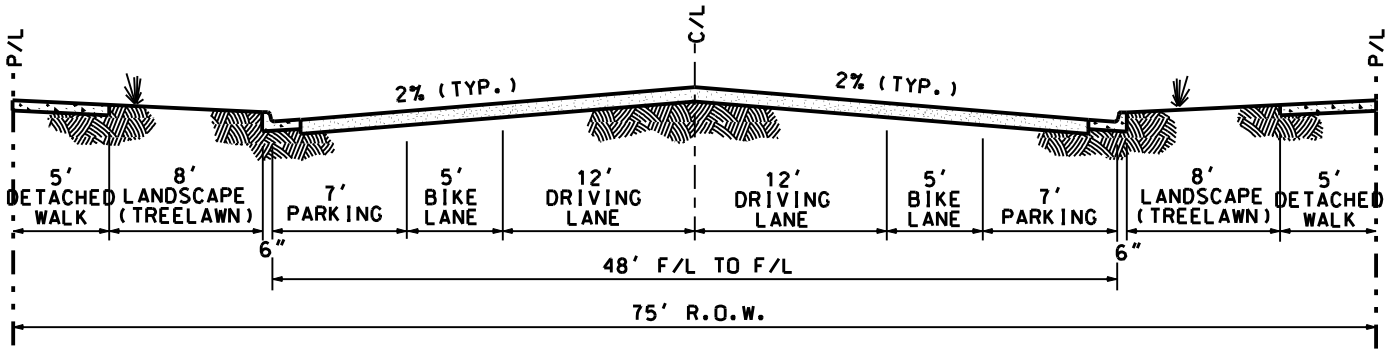
   Using sign posts that meet these specifications and using lateral clearance listed in the MUTCD, install base (2 1/4" x 2 1/4" x 3") into the ground leaving approximately two (2) inches of the base above ground. If concrete, rock, gravel, etc. is going to be placed around the base, the Contractor shall place a three to three and one half (3 – 3½) inch round PVC sleeve around the outside of the base to the depth of the material to be placed around it. The base shall be two (2) inches above the sleeve. Place post into base so that the sign meets vertical clearance and is stable. Posts shall be connected to the base using two (2) three eights (3/8) inch drive rivets in accordance with the manufactures recommendations to insure proper breakaway.

   Signs placed on sign posts shall be attached using three eights (3/8) inch drive rivets with E.G. finish (zinc coated) and nylon washers designed specifically for sign installation.

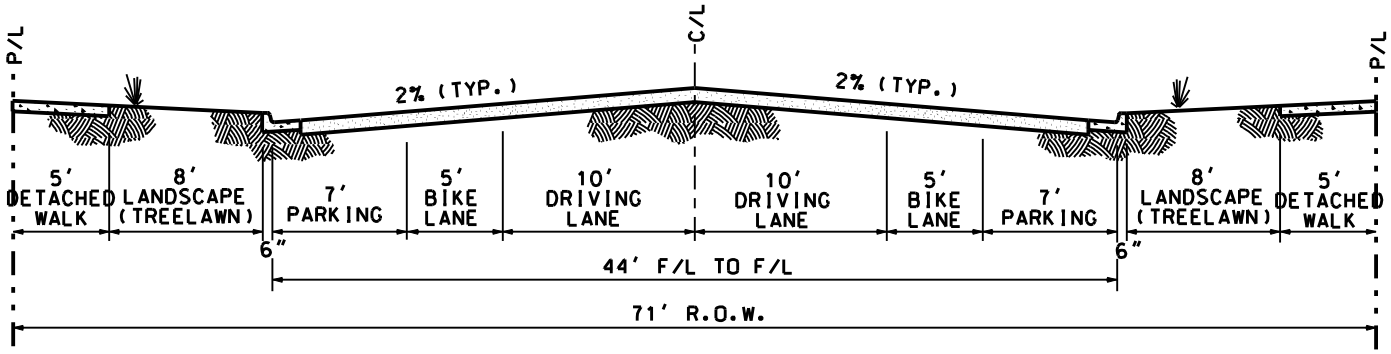
4. Signs shall not be placed on utility poles, street light poles or traffic signal poles without permission from the City of Longmont. When authorized, signs mounted on existing supports such as traffic signal poles, street light poles, or utility poles shall be mounted using bands and brackets specified in the approved materials list.

5. The Contractor is responsible and shall obtain underground utility locates before installation begins. Signs mounted to existing support such as signal poles or light poles require no utility locates.

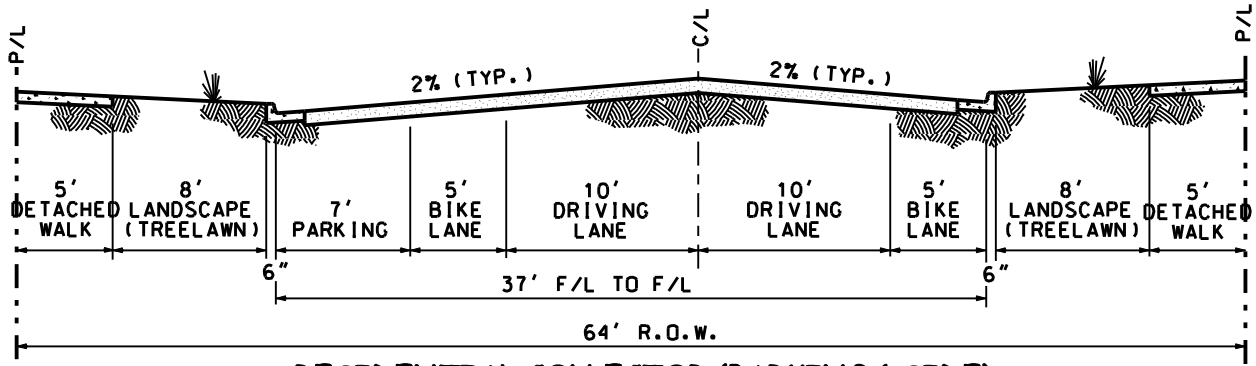
6. When only a street name sign is on the post, the post shall be at a height as if a thirty (30) inch STOP sign were mounted on it.



COMMERCIAL / INDUSTRIAL COLLECTOR (PARKING 2 SIDES)



RESIDENTIAL COLLECTOR (PARKING 2 SIDES)



RESIDENTIAL COLLECTOR (PARKING 1 SIDE)

NOTES:

1. SLOPE PAVEMENT AT 2% FROM CROWN TO LIP OF GUTTER.
2. TYPICAL SECTIONS SHOW MINIMUM REQUIREMENTS. ADDITIONAL ROADWAY WIDTHS & RIGHT OF WAY MAY BE REQUIRED TO ACCOMODATE TRAFFIC OR OTHER DEVELOPMENT NEEDS SUCH AS TURN LANES. ACCEL / DECEL LANES. EXTRA LANES. PEDESTRIAN OR BYCYCLE FACILITIES. LANDSCAPING. UTILITIES OR CONSTRUCTION REQUIREMENTS.
3. WHEN FLOW LINE ELEVATIONS ARE NOT EQUAL PAVEMENT SHALL BE SLOPED 2% FROM THE HIGHER LIP. MAXIMUM STREET CROSS GRADE SHALL NOT EXCEED 4%.
4. COLLECTOR AND ARTERIAL STREETS HAVE DETACHED WALK.
5. BECAUSE OF THE WIDE RANGE OF VOLUMES AND USES THAT CAN BE EXPERIENCED WITH ARTERIAL AND COLLECTOR STREETS. THEY WILL BE REVIEWED MORE EXTENSIVELY ON A CASE BY CASE BASIS TO DETERMINE THE ACTUAL RIGHT-OF-WAY AND STREET WIDTH NEEDS.

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

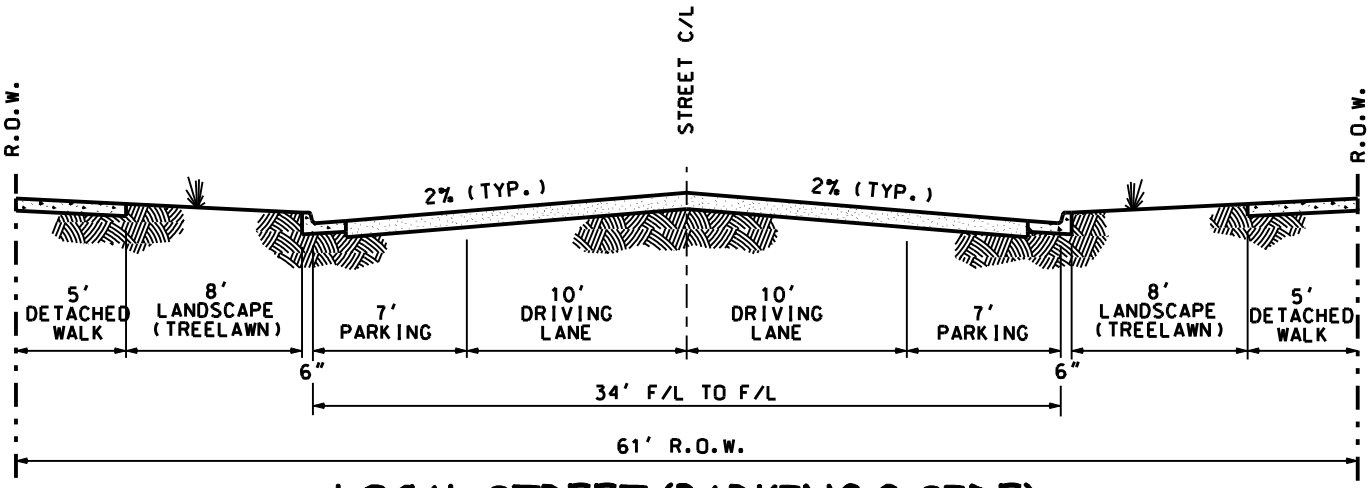
TYPICAL STREET SECTION

DETAIL 200-01

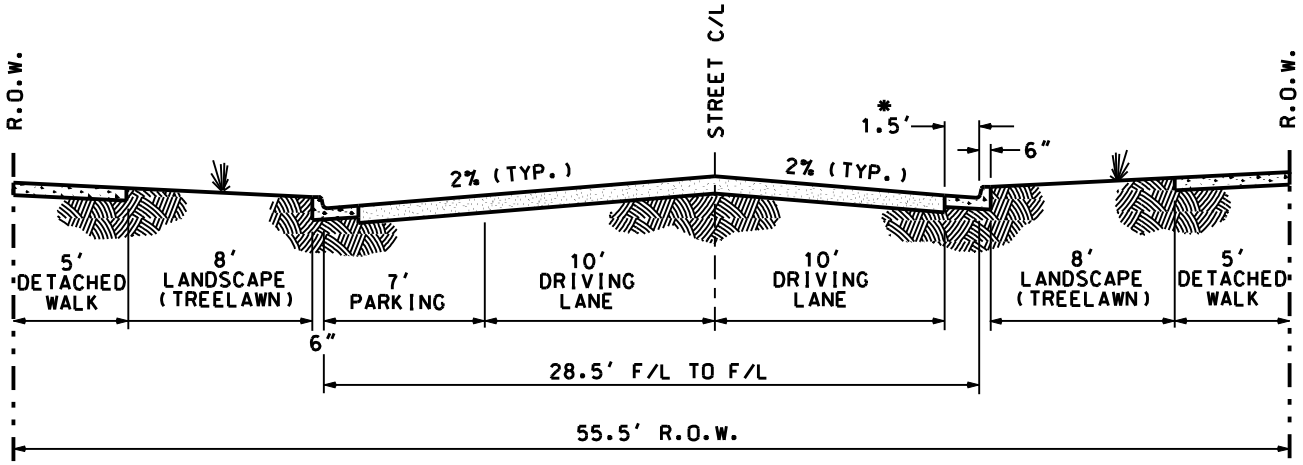
REB

DATE: DECEMBER, 2006

SCALE: NOT TO SCALE



LOCAL STREET (PARKING 2 SIDE)



LOCAL STREET (PARKING 1 SIDE)

* Note: IF NO PARKING LANE, TRAVEL LANE SHALL INCLUDE GUTTER PAN.

NOTES:

1. SLOPE PAVEMENT AT 2% FROM CROWN TO LIP OF GUTTER.
2. TYPICAL SECTIONS SHOW MINIMUM REQUIREMENTS. ADDITIONAL ROADWAY WIDTHS & RIGHT OF WAY MAY BE REQUIRED TO ACCOMODATE TRAFFIC OR OTHER DEVELOPMENT NEEDS SUCH AS TURN LANES, ACCEL / DECEL LANES, EXTRA LANES, PEDESTRIAN OR BYCYCLE FACILITIES, LANDSCAPING, UTILITIES OR CONSTRUCTION REQUIREMENTS.
3. WHEN FLOW LINE ELEVATIONS ARE NOT EQUAL PAVEMENT SHALL BE SLOPED 2% FROM THE HIGHER LIP. MAXIMUM STREET CROSS GRADE SHALL NOT EXCEED 4%.
4. COLLECTOR AND ARTERIAL STREETS HAVE DETACHED WALK.
5. BECAUSE OF THE WIDE RANGE OF VOLUMES AND USES THAT CAN BE EXPERIENCED WITH ARTERIAL AND COLLECTOR STREETS, THEY WILL BE REVIEWED MORE EXTENSIVELY ON A CASE BY CASE BASIS TO DETERMINE THE ACTUAL RIGHT-OF-WAY AND STREET WIDTH NEEDS.

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

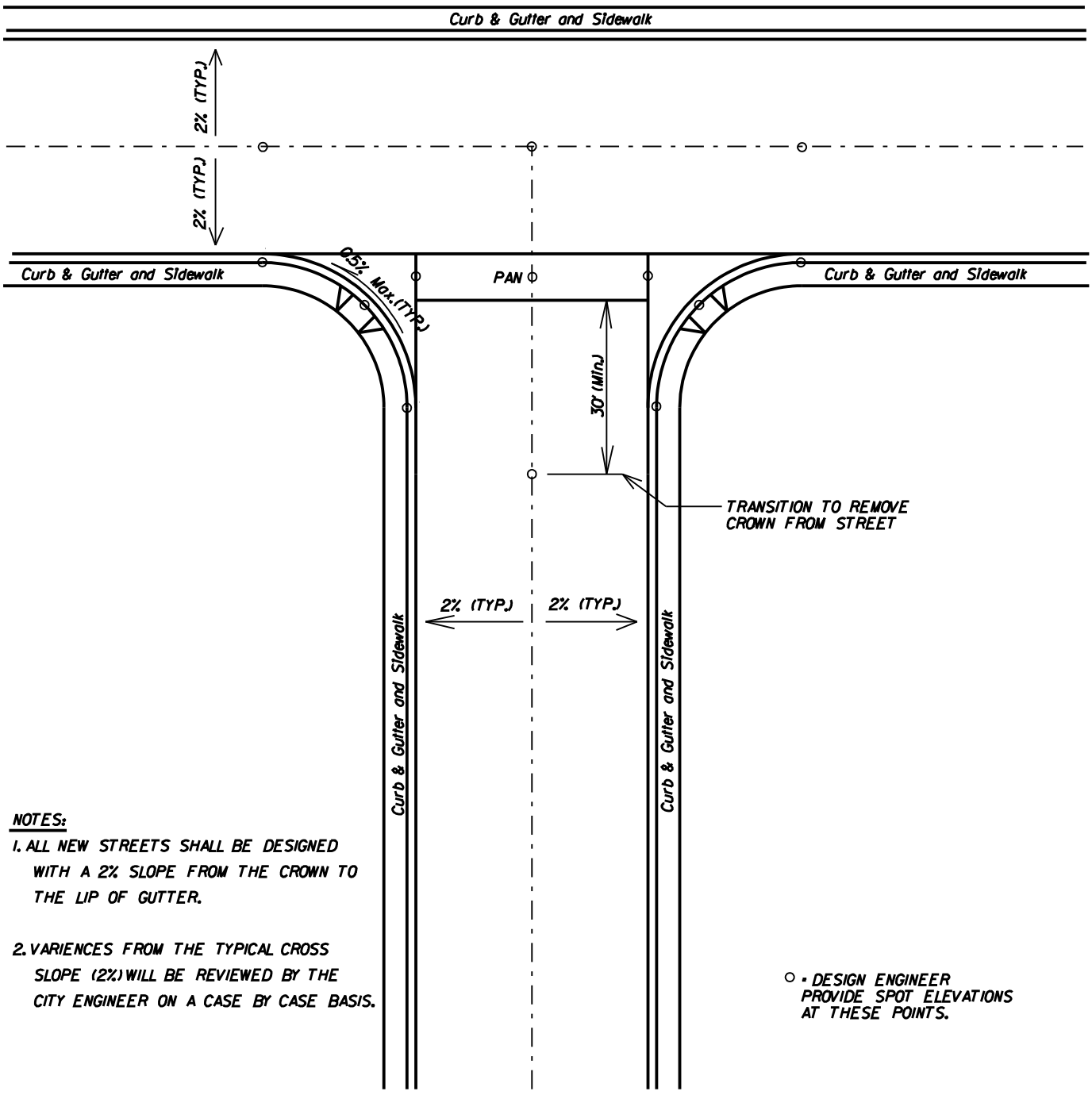
TYPICAL STREET SECTION

DETAIL 200-01A

REB

DATE: DECEMBER, 2006

SCALE: NOT TO SCALE



NOTES:

1. ALL NEW STREETS SHALL BE DESIGNED WITH A 2% SLOPE FROM THE CROWN TO THE LIP OF GUTTER.

2. VARIENCES FROM THE TYPICAL CROSS SLOPE (2%) WILL BE REVIEWED BY THE CITY ENGINEER ON A CASE BY CASE BASIS.

○ - DESIGN ENGINEER PROVIDE SPOT ELEVATIONS AT THESE POINTS.

REVISED
3/12/2001
1/3/2005

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

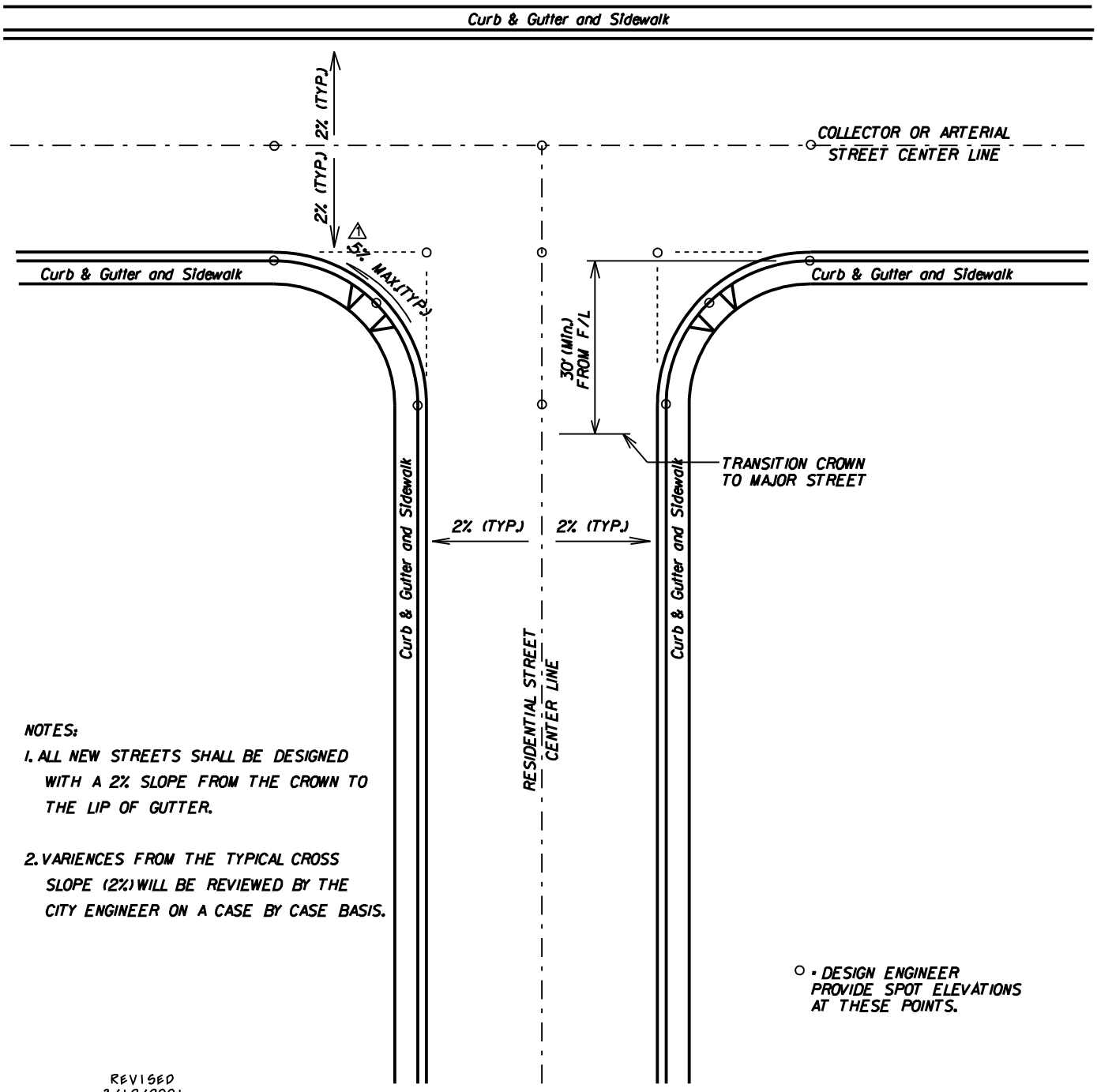
STREET INTERSECTION CROSSPAN APPROACH DETAIL

DETAIL 200-01B

REO

DATE: JANUARY 2, 1997

SCALE: NOT TO SCALE



NOTES:

1. ALL NEW STREETS SHALL BE DESIGNED WITH A 2% SLOPE FROM THE CROWN TO THE LIP OF GUTTER.

2. VARIENCES FROM THE TYPICAL CROSS SLOPE (2%) WILL BE REVIEWED BY THE CITY ENGINEER ON A CASE BY CASE BASIS.

○ - DESIGN ENGINEER PROVIDE SPOT ELEVATIONS AT THESE POINTS.

REVISED
3/12/2001
⚠ 9/10/2002
1/3/2005

PUBLIC WORKS DIVISION

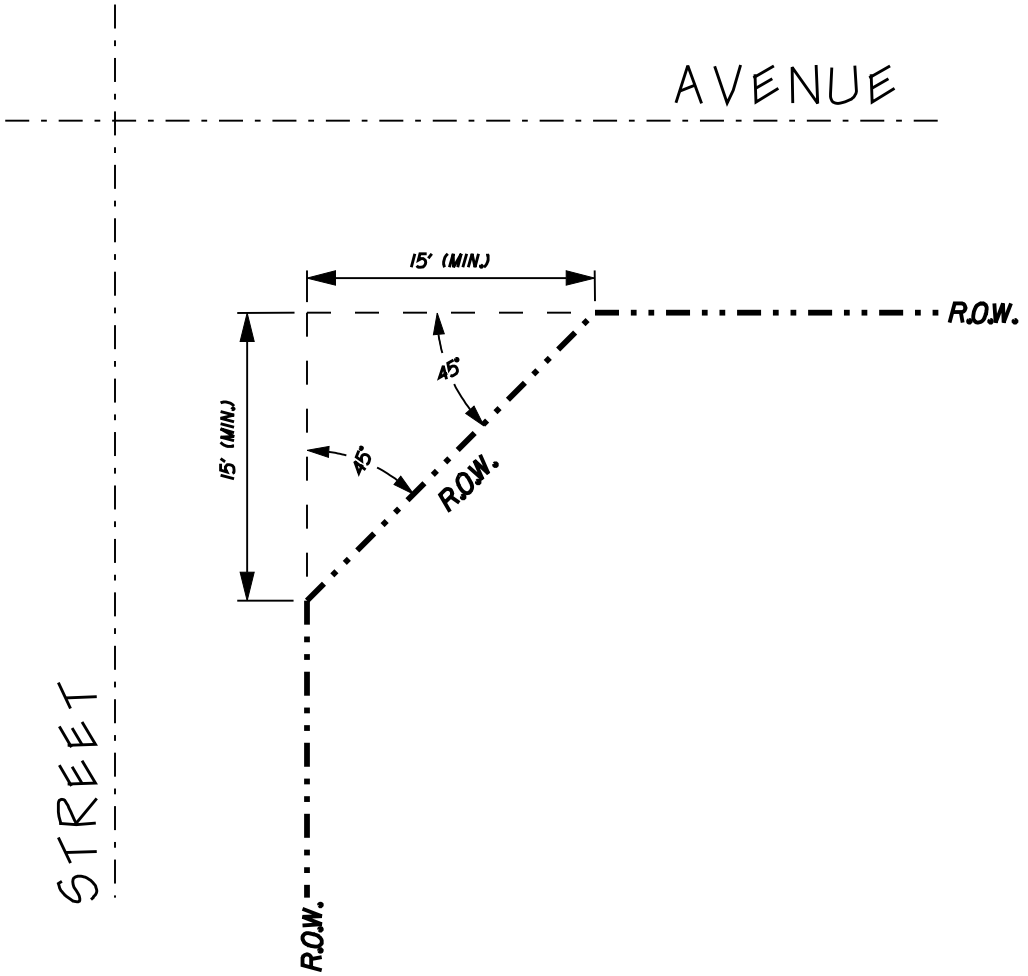
STREET INTERSECTION APPROACH DETAIL

DETAIL 200-01C

REO

DATE: JANUARY 2, 1997

SCALE: NOT TO SCALE



NOTE:

TRUNCATE RIGHT OF WAY, MINIMUM 1 FOOT BEHIND BACK OF ALL STANDARD CURB RAMPS. ADDITIONAL RIGHT OF WAY MAY BE NECESSARY IN SOME SITUATIONS.

REVISED
3/4/1997
3/12/2001
12/29/04

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

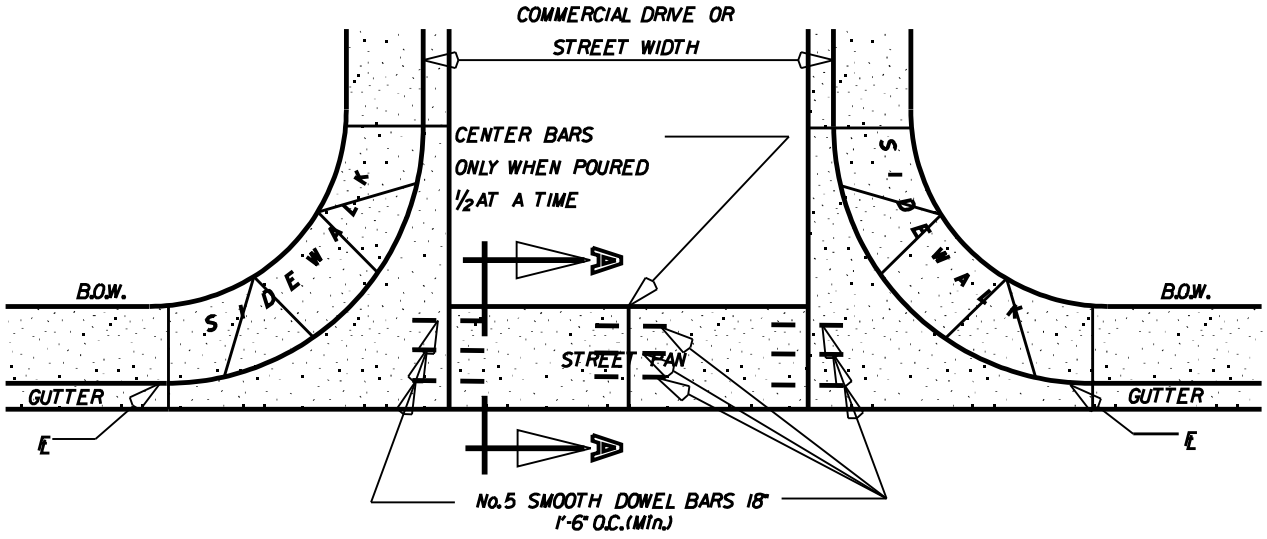
INTERSECTION RIGHT OF WAY

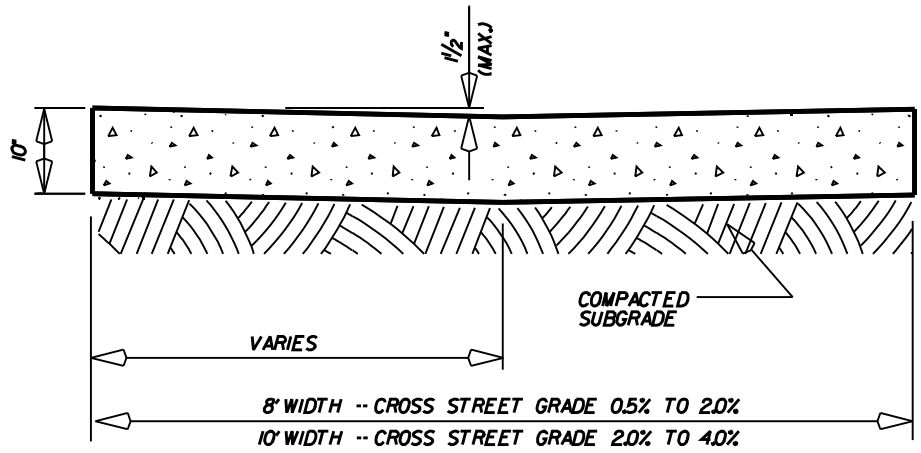
DETAIL 200-02

REB

DATE: MARCH, 1993

SCALE: NOT TO SCALE





SEC. A-A

REVISED
3/4/1997
3/12/2001
1/3/2005

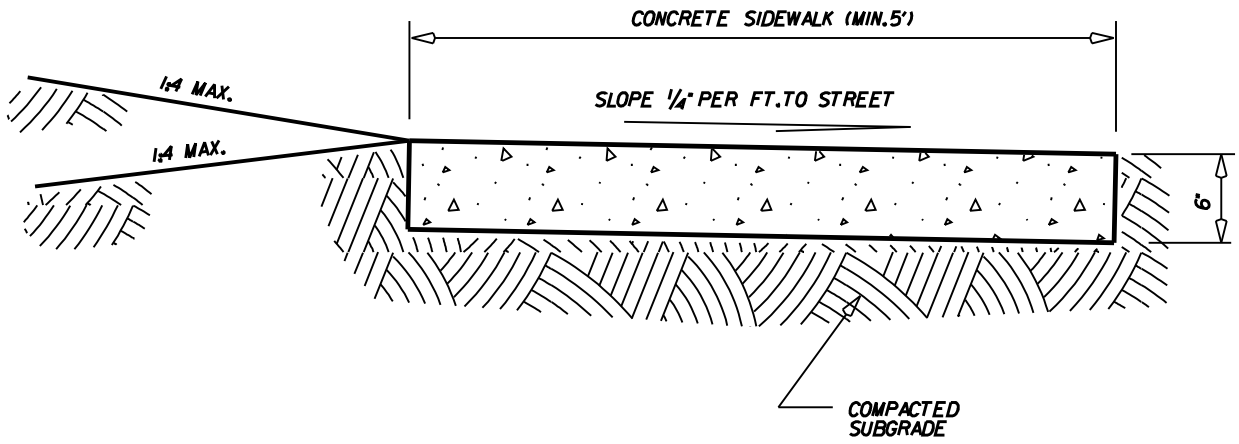
PUBLIC WORKS DIVISION

CONCRETE CROSS PAN

DETAIL 200-03

REB

DATE: MARCH, 1993 **SCALE:** NOT TO SCALE



REVISED
3/4/1997
3/12/2001
1/3/2005

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

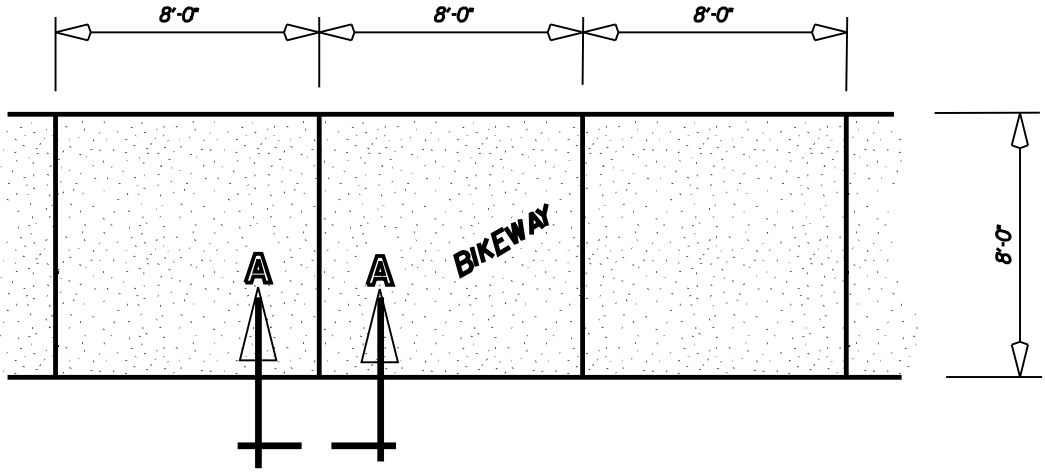
DETACHED SIDEWALK DETAIL

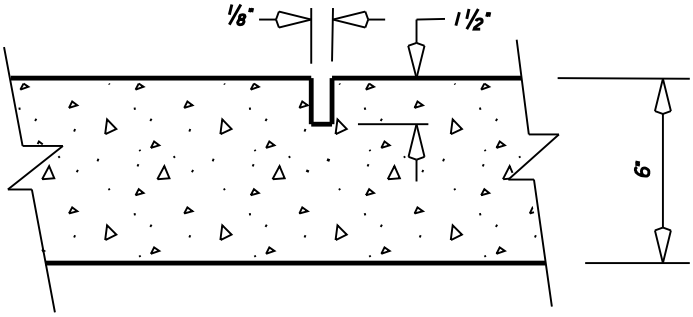
DETAIL 200-04

REV

DATE: MARCH, 1993

SCALE: NOT TO SCALE





SEC. A-A

NOTES:

1. SAWCUT OR 1/2" ZIPSTRIP JOINTS AT 8' O.C.
2. EXPANSION JOINTS REQUIRED AT CURB RAMPS AND AT 400' SPACING.
3. 4,000 p.s.i. CONCRETE WITH FIBER MESH.
4. 6" THICK CONCRETE WALK WITH FIBER MESH. PER SPECS.
5. FINISH TO BE LIGHT BROOM. NO TOOLED JOINTS - PATH EDGE ONLY.

REVISED
11/5/2003
8/9/1999
3/4/1997
1/3/2005

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

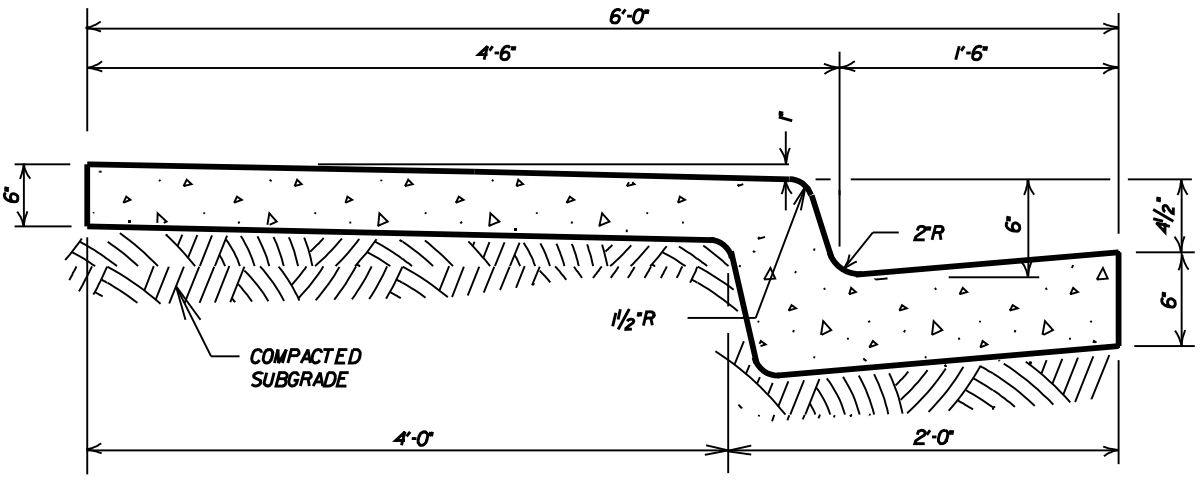
BIKEWAY DETAIL

DETAIL 200-05

REB

DATE: MARCH, 1993

SCALE: NOT TO SCALE



NOTES:

1. GUTTER SLOPE- 1½" IN 1'-6"
2. WALK SLOPE-¼" IN 1'-0"
3. AT DRIVES REFER TO DETAIL 200-08

REVISED
3/4/1997
3/12/2001
11/5/2003
1/3/2005

CITY OF LONGMONT COLORADO

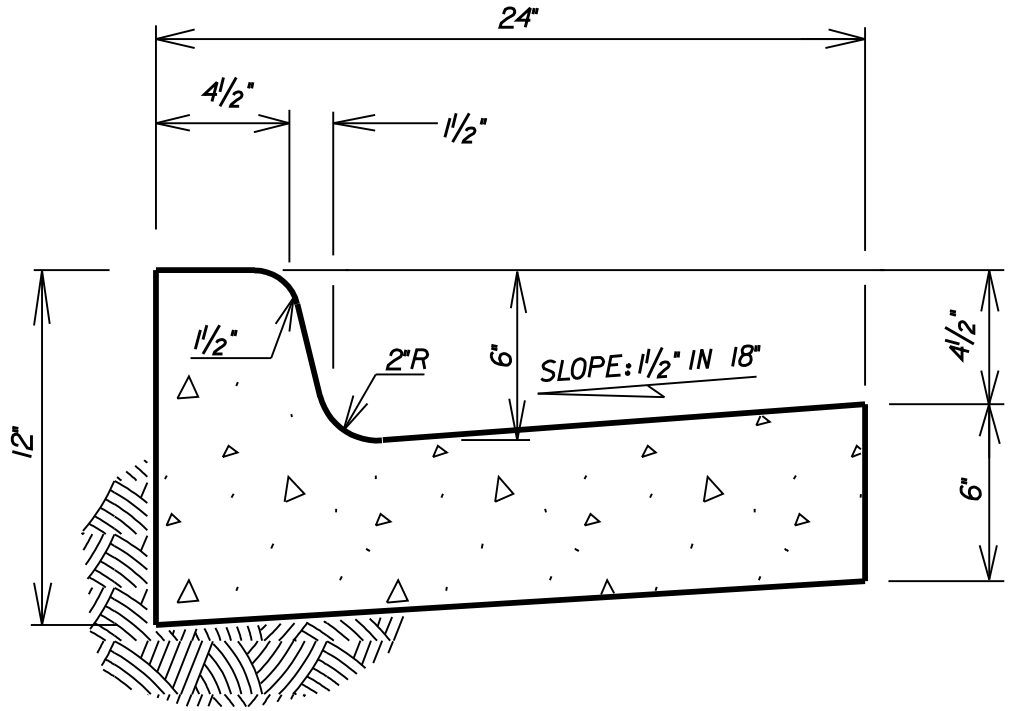
PUBLIC WORKS DIVISION

VERTICAL CURBWALK DETAIL

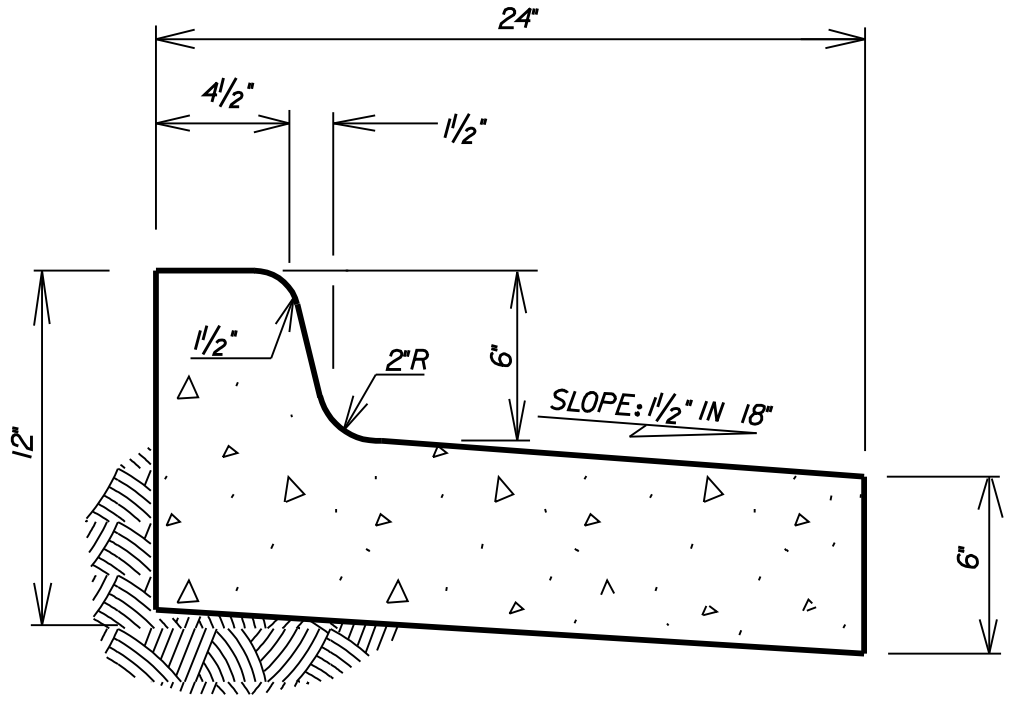
DETAIL 200-06

RED

DATE: MARCH, 1993 **SCALE:** NOT TO SCALE



(CATCH SECTION)



(SPILL SECTION)

REVISED
1/3/2005

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

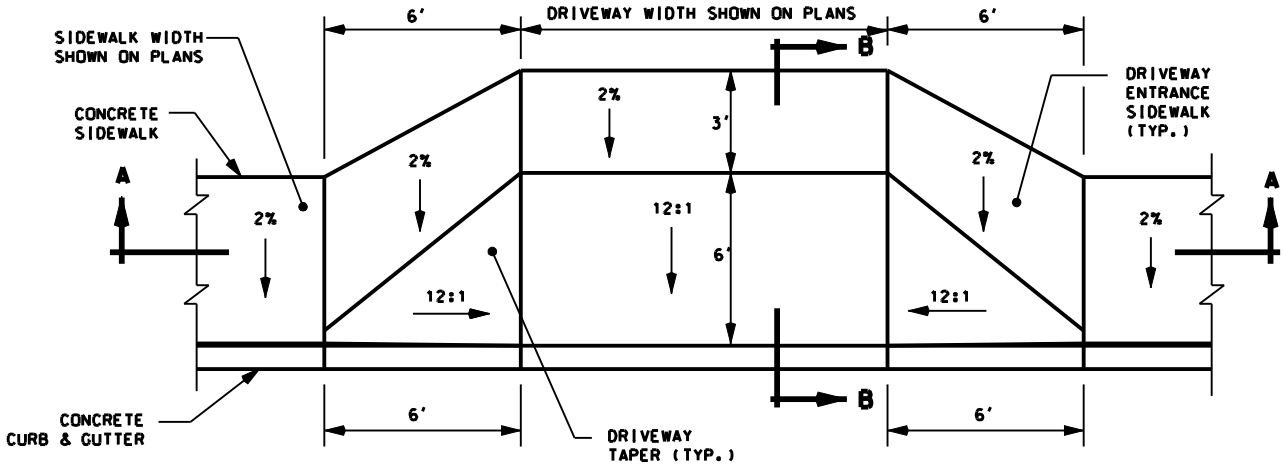
VERTICAL CURB & GUTTER TYPE B

DETAIL 200-07

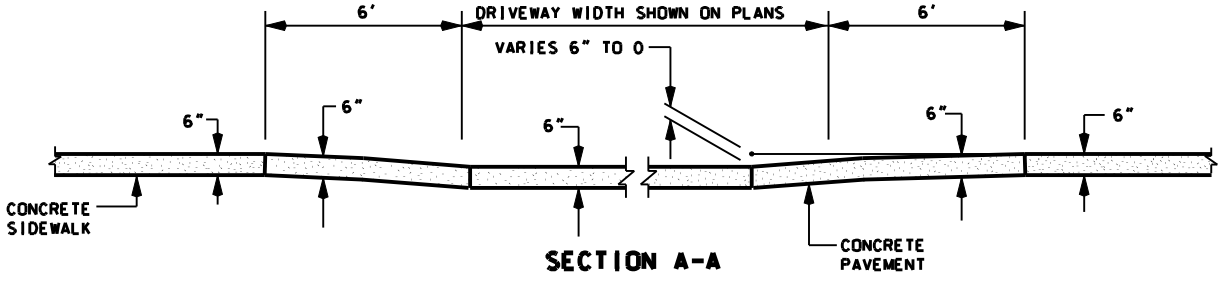
REB

DATE: MARCH, 1993

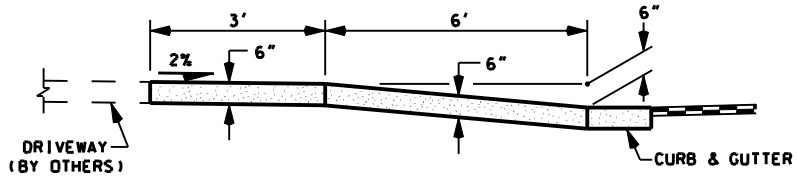
SCALE: NOT TO SCALE



CONCRETE DRIVEWAY ENTRANCE TYPE A



SECTION A-A



SECTION B-B

NOTES:

1. DRIVEWAY WIDTHS TO BE IN ACCORDANCE WITH MUNICIPAL CODE 15.05.050.
2. FOR ALLEY AND COMMERCIAL DRIVES. INCREASE THICKNESS TO 10".
3. APPLY BROOM FINISH TO SURFACE AND EVENLY SPACE JOINTS (10' MAX.).

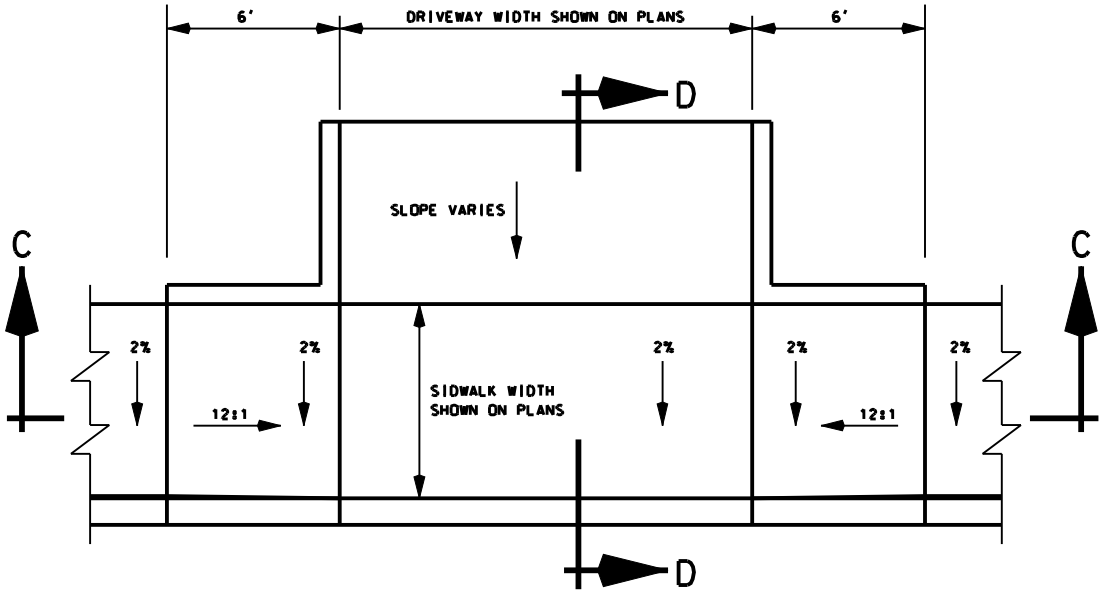
PUBLIC WORKS DIVISION

CONCRETE DRIVEWAY (TYPE A) WITH ATTACHED WALK
DETAIL 200-08A

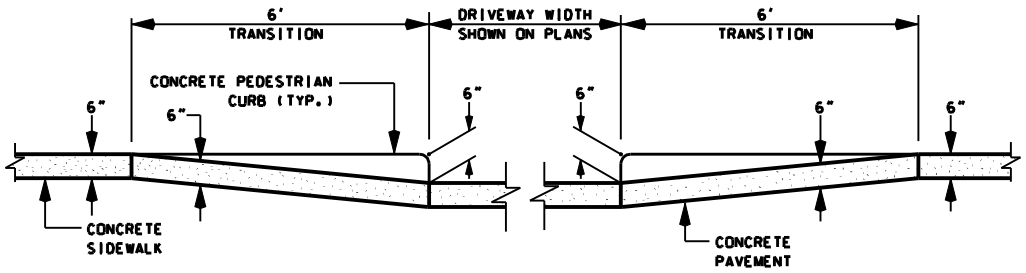
REB

DATE: DECEMBER, 2005

SCALE: NOT TO SCALE



PLAN VIEW
CONCRETE DRIVEWAY ENTRANCE TYPE B



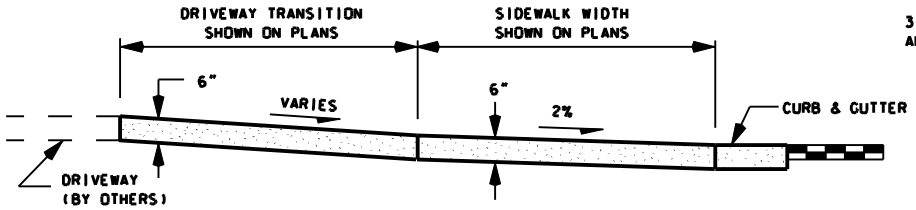
SECTION C-C

NOTES:

1. DRIVEWAY WIDTHS TO BE IN ACCORDANCE WITH MUNICIPAL CODE 15.05.050.

2. FOR ALLEY AND COMMERCIAL DRIVES. INCREASE THICKNESS TO 10".

3. APPLY BROOM FINISH TO SURFACE AND EVENLY SPACE JOINTS (10' MAX.).



SECTION D-D

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

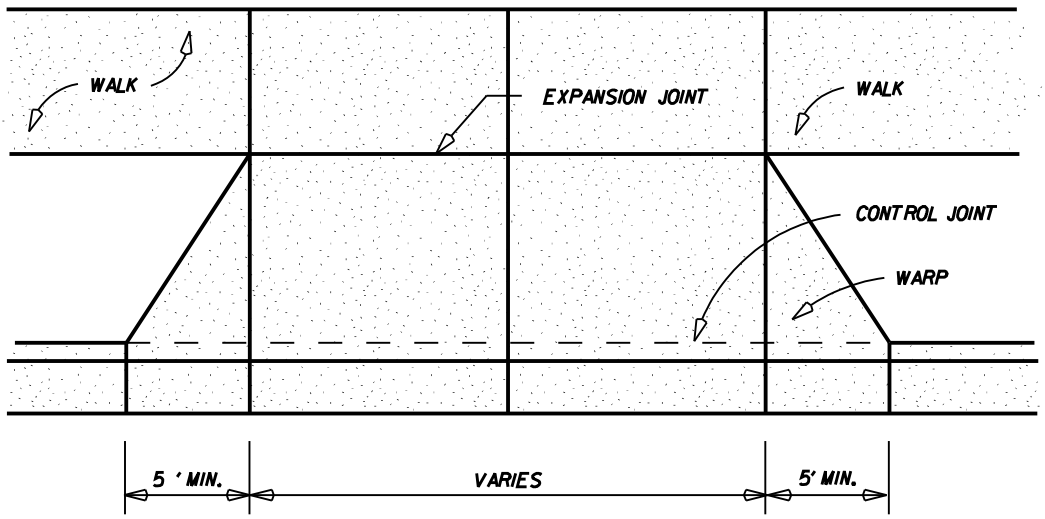
CONCRETE DRIVEWAY (TYPE B) WITH ATTACHED WALK

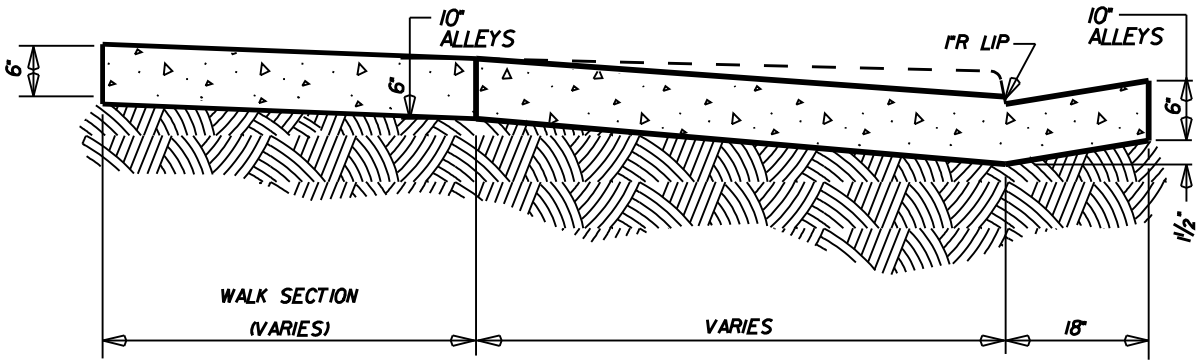
DETAIL 200-08 B

REB

DATE: DECEMBER, 2005

SCALE: NOT TO SCALE





NOTE:

1. 10' MAX. EVENLY SPACED JOINTS. APPLY BROOM FINISH TO SURFACE. DRIVEWAY WIDTHS IN ACCORDANCE WITH MUNICIPAL CODE 15.05.050.D STREETS.A. AS FOLLOWS.

2. CURB CUTS IN RESIDENTIAL DISTRICTS SHALL NOT BE LESS THAN 12'. NOR MORE THAN 24'. CURB CUTS IN COMMERCIAL / INDUSTRIAL DISTRICTS SHALL NOT BE LESS THAN 12' NO MORE THAN 30' WHEN SERVING ONE PROPERTY OR 40' WHEN SERVING MORE THAN ONE PROPERTY.

3. ALLEY AND COMMERCIAL DRIVES SHALL BE 10" THICK ALLEY CURB CUTS SHALL BE 20' IN LENGTH.

REVISED
8/9/1999
3/4/1997
3/12/2001
1/3/2005

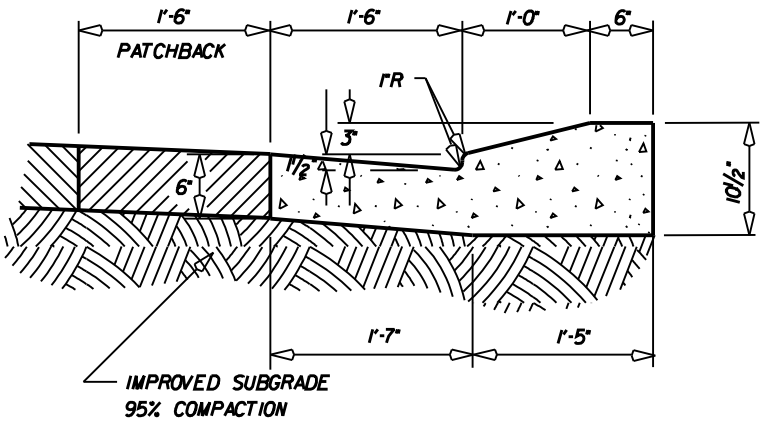
PUBLIC WORKS DIVISION

CONCRETE DRIVEWAY OFFSET WALK (MONOLITHIC POUR)

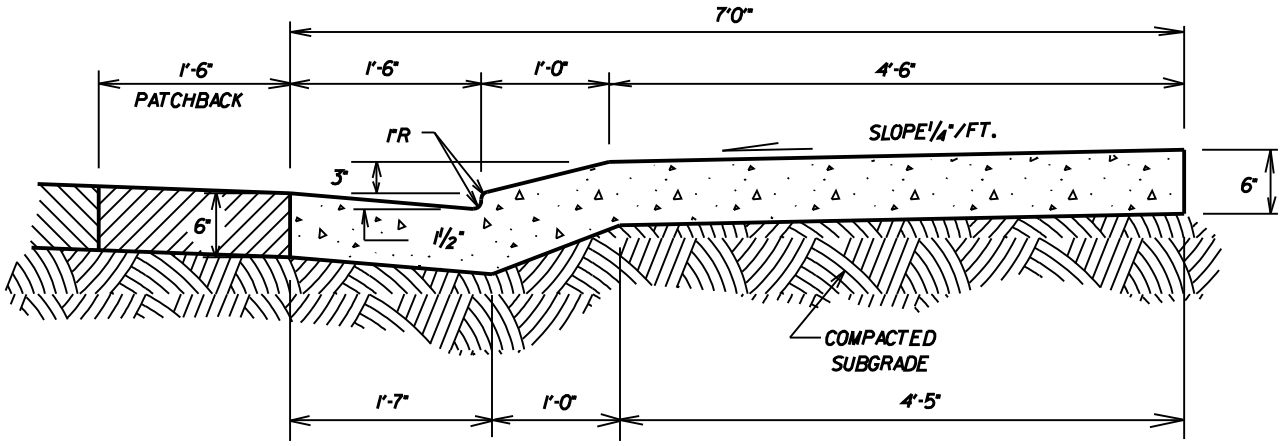
DETAIL 200-09

REB

DATE: MAY, 1993 **SCALE:** NOT TO SCALE



CURB SECTION



CURBWALK SECTION

NOTE:

1. GUTTER SLOPE - 1½" IN 1'-6"
2. WALK SLOPE - ¼" IN 1'-0"
3. RESIDENTIAL ONLY.
4. ALLEY DRIVE CUTS SHALL BE 10" THICK

REVISED
3/6/1997
3/9/2001
1/3/2005

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

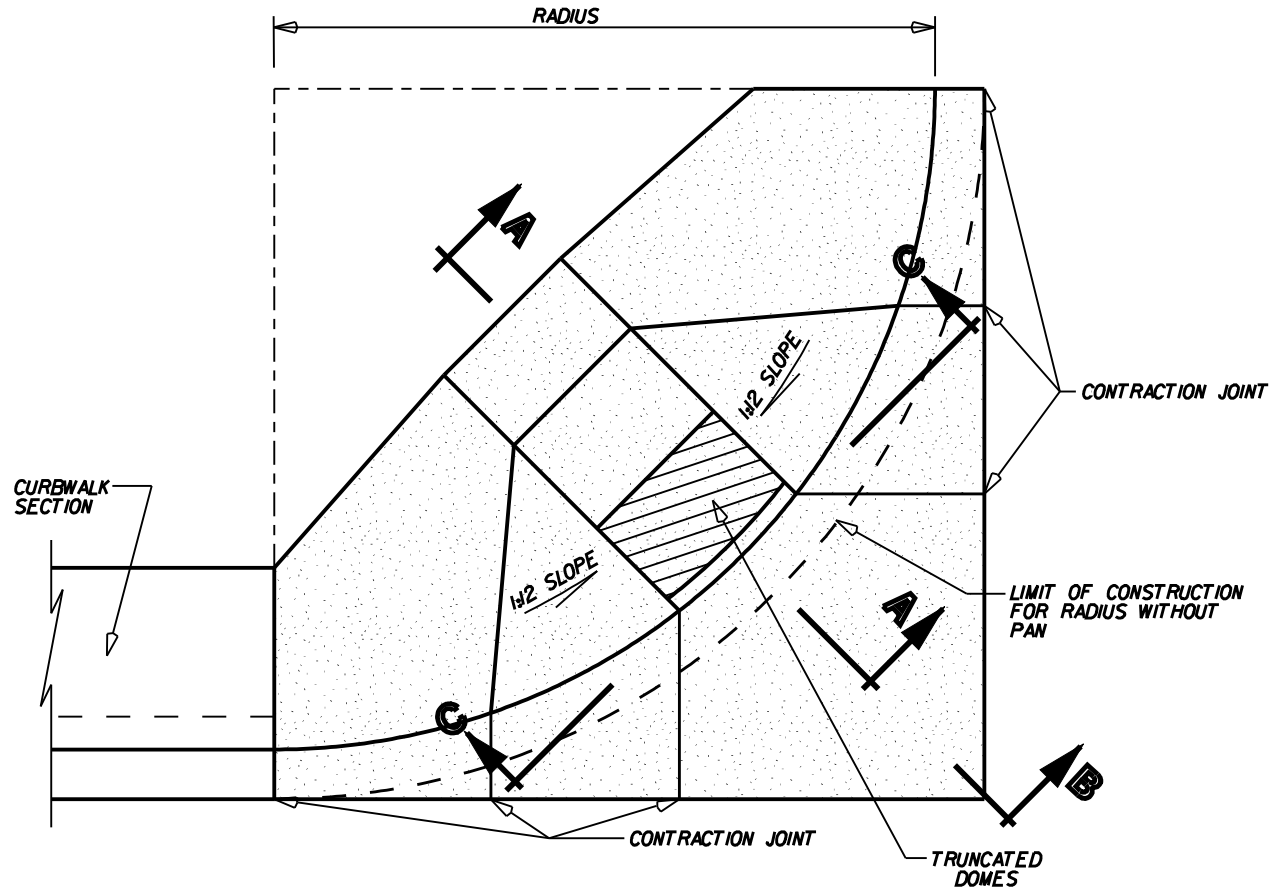
MOUNTABLE CURBWALK

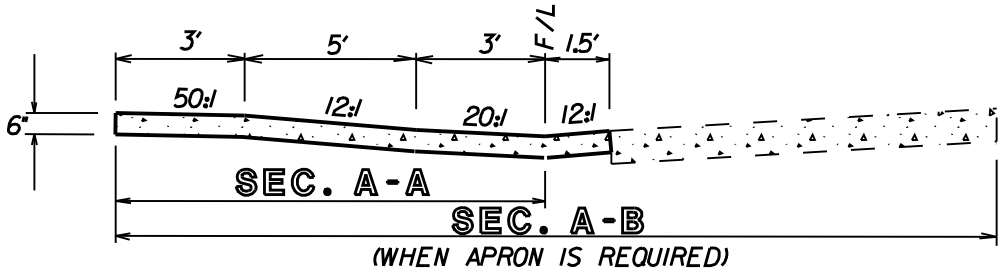
DETAIL 200-10

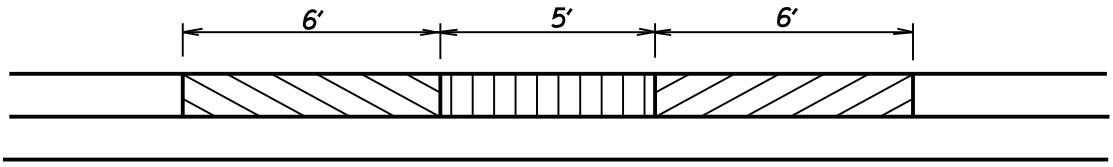
REB

DATE: MARCH, 1997

SCALE: NOT TO SCALE







SEC. C-C

SEE DETAIL 200-15 FOR TRUNCATED DOME AND CONSTRUCTION JOINT NOTES AND DETAILS.

REVISED
3/9/2001
12/29/2004

CITY OF LONGMONT COLORADO

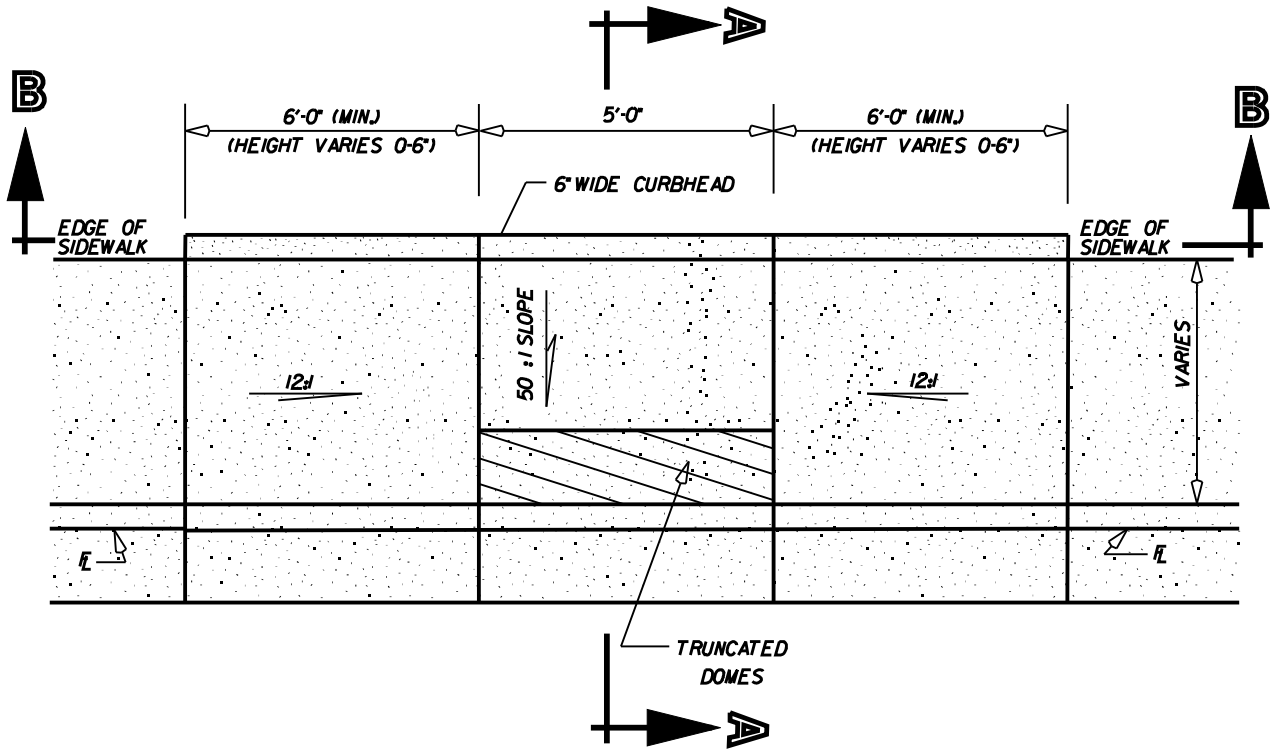
PUBLIC WORKS DIVISION

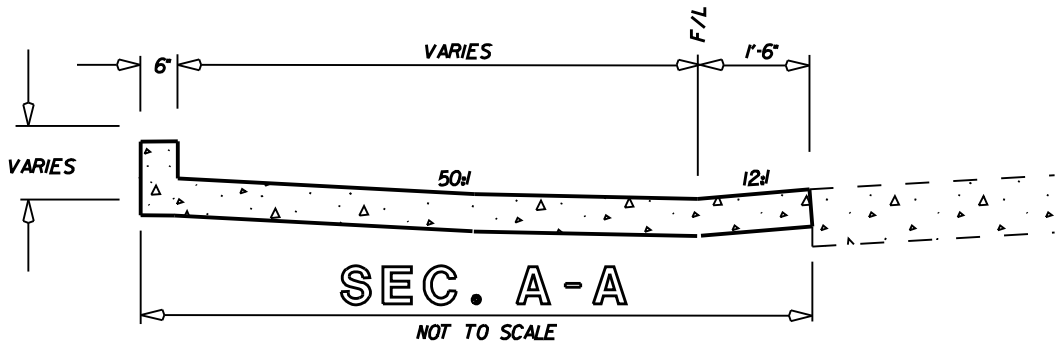
CURB RAMP DETAIL
RADIAL CURBWALK
DETAIL 200-11

REB

DATE: MARCH, 1993

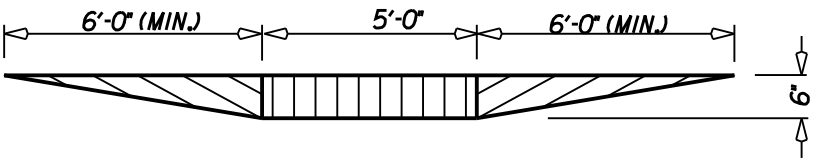
SCALE: NOT TO SCALE





SEC. A-A

NOT TO SCALE



SEC. B-B

NOT TO SCALE

SEE DETAIL 200-15 FOR TRUNCATED DOME AND CONSTRUCTION JOINT NOTES AND DETAILS.

REVISED
3/9/2001
11/5/2003
12/30/2004

PUBLIC WORKS DIVISION

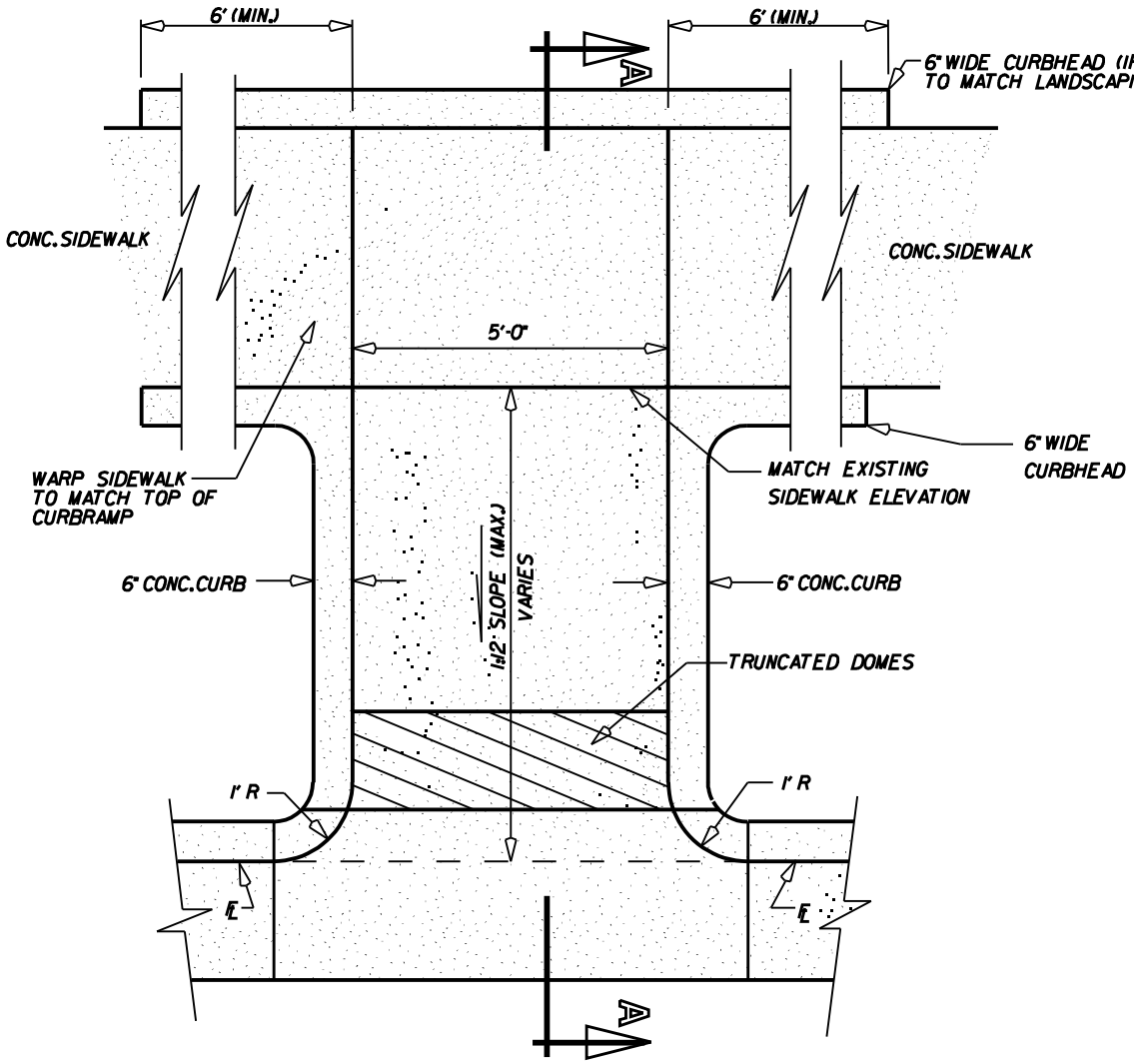
CURB RAMP DETAIL MID-BLOCK, SINGLE

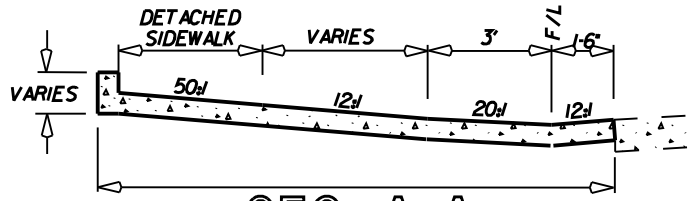
DETAIL 200-12

RED

DATE: MARCH, 1993

SCALE: NOT TO SCALE





SEC. A-A

SEE DETAIL 200-15 FOR TRUNCATED DOME AND CONSTRUCTION JOINT NOTES AND DETAILS.

REVISED
3/9/2001
12/30/2004

PUBLIC WORKS DIVISION

CURB RAMP DETAIL
DETACHED SIDEWALK
DETAIL 200-13

REB

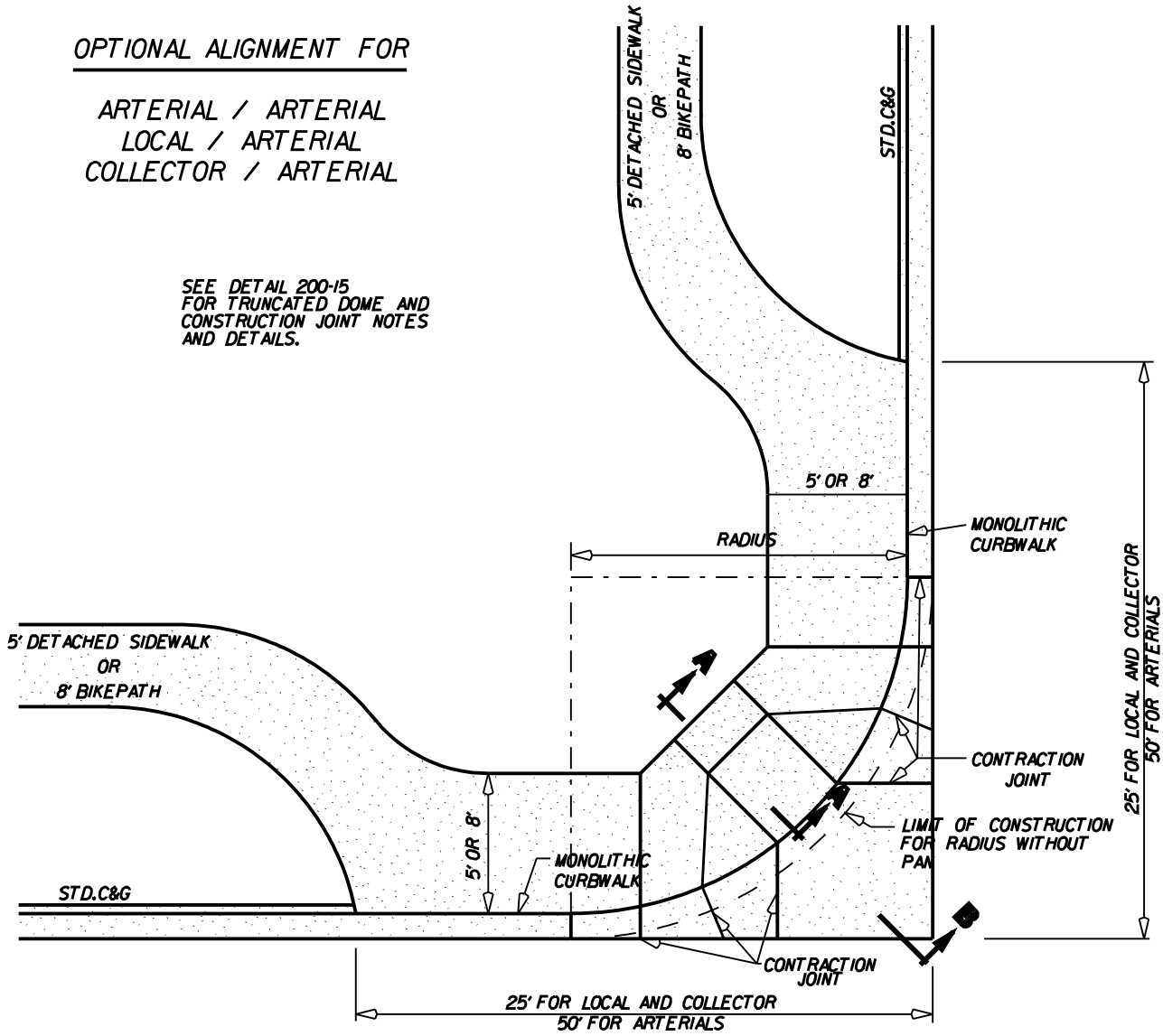
DATE: MARCH, 1993

SCALE: NOT TO SCALE

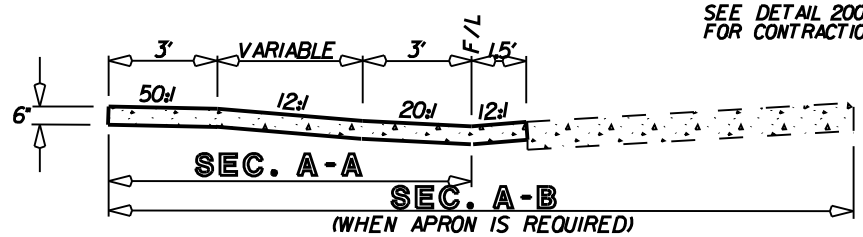
OPTIONAL ALIGNMENT FOR

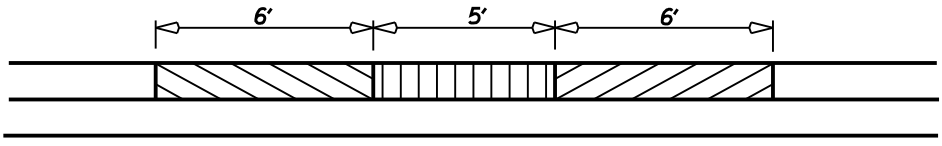
ARTERIAL / ARTERIAL
LOCAL / ARTERIAL
COLLECTOR / ARTERIAL

SEE DETAIL 200-15
FOR TRUNCATED DOME AND
CONSTRUCTION JOINT NOTES
AND DETAILS.



SEE DETAIL 200-15
FOR CONTRACTION JOINT DETAIL





SEC. C-C

REVISED
3/12/2001
12/30/2004

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

CURB RAMP TRANSITION DETAIL FOR DETACHED WALK AND OR BIKEPATH

DETAIL 200-14 Alt. A

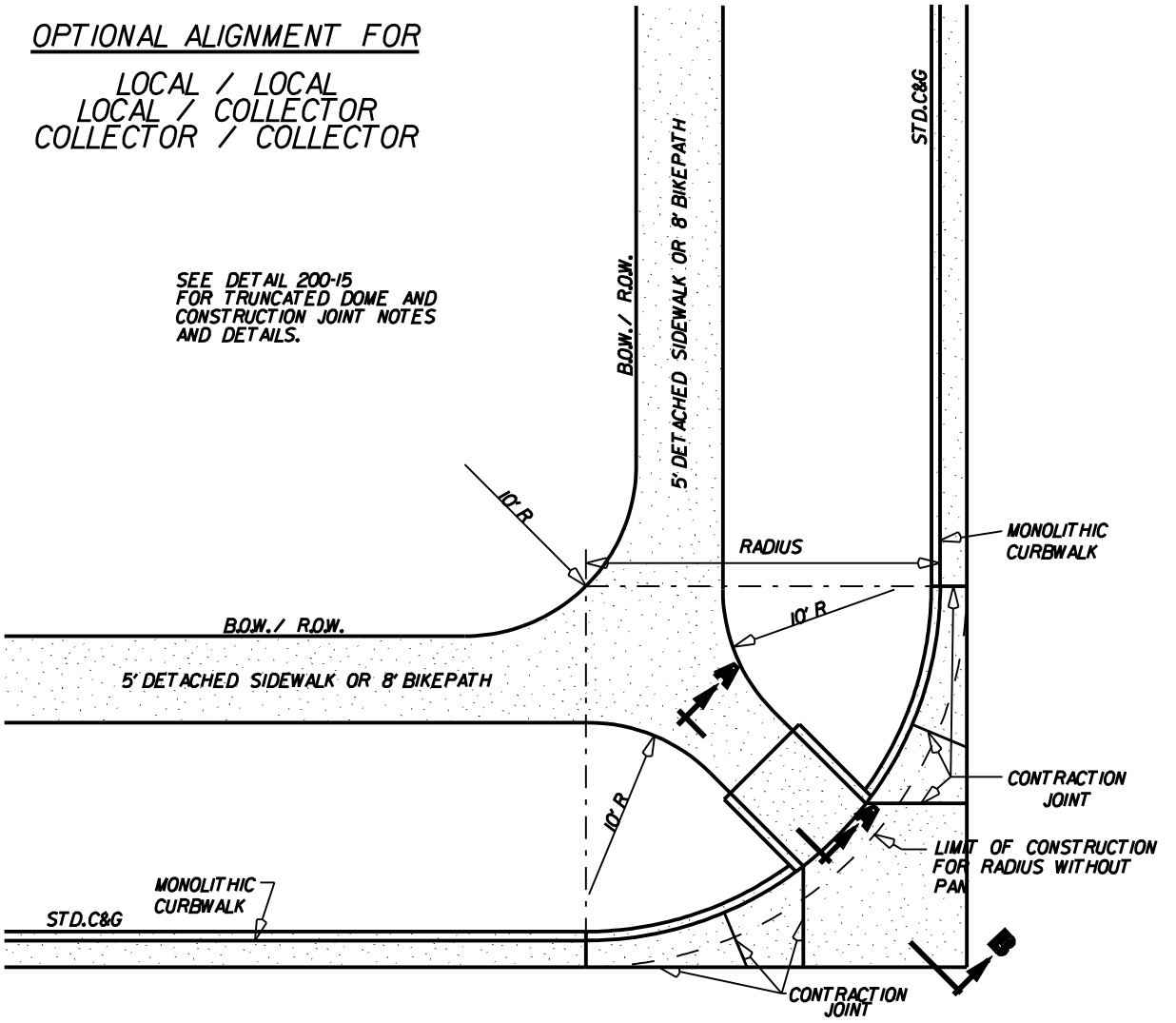
REV

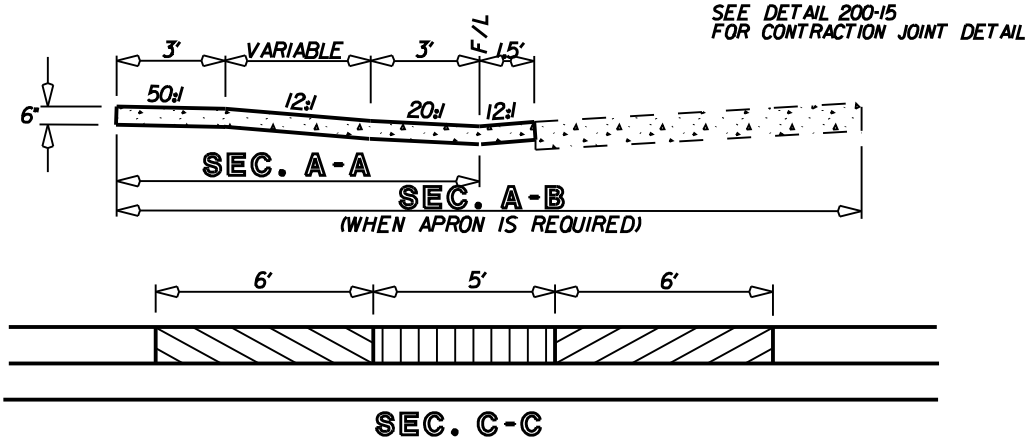
DATE: OCTOBER, 1999

SCALE: NOT TO SCALE

OPTIONAL ALIGNMENT FOR

LOCAL / LOCAL
LOCAL / COLLECTOR
COLLECTOR / COLLECTOR





REVISED

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

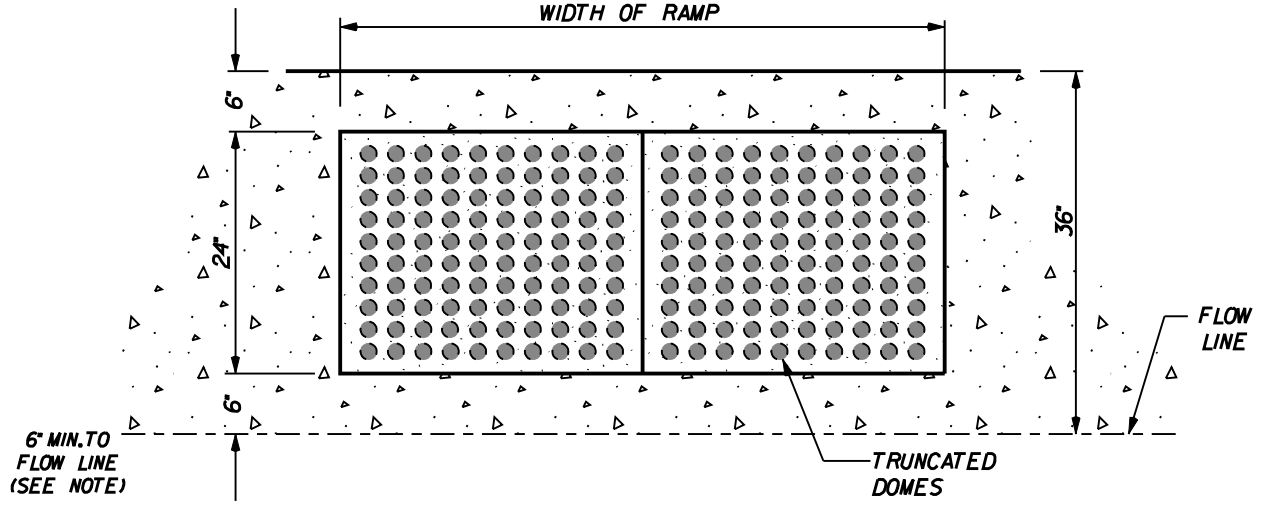
CURB RAMP TRANSITION DETAIL FOR DETACHED WALK AND OR BIKEPATH

DETAIL 200-14 Alt. B

REV

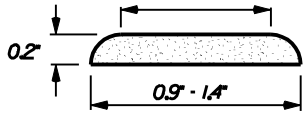
DATE: OCTOBER, 2006

SCALE: NOT TO SCALE

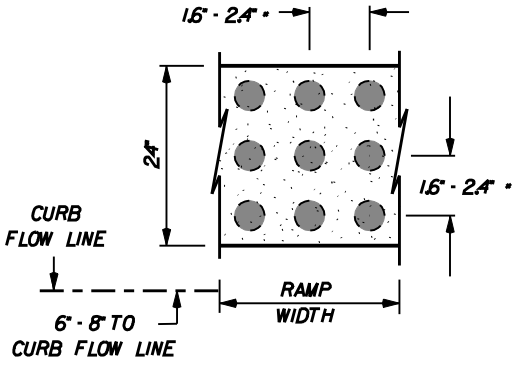


PLAN VIEW OF TRUNCATED DOMES

THE TOP DIAMETER OF THE TRUNCATED DOMES SHALL BE 50% TO 65% OF THE BASE DIAMETER



ELEVATION VIEW



PLAN VIEW

* SHALL BE EQUAL IN BOTH DIRECTIONS

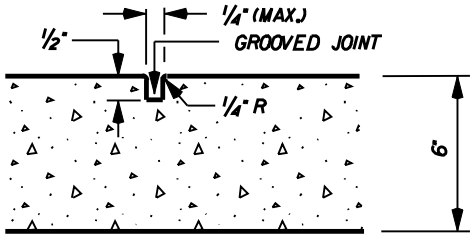
GENERAL NOTES:

1. TRUNCATED DOMES SHALL BE INSTALLED AT SIDEWALK/ STREET INTERSECTIONS. THE DOMES SHALL BE PLACED IN A SQUARE GRID.
2. TRUNCATED DOMES SHALL BE INSTALLED A MINIMUM OF 6 INCHES FROM THE FLOW LINE OF THE CURB AND NOT BE MORE THAN A MAXIMUM OF 8 INCHES FROM THE FLOW LINE. ALL TRUNCATED DOMES SHALL BE 24 INCHES IN LENGTH AND COVER THE COMPLETE WIDTH OF THE RAMP AREA.
3. RAMP SLOPES SHALL NOT BE STEEPER THAN 1" PER FOOT (12:1) THE TRUNCATED DOME SLOPE SHALL NOT BE STEEPER THAN 0.6" PER FOOT (20:1).
4. REFER TO THE MATERIALS LIST FOR APPROVED TRUNCATED DOME MANUFACTURERS / PRODUCTS.

DOME AND DETECTABLE WARNING DETAILS

CONSTRUCTION NOTES:

THE RAMP AREA SHALL RECEIVE A COARSER BRUSH TREATMENT THAN THE SIDEWALK.



JOINT SHALL BE TOOLED IN LIEU OF SAWCUTTING AT TIME OF RAMP INSTALLATION BEFORE CONCRETE HAS HARDENED.

CONTRACTION JOINT

REVISED

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

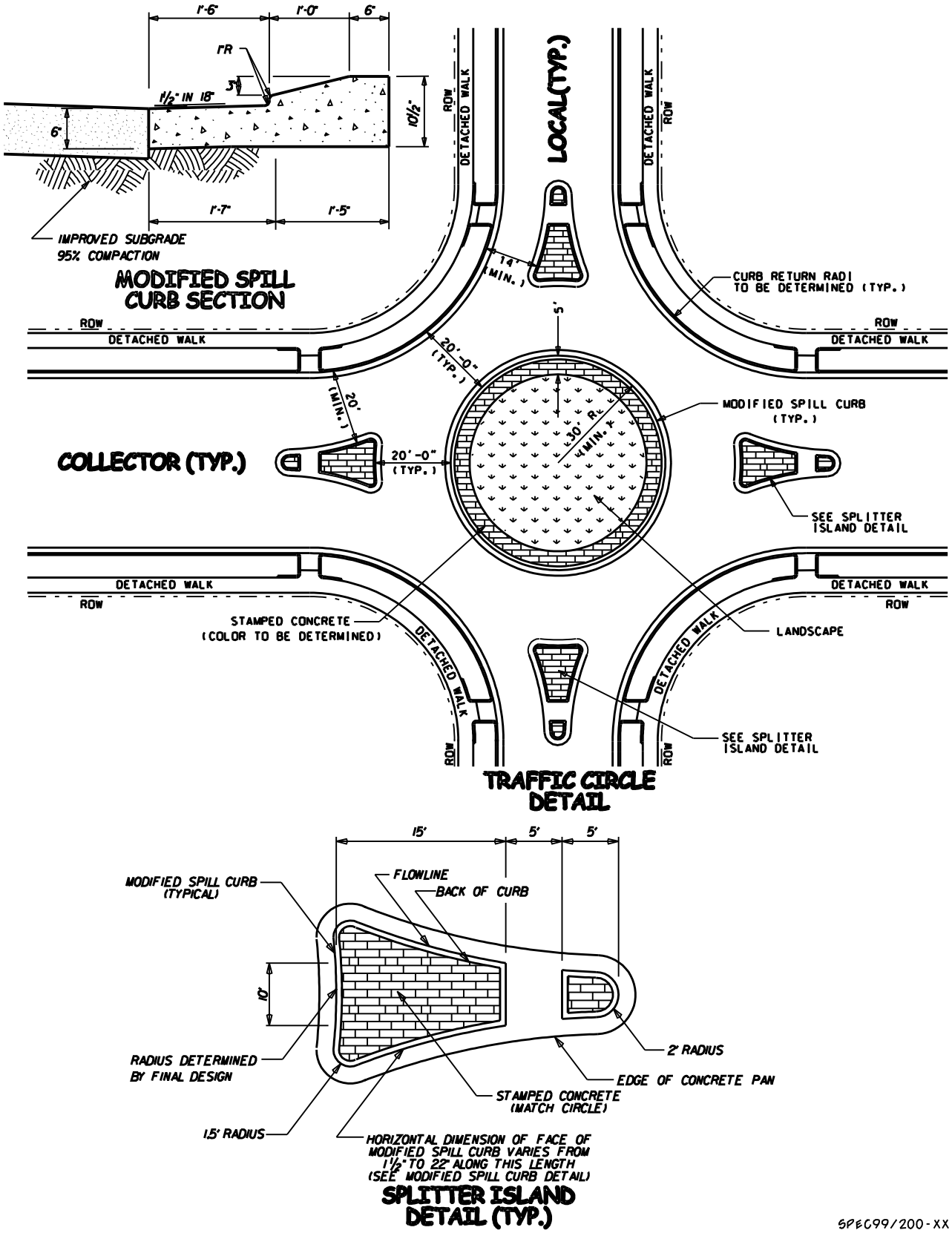
CURB RAMP DETECTABLE WARNING AND CONTRACTION JOINT DETAIL

DETAIL 200-15

REB

DATE: JANUARY, 2005

SCALE: NOT TO SCALE



SPEC99/200-XX

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

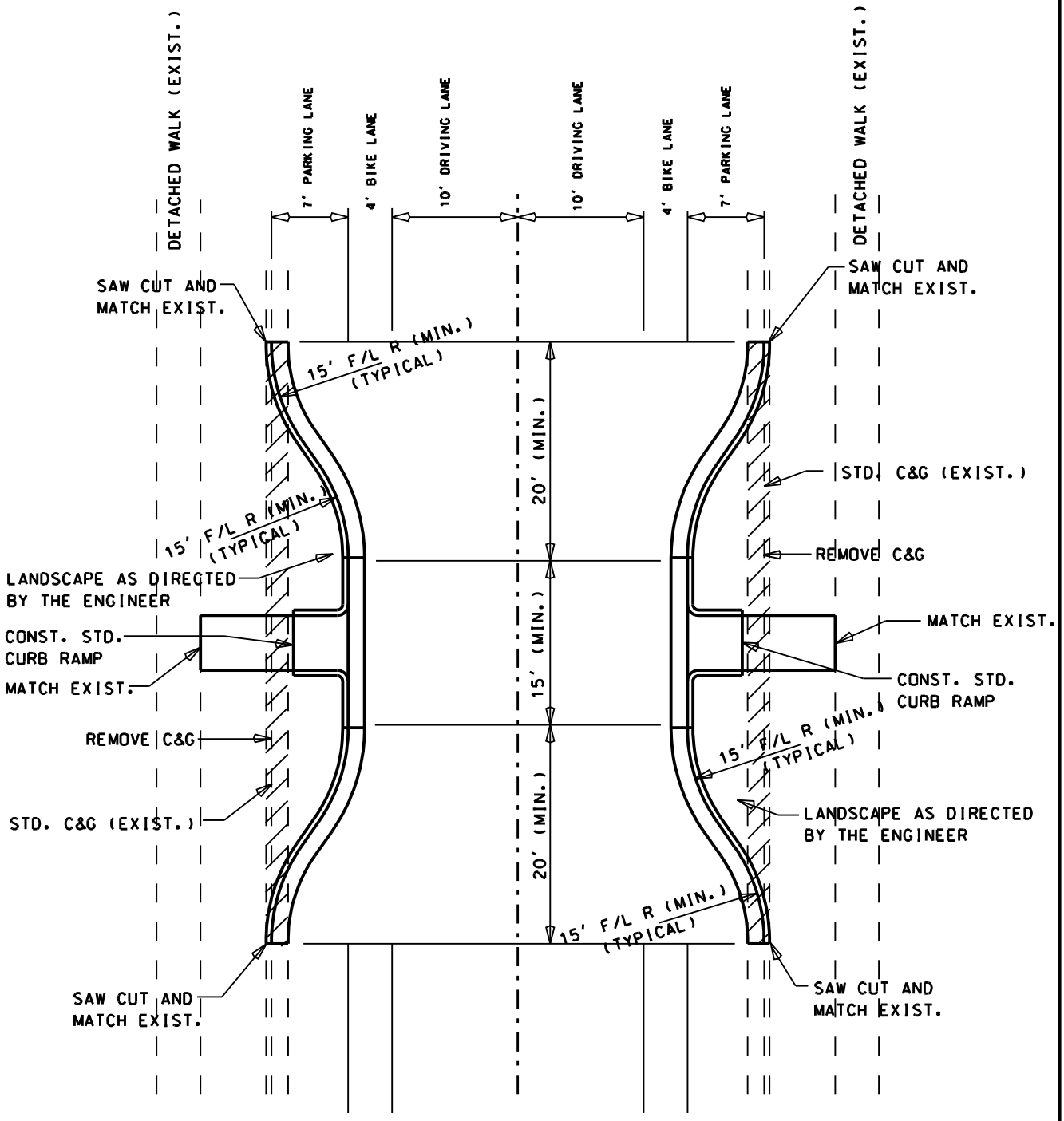
TRAFFIC CIRCLE DETAIL

DETAIL 200-16

REB

DATE: MARCH, 2006

SCALE: NOT TO SCALE



SPEED TABLE AT THE PEDESTRIAN CROSSIING MAY BE OPTION DIRECTED BY THE ENGINEER SEE DETAIL 200-15B

SEE DETAIL 200-15 FOR TRUNCATED DOME AND CONSTRUCTION JOINT DETAIL

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

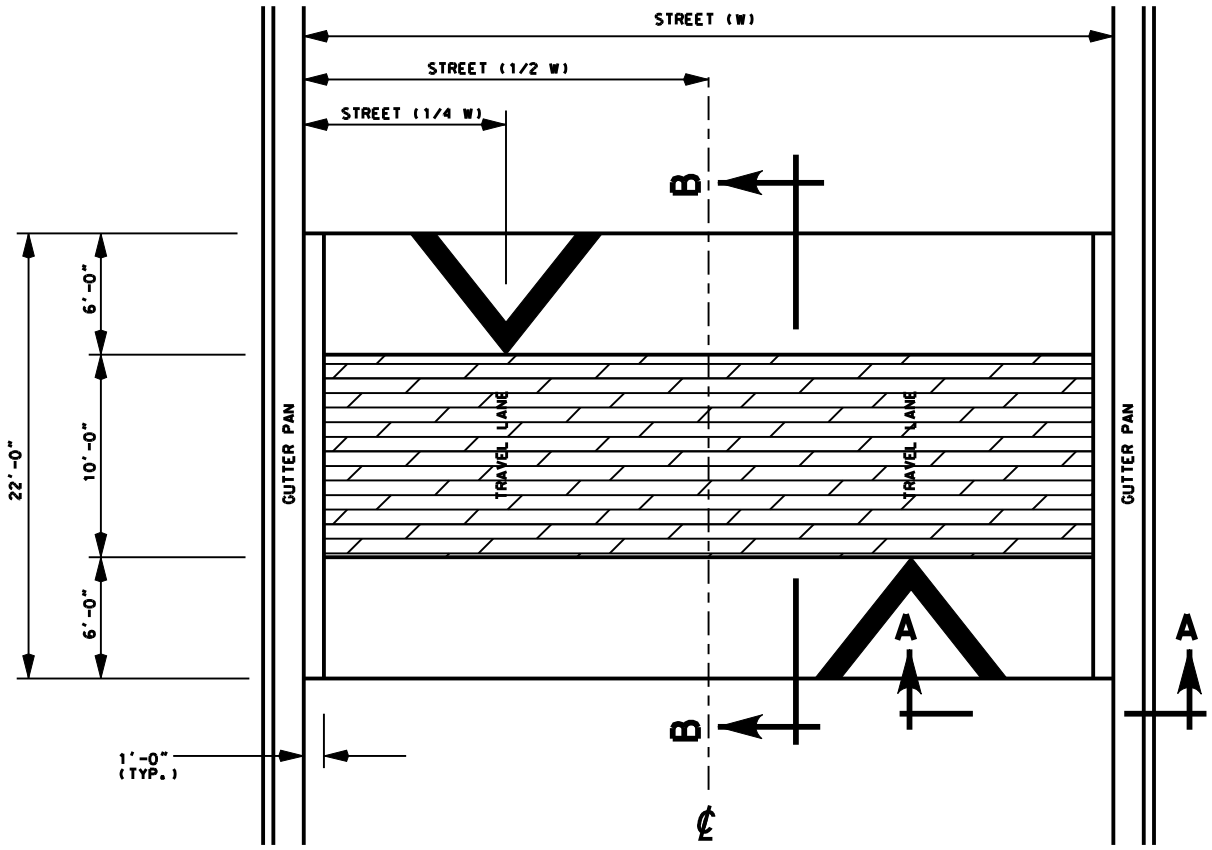
MID-BLOCK NECKDOWN WITH DETACHED WALK

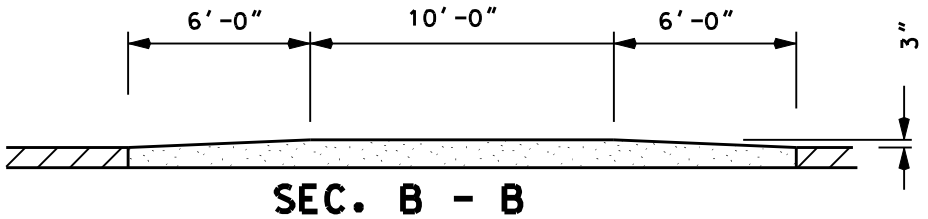
DETAIL 200-16A

REB

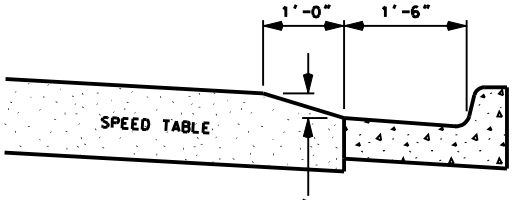
DATE: OCTOBER, 2006

SCALE: NOT TO SCALE

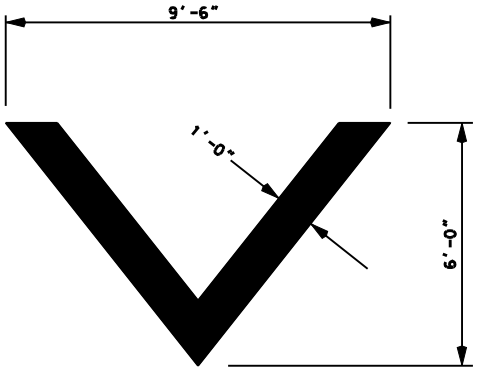




SEC. B - B



SEC. A - A



WHITE PAINT
WARNING MARKER

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

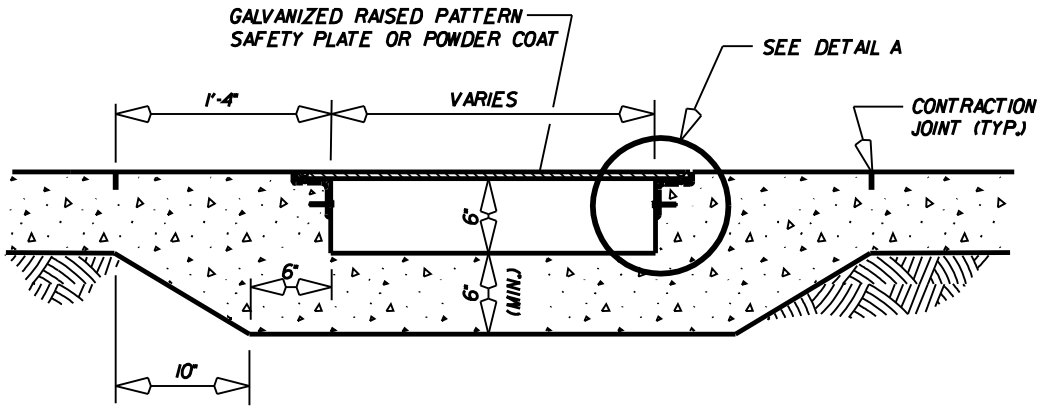
SPEED TABLES OR SPEED HUMPS WITH CROSSWALK
DETAIL 200-16B

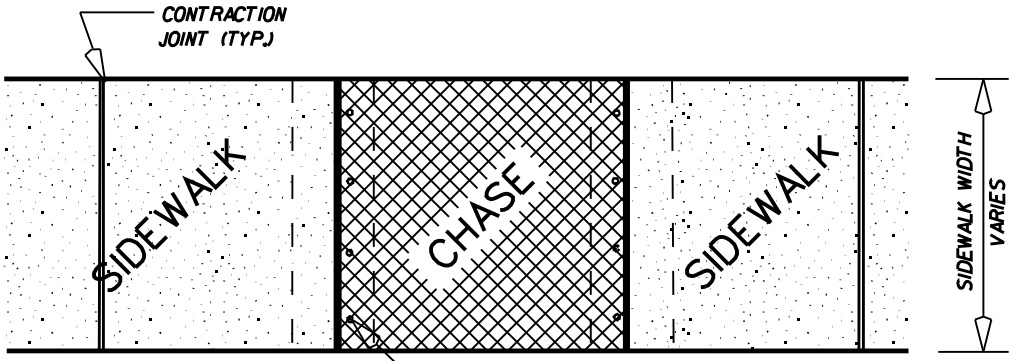
REB

DATE: OCTOBER, 2006

SCALE: NOT TO SCALE

NOTE: SLOPE CHANNEL 1/4" PER FT. IN THE DIRECTION OF FLOW. (FLOW TO STREET)





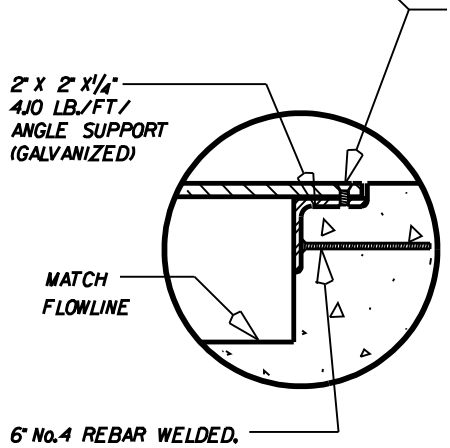


PLATE THICKNESS	CHASE DRAIN WIDTH
5/16"	0 - 12"
3/8"	13" - 24"

NOTE:
CHASE DRAINS SHALL NOT BE CONSTRUCTED WITH AN OPENING WIDTH OF GREATER THAN 2 FEET. MULTIPLE CHASES MAY BE CONSTRUCTED WITH A MINIMUM 1 FOOT SEPARATION BETWEEN CHASE THROAT OPENINGS.

DETAIL A

REVISED
3/4/1997
3/12/2001
1/3/2005

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

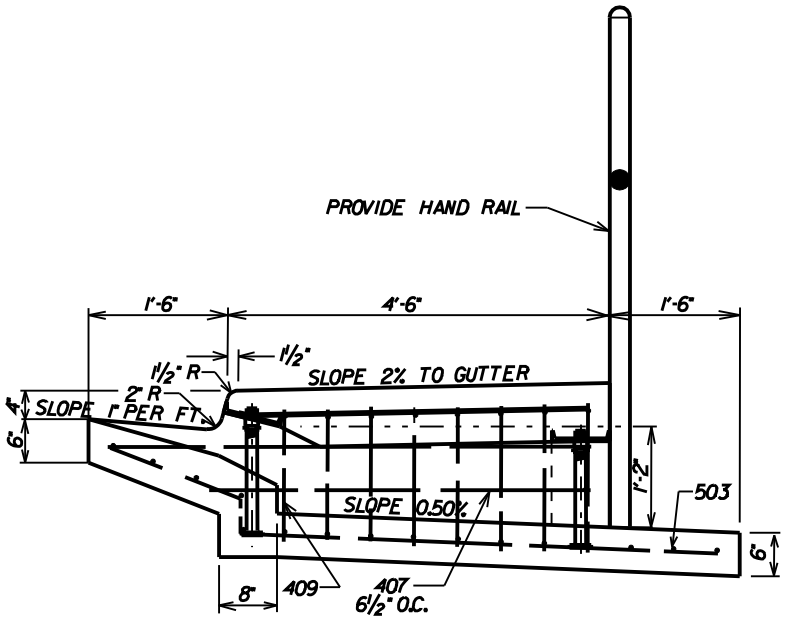
CHASE DRAIN DETAIL

DETAIL 200-17

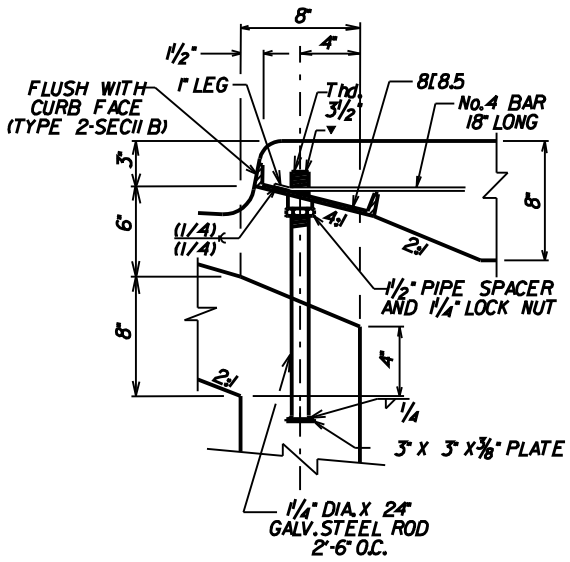
REB

DATE: MARCH, 1993

SCALE: NOT TO SCALE

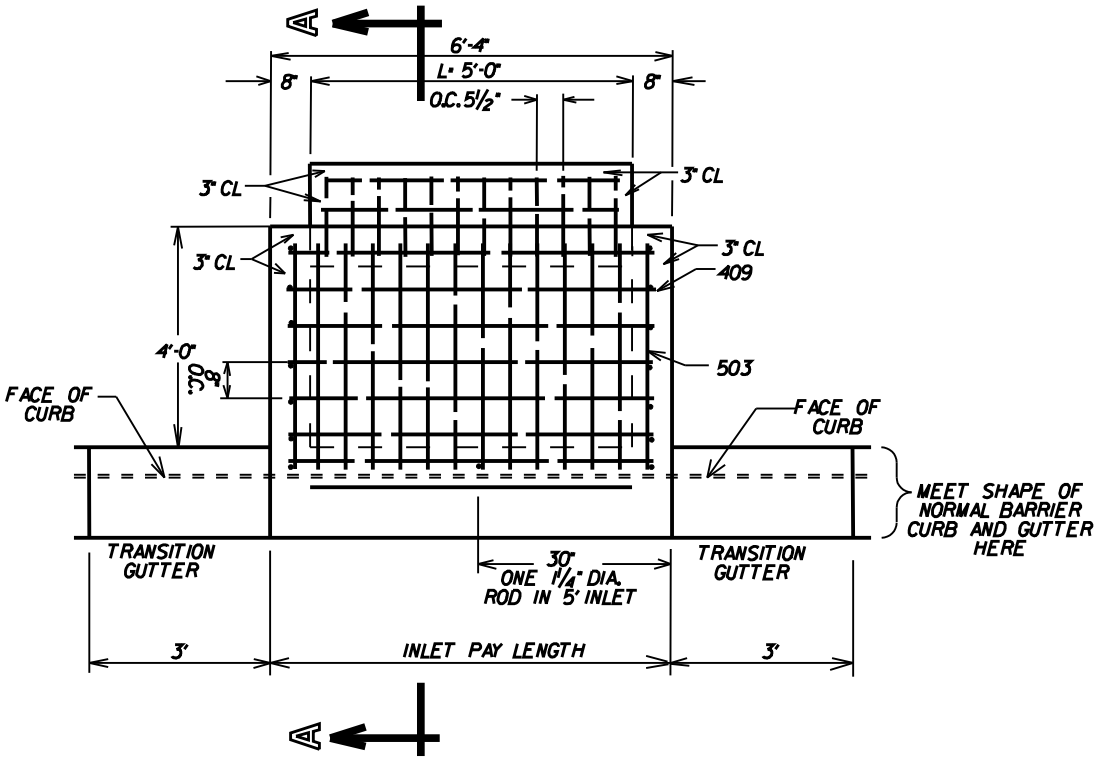


SEC. A - A



CURB FACE ASSEMBLEY

Place Entire Assembley Before Pouring Concrete.



TYPICAL PLAN VIEW

REVISED
3/12/2001
1/3/2005

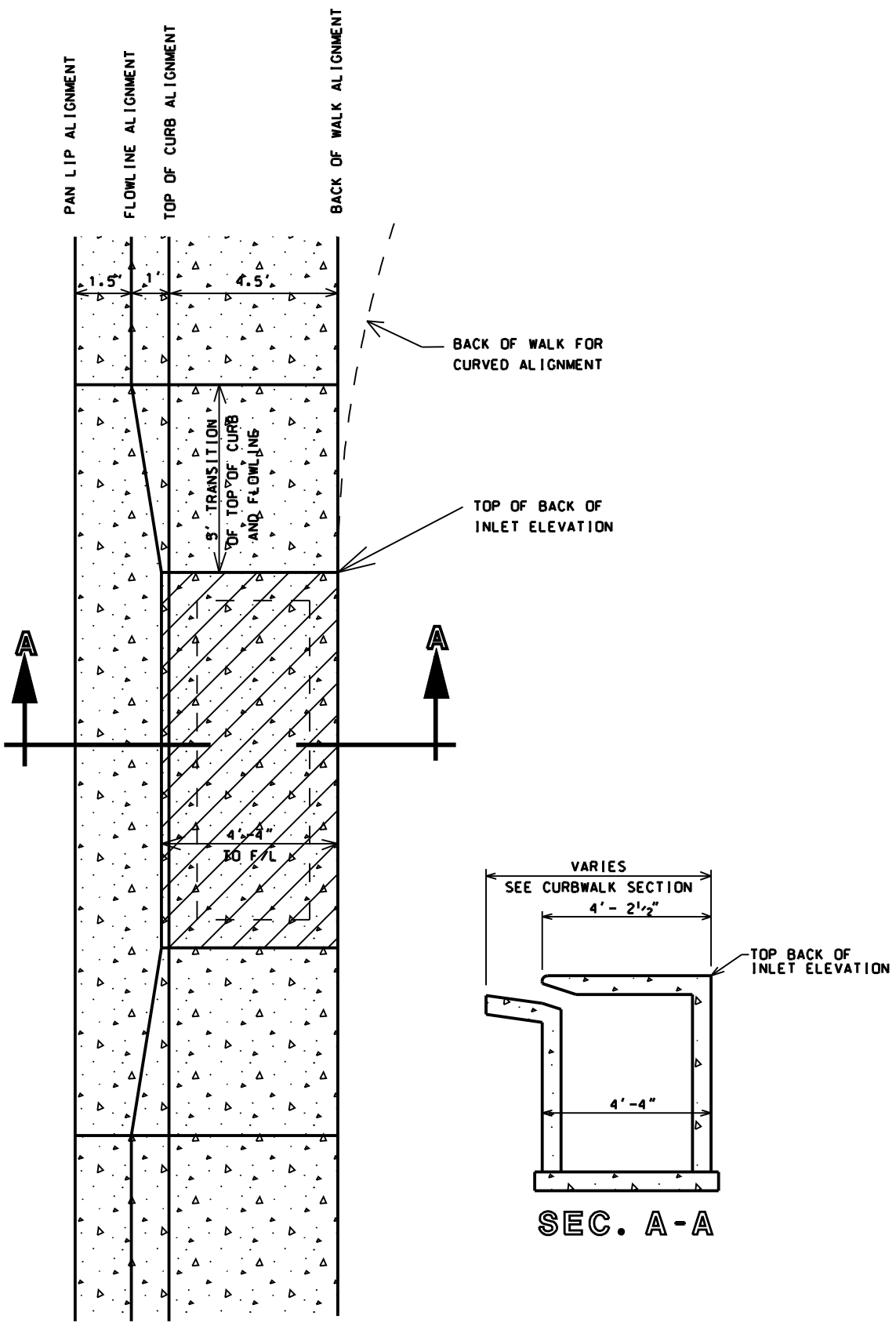
PUBLIC WORKS DIVISION

TYPE R (MODIFIED) - (CHASE) DETAIL 200-18

REB

DATE: SEPT. 5, 1996

SCALE: NOT TO SCALE



REVISED
1/3/2005

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

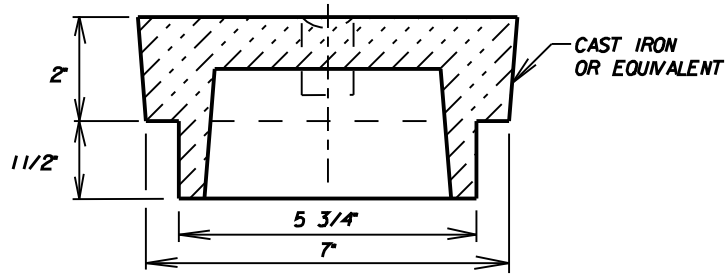
STAKING DETAIL
MOUNTABLE CURB INLET
DETAIL 200-19

REB

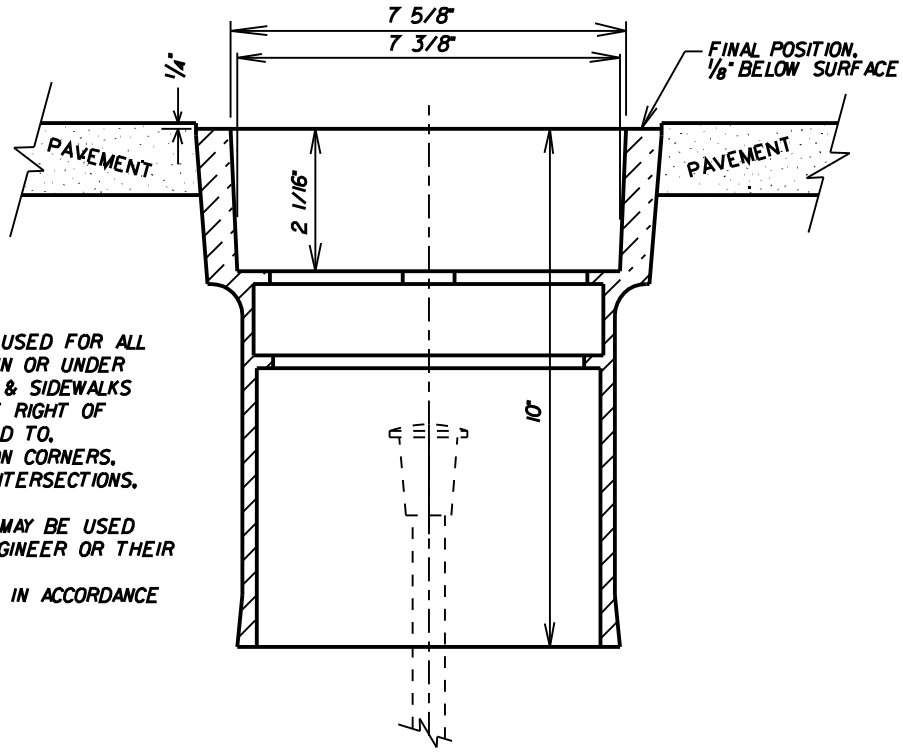
DATE: JAN., 1996

SCALE: NOT TO SCALE





MONUMENT LID



MONUMENT RISER

NOTES:
1. TYPICAL MONUMENT BOX TO BE USED FOR ALL SURVEY MONUMENTS LOCATED IN OR UNDER PAVED STREETS, BIKE PATH'S & SIDEWALKS WITHIN THE CITY OF LONGMONT RIGHT OF WAY, INCLUDING BUT NOT LIMITED TO, PROPERTY CORNERS, SUBDIVISION CORNERS, REFERENCE MARKS, STREET INTERSECTIONS, AND WITNESS CORNERS.
2. ALTERNATE MONUMENT BOXES MAY BE USED IF APPROVED BY THE CITY ENGINEER OR THEIR DESIGNEE.
3. ALL MONUMENTS SHALL BE SET IN ACCORDANCE WITH COLORADO STATE LAW.

REVISED
1/3/2005

CITY OF LONGMONT COLORADO

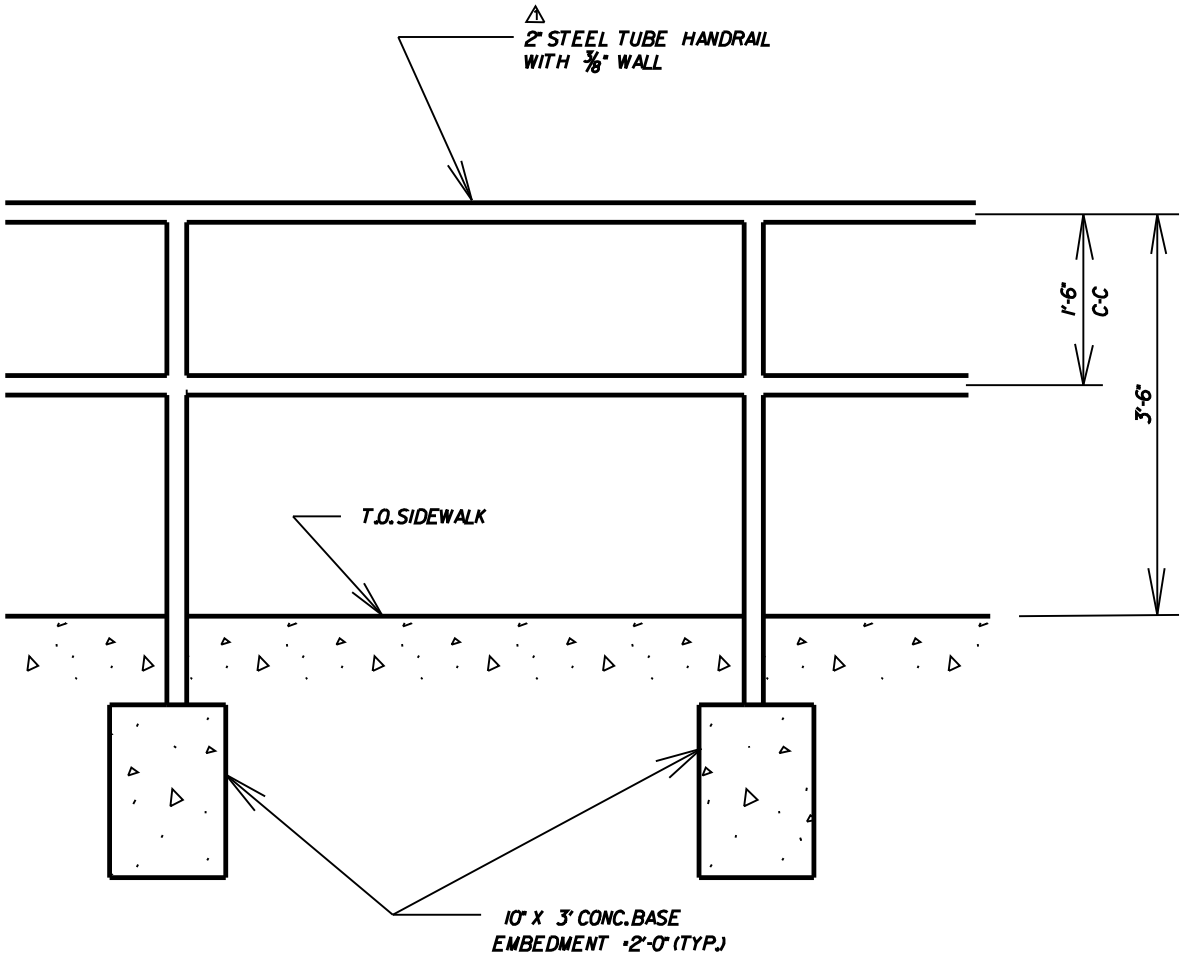
PUBLIC WORKS DIVISION

SURVEY MONUMENT BOX

DETAIL 200-20

REB

DATE: APRIL, 1995 **SCALE:** NOT TO SCALE



⚠

1. BASE SHALL BE CLASS B CONCRETE.
2. TOP OF HANDRAIL TO MATCH SIDEWALK GRADE.
3. TYPE AND COLOR OF FINISH SHALL BE APPROVED BY THE CITY OF LONGMONT.

REVISED
3/12/2001
⚠9/10/2002
1/3/2005

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

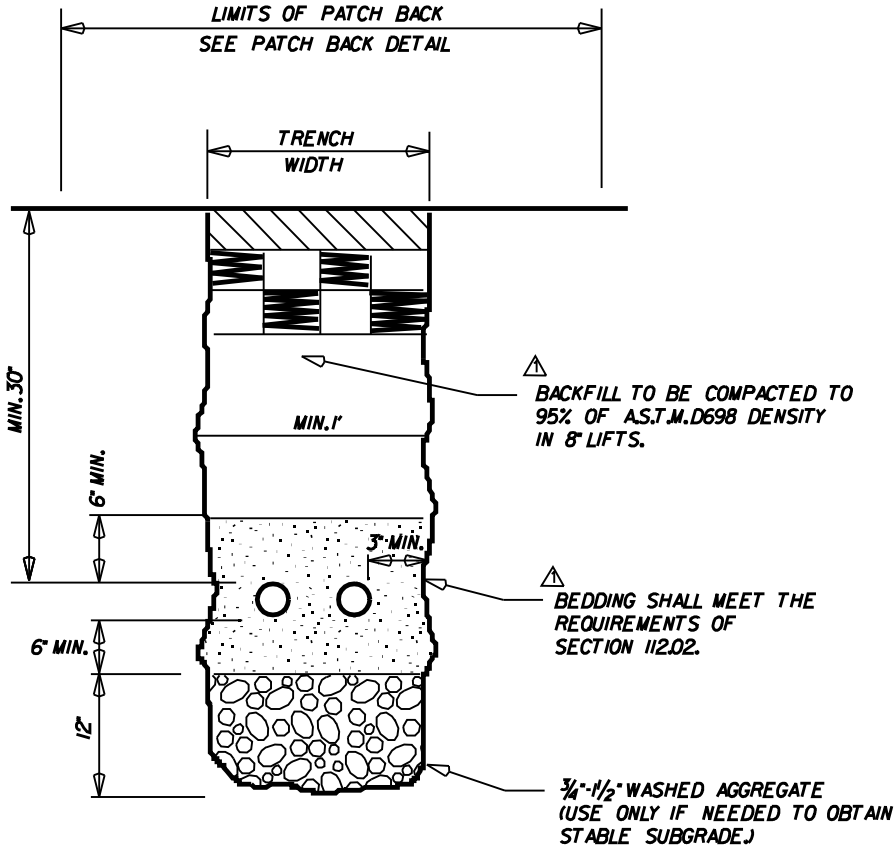
PEDESTRIAN HANDRAIL DETAIL

DETAIL 200-21

REB

DATE: MARCH., 1993

SCALE: NOT TO SCALE



REVISED
3/12/2001
1 9/10/2002
1/3/2005

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

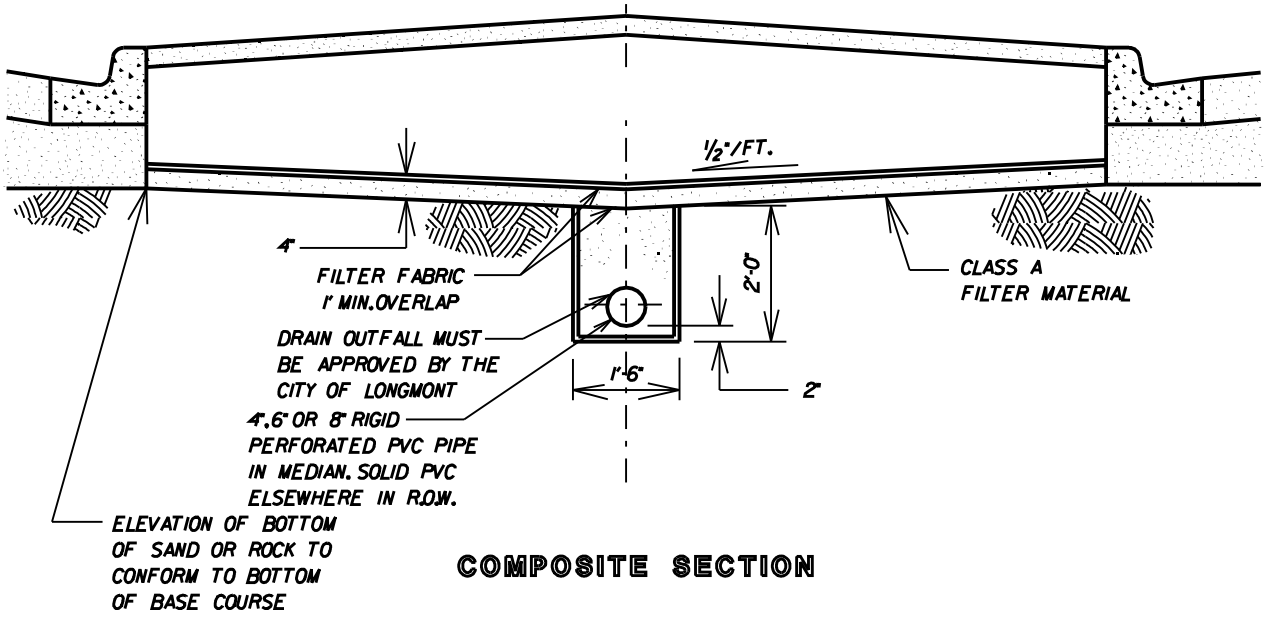
CONDUIT TRENCH

DETAIL 200-22

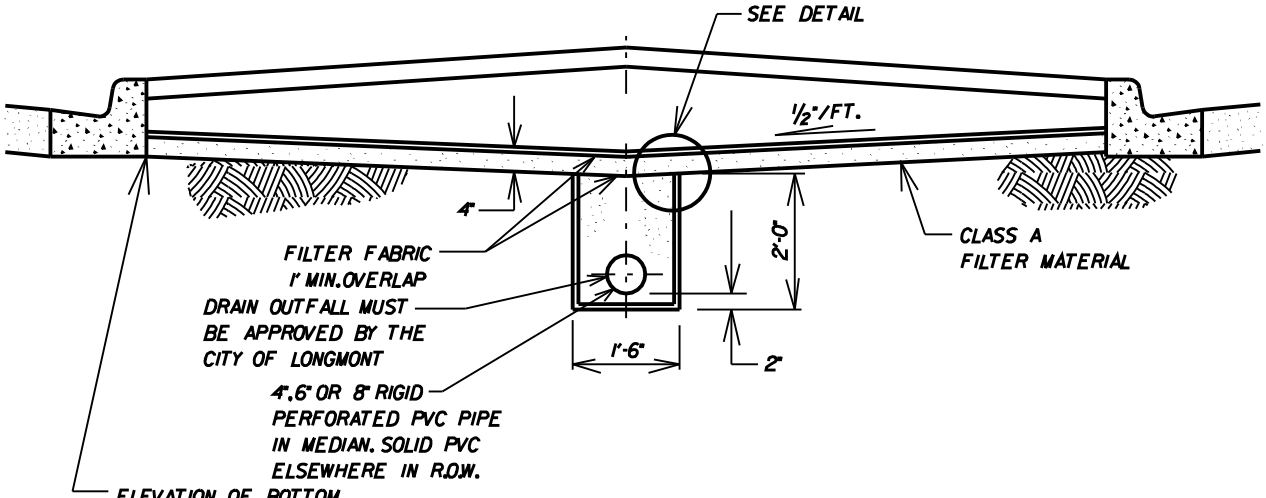
REO

DATE: AUG., 1992

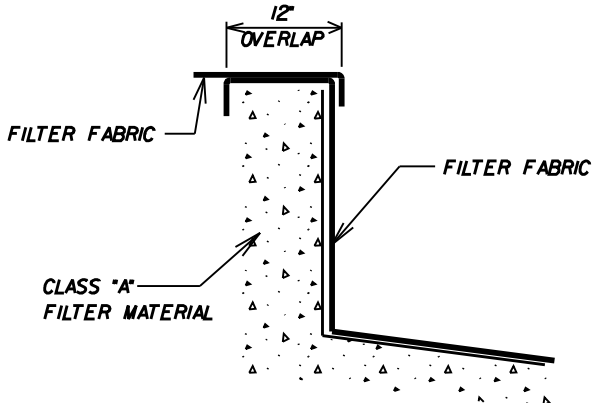
SCALE: NOT TO SCALE



COMPOSITE SECTION



FULL DEPTH ASPHALT



FABRIC OVERLAP DETAIL

REVISED
3/12/2001
1/3/2005

PUBLIC WORKS DIVISION

STANDARD PIPE UNDERDRAIN (RAISED IRRIGATED MEDIANS)

DETAIL 200-23

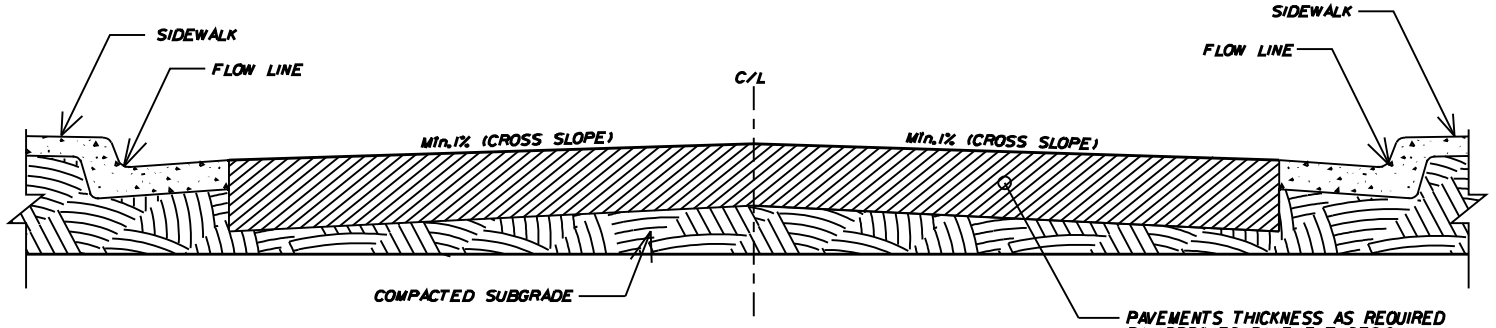
RED

DATE: JAN., 1996 **SCALE:** NOT TO SCALE

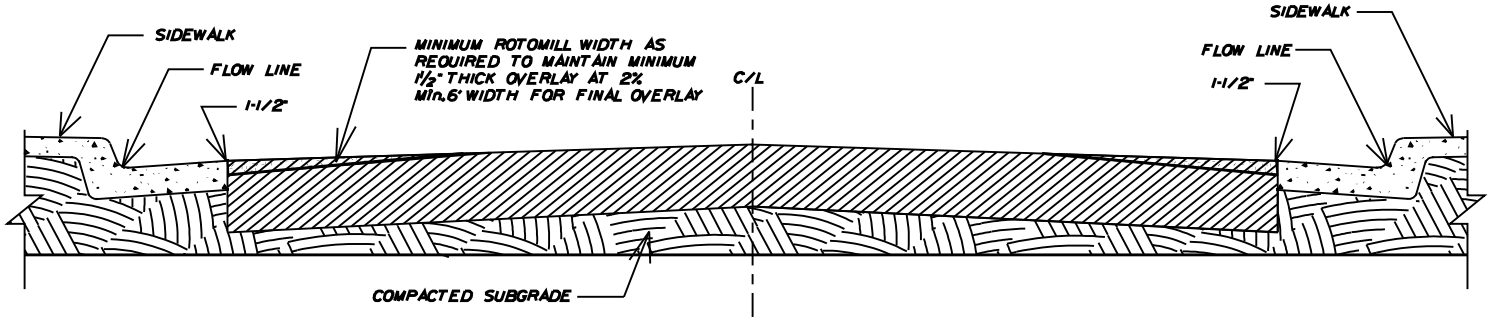
PUBLIC WORKS DIVISION

CITY OF LONGMONT COLORADO

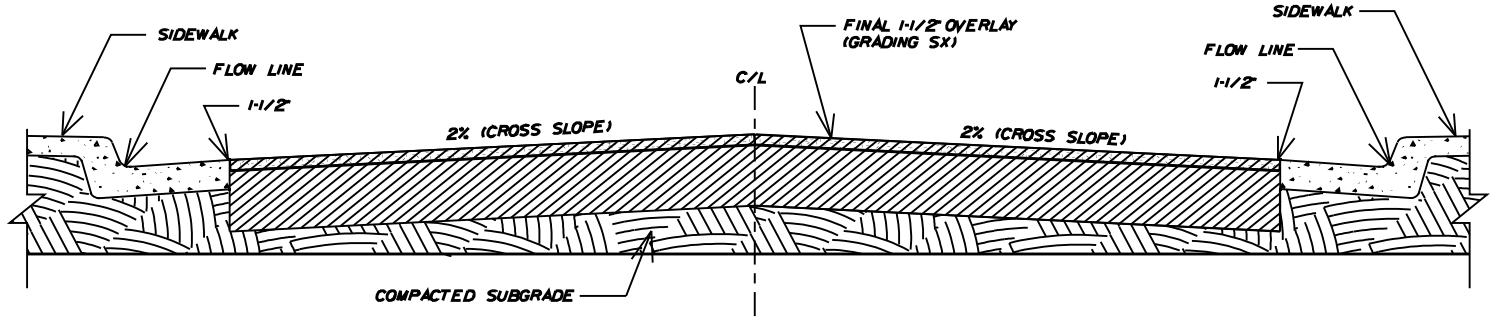
REVISED
3/12/2001
7/24/2001



CONSTRUCTION ACCEPTANCE PAVING



ROTOMILL DETAIL PRIOR TO FINAL LIFT



FINAL LIFT (FULL WIDTH OVERLAY)

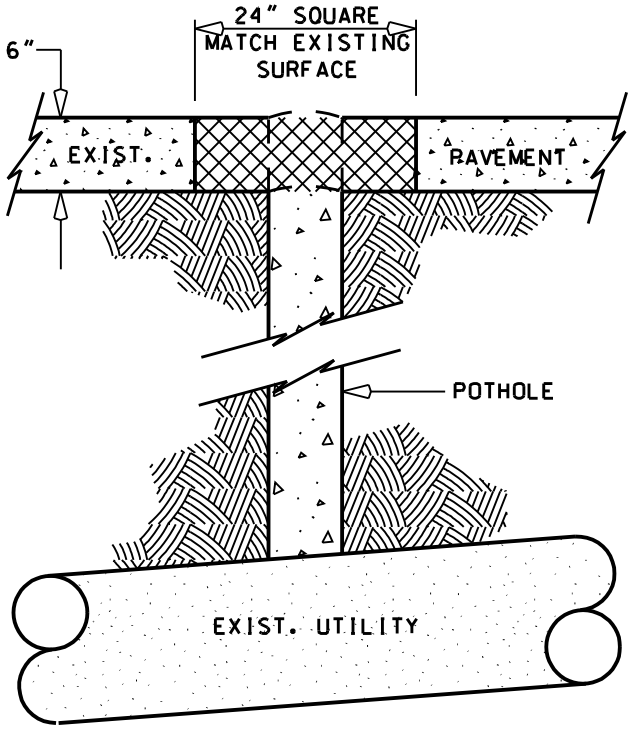
ROTOMILL DETAIL (FINAL OVERLAY)

DETAIL 200-24

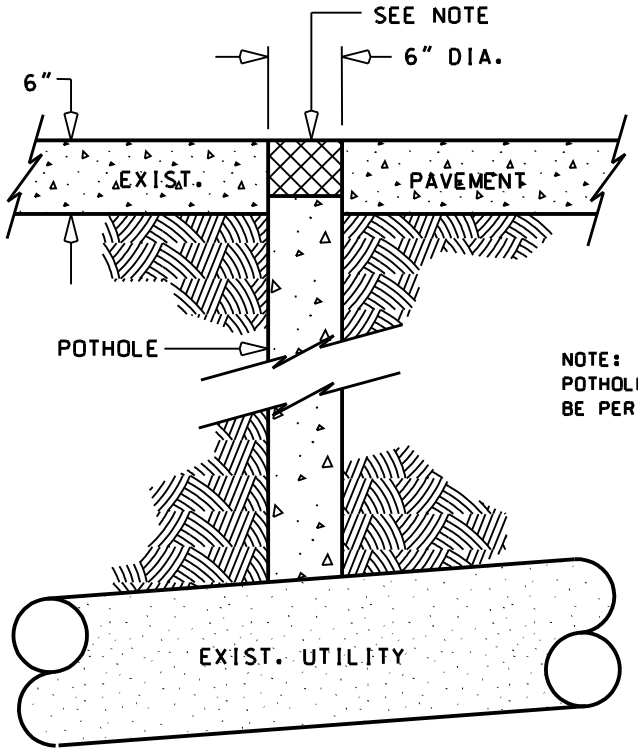
DATE: JUNE, 2000

SCALE: NOT TO SCALE

REB



PERMANANT POTHOLE PATCH



NOTE:
POTHOLE PATCHING MATERIALS SHALL
BE PER THE APPROVED MATERIALS LIST.

TEMPORARY POTHOLE PATCH

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

CORE DRILLED POTHOLE PATCHING DETAIL

DETAIL 200-25

REV

DATE: DECEMBER, 2005

SCALE: NOT TO SCALE

CITY OF LONGMONT
SECTION 300 - STORM DRAINAGE IMPROVEMENTS
TABLE OF CONTENTS

300.00 DESIGN CRITERIA 1

300.01 SUBMITTALS 2

301.00 STORM DRAINAGE IMPROVEMENTS 3

301.01 GENERAL 3
301.02 REINFORCED CONCRETE PIPE MATERIAL 4
301.03 REINFORCED CONCRETE BOX CULVERTS AND INLET MATERIAL 5
301.04 NON-REINFORCED CONCRETE PIPE MATERIAL 5
301.05 POLYVINYL CHLORIDE (PVC) PIPE MATERIAL 6
301.07 A-2000 PVC STORM SEWER PIPE 7
301.08 ALUMINIZED STEEL ULTRA FLO STORM SEWER PIPE – 16 GAGE OR THICKER 8
301.09 ALUMINUM ULTRA FLO STORM SEWER PIPE – 14 GAGE OR THICKER 8
301.10 POLYMERIC ULTRA FLO STORM SEWER PIPE – 16 GAGE OR THICKER 9
301.11 MANHOLE MATERIAL 9
301.12 END SECTION AND OUTFALL MATERIAL 10
301.13 INSTALLATION OF PIPE AND APPURTENANCES 10
301.14 CONSTRUCTION OF MANHOLES 10
301.15 CONSTRUCTION OF STORM WATER INLETS AND STRUCTURES 11
301.16 TESTING AND FLUSHING PIPE 12
301.17 VIDEO OF COMPLETED STORM SEWER PIPE 12

SECTION 300 - STORM DRAINAGE IMPROVEMENTS
INDEX OF DETAILS

300-01	Typical Pipe Bedding
300-02	Standard Manhole
300-03	Standard Manhole Cover
300-04	Type “R” Inlet Access Location
300-05	Manhole Cover Location
300-6A	Standard Flared End Section
300-6B	Elliptical Flared End Section
300-6C	Flared End Section Trash Rack (Circular Pipe)
300-6D	Trash Rack Mounting (Circular Flared End Section)
300-6E	Flared End Section Trash Rack (Elliptical Pipe)
300-6F	Trash Rack Mounting (Elliptical Flared End Section)
300-07	Silt Fence Erosion Barrier
300-08	Straw Bale Erosion Barrier
300-09	Construction Staging Pad

STORM DRAINAGE IMPROVEMENTS

300.00 DESIGN CRITERIA

1. The minimum design standards shall be in accordance with this section or the City of Longmont Storm Drainage Criteria Manual, latest edition, in that order.

2. Offsite drainage calculations must be included in the drainage reports. These calculations will include both upstream and downstream areas. Subdivisions and other properties are required to provide facilities to pass upstream runoff through the site without exceeding street, storm sewer, or channel capacities. If downstream improvements have not been installed, upstream subdivisions are responsible to make improvements to reach the major drainage way.

3. On-site drainage calculations will include hydrology (minor storm: 2-year for residential, 5-year for commercial/industrial, and major storm: 100-year for all), runoff calculations at specific design points, street capacity calculations, inlet and storm sewer calculations, channel and erosion designs, and detention storage for 10-year and 100-year design storms.

4. The hydrology method for areas less than 100 acres will be the Rational Method. Areas greater than 160 acres will be calculated using Colorado Urban Hydrograph Procedure for basin hydrographs and the Storm Water Management Model for routing. The basins between 100 and 160 acres may use either method. Areas larger than 130 acres typically require a maintained channel or storm sewer to accommodate nuisance flows and deter erosion.

5. The design for storm drainage runoff street capacity is limited to no curb overtopping for minor storms, including one open lane for local commercial/industrial and collector streets, and two open lanes for arterial streets. Street capacity during major storms are limited to twelve (12) inch depth at gutter flowline and six (6) inch maximum depth at the crown of arterial streets. Street capacity for major storms must also be limited to stay within the street right-of-way.

6. All major drainage way channel improvements should be discussed with the Parks Division prior to submittal of public improvement plans. Many channels are designated as greenways and must follow those specifications. The creek itself may include trees that the City may wish to save. Responsibility of maintenance must be determined during the review process. Construction of the channel improvements is the sole responsibility of the property adjacent to the channel unless private agreements are reached. The channel will be constructed according to a design following Section 700 of Longmont Storm Drainage Criteria Manual.

7. Bridges will be designed for the 10-year design storm for local and collector streets and the 100-year design storm for arterial streets. Subdivisions that need additional capacity to remove land from the floodplain, are responsible to provide that capacity.

8. Storm sewers will be provided when the street capacity exceeds the allowable street flow for either the minor or major storm. The location of the storm sewer shall typically be under the asphalt, ten (10) feet south or east of the street centerline.

9. Crosspans are not acceptable in through collector or arterial streets. Crosspans may be acceptable at intersections with stop signs and no potential for street light signalization.

10. Crosspans and rundowns are not acceptable for delivering minor storm runoff from a street to a detention pond. Inlets and storm sewers must be provided.

11. 100-year storm runoff overflow channels between buildings will include a minimum thirty (30) foot wide drainage easement, typically centered on the property line. Storm sewers constructed in these easements will be offset five (5) feet from the property line.

12. Subdivisions with lots less than one (1) acre must provide detention for the entire subdivision. Lots greater than one (1) acre may be assigned individual detention responsibilities.

13. Detention ponds will be privately maintained unless agreed to otherwise in the Public Improvement Agreement. Detention ponds are defined to include the outlet structure and outlet release pipeline until it reaches a City storm sewer manhole.

14. Detention Pond sizes will be calculated with the equation V = KA where:

    For the 100-year, K100= (1.78I-0.002I2-3.56)/1000

    For the 10-year, K10= (0.95I-1.90)/1000

    Where V= required volume for the 100- or 10-year storm (acre-feet)

    I = Developed basin imperviousness (%)

    A = Tributary Area (Acres)

    Maximum release rates are limited to:

    Q100=1.0A

    Q10=0.24A

For detention ponds in series or release rates less than maximum, a calibrated FAA mass diagram method may be used to calculate volume.

300.01 SUBMITTALS

1. Two (2) copies of the preliminary drainage report are required to be submitted with the preliminary plat. The applicant is responsible to submit copies of the report to any irrigation ditch company or agency that may be affected by the proposed project. The preliminary drainage report will include hydrology for on-site and tributary off-site area's, proposed flow routes including estimated locations for inlet and storm sewer placement, and calculations for detention requirements and proposed detention pond configurations. The preliminary drainage report must be approved prior to approval of the preliminary plat.

2. Two (2) copies of the final drainage report are required to be submitted with the final plat submittal. The applicant is responsible to submit copies of the report to any irrigation ditch

company or agency that may be affected by the proposed project. The final drainage report will include the updated information from the preliminary report and hydraulic calculations for all drainage improvements. The final drainage report must be approved prior to approval of the final plat and the construction drawings.

301.00 STORM DRAINAGE IMPROVEMENTS

301.01 GENERAL

1. This section of the specifications covers the furnishing and installing of all storm drainage improvements, storm sewers, storm water inlets, manholes, headwalls, other appurtenances and all related work necessary to complete the storm drainage improvements. Trenching and backfill shall be done in accordance with the requirement of the General Requirements Section of the Standard Specifications under “Trenching”.

2. All piping and material shall be of the type and materials specified herein. The use of materials other than those specified herein require approval from the engineer. All materials shall be new and unused. All pipe sizes and references to pipe diameter on the drawings or in the specifications are intended to be the nominal inside diameter, and shall be interpreted as such. Pipe inside diameter shall be 18 inches and larger for public storm sewers. Pipe inside diameter shall be fifteen (15) inches and larger for private storm sewers that are connecting to public manholes. All pipe will have a minimum of two (2) feet of cover from the subgrade under the asphalt and base course to the top of the bell of the pipe.

3. The work covered by this section will not be accepted until the backfill connected with the work has been completed satisfactorily. Any section of storm sewer line that is found defective in tests, material, alignment, grade, or joints shall be corrected.

4. The contractor shall provide a copy of the manufacturer's installation recommendations for each type of pipe to each foreman and inspector prior to construction. These installation recommendations shall be followed during construction unless otherwise allowed by the engineer. These specifications requirements take priority over the manufacturers installation recommendations.

5. The extensions of storm drainage pipe shall be of the same material as the existing culvert. The physical connection to the existing storm drain system shall be plugged at the first downstream manhole until the storm system has been completed to the satisfaction of the engineer.

6. When a storm drain line is anticipated to be extended at a future date, the contractor shall install a manhole at the end of the line and shall install plugged stub out(s) in the direction(s) of the extension.

7. The contractor shall locate manholes at all changes in grade, alignment, pipe materials, and pipe sizes. For changes in pipe size, the crowns of the pipes shall be at the same elevation, or the incoming flow shall be 0.2 feet above the outgoing flow, whichever is the greater drop across the manhole invert. The storm piping may not be curved. Manholes shall be located at street intersections whenever possible.

8. The engineer reserves the right to require the testing of pipe and materials after delivery and to reject all pipe or materials represented by the sample which fail to comply with the specified requirements.

301.02 REINFORCED CONCRETE PIPE MATERIAL

1. Reinforced concrete pipe may be used on storm sewer projects under the pavement within City right-of-way.

2. Circular reinforced concrete pipe shall meet the requirements of ASTM C76 and the requirements contained in the wastewater collection specifications. The use of elliptical reinforcing will only be allowed if approved by the engineer. Pipe laying lengths shall be a minimum of 7'-6". The class of pipe shall be as indicated on the approved plans. The pipe strength shall be a minimum of Class III. Bedding for concrete pipe will be a minimum of six (6) inches below the pipe to springline or the midpoint of the pipe.

3. Gaskets shall be rubber O-ring type per ASTM C 361 and ASTM C 443. Gaskets will be used in a bell and spigot joint. A Type 4-G Gasket is an acceptable substitute for an O-ring joint.

4. Arch culvert reinforced concrete pipe shall meet the requirements of ASTM C 506 and the requirements contained herein.

5. Elliptical reinforced concrete pipe shall meet the requirements of ASTM C 507 and the requirements contained herein.

6. All RCP shall be constructed with Type II modified cement. The absorption of the concrete pipe shall not exceed 5.5%.

7. Each pipe joint shall conform to ASTM C 361, Section 8, with the gaskets confined in a groove cast in the pipe spigot. Pipe with collars in lieu of integral cast bells will not be accepted. The pipe joints shall be designed to withstand, without cracking, the gasket compression plus a differential load across the joint equal to 4,000 pounds per foot of inside diameter.

8. Each piece of reinforced concrete storm drain pipe shall be plainly and permanently marked showing the pipe class, date of manufacture, and the manufacturer's name or mark. These markings shall be made on the outside of the pipe before curing or shall be painted on the pipe using waterproof paint.

9. The engineer may require the submittal of reports covering joint leakage, joint shear, cement mill reports, and three edge bearings on each size and class of pipe for review before any pipe is installed in the field. The tests for joint leakage, joint shear, and three-edge bearing are for proof of design only. Reports covering tests made on other pipe of the same size, class, and design as specified herein, and manufactured from materials of equivalent type and quality are generally acceptable.

10. The engineer may require the submittal of drawings, specifications, and other data showing complete details of the design, fabrication, and construction of the reinforced concrete pipe for review. These submittals shall include data on all materials proposed to

be used in the pipe, the size and location of each cage of the reinforcement, joint details including reinforcement, gasket details, and test results on materials, joints, and pipe.

301.03 REINFORCED CONCRETE BOX CULVERTS AND INLET MATERIAL

1. Reinforced concrete box culverts may be used on storm sewer projects under the pavement within City right-of-way.

2. Reinforced concrete box culverts shall conform to the requirements of ASTM C 789 or C 850.

3. Inlet grates in streets, alleys, and areas with pedestrians shall be of a design that is safe for bicycles and pedestrians.

4. Structures, detention outlets, and inlets shall be reinforced as per the approved plans. All structures shall have steel rebar reinforcement to prevent shrinkage.

5. Type 13 inlet grates are to be the smaller version (Neenah Model R-3246-1 or Deeter Model 2045) with a 17.75" x 36" grate with a minimum 1.8 square foot opening.

6. Access covers and steps shall be provided for all inlets. Access covers shall have the words "Storm Sewer, Confined Space, Entry Permit Required" cast on the cover. Access covers will be sized for twenty four (24) inch diameter openings, one (1) inch thick, designed for traffic loading. Access covers will be located above the pipelines so the City's jetting equipment can access the pipelines.

7. All inlets shall be cast-in-place.

301.04 NON-REINFORCED CONCRETE PIPE MATERIAL

1. Non-reinforced concrete pipe may be used on storm sewer projects which are not under the pavement within City right-of-way.

2. Non-reinforced concrete pipe may be allowed if approved by the engineer. Pipe shall be a minimum of 7'-6" in length. Class of pipe shall be as indicated on the drawings.

3. Non-reinforced concrete pipe shall conform to the requirements of AASHTO M 86 for the required diameters and strength classes. Joints shall be integral bell and spigot type joints with the gaskets confined in a groove cast in the pipe spigot.

4. Gaskets shall be rubber neoprene gaskets, ASTM C 443, or O-ring rubber type, ASTM C 361, and shall be used in the bell and spigot joint.

5. All pipe shall be constructed with Type II modified cement. The absorption of the concrete pipe shall not exceed 5.5%.

6. Each piece of pipe shall be plainly and permanently marked showing the pipe class, date of manufacture, and the manufacturer's name or mark. These markings shall be made on the outside of the pipe before curing or shall be painted on the pipe using waterproof paint.

7. The engineer may require the submittal of reports covering joint leakage, joint shear, cement mill reports, and three edge bearings on each size and class of pipe for review before any pipe is installed in the field. The tests for joint leakage, joint shear, and three-edge bearing are for proof of design only. Reports covering tests made on other pipe of the same size, class, and design as specified herein, and manufactured from materials of equivalent type and quality are generally acceptable.

8. The engineer may require the submittal of drawings, specifications, and other data showing complete details of the design, and fabrication for review. These submittals shall include data on all materials proposed to be used in the pipe, joint details, gasket details, and test results on materials, joints, and pipe.

301.05 POLYVINYL CHLORIDE (PVC) PIPE MATERIAL

1. Polyvinyl Chloride (PVC) Pipe may be used on storm sewer projects under the pavement within City right-of-way.

2. Polyvinyl chloride pipe shall meet the requirements contained in wastewater collection specifications.

3. All sizes of PVC pipe shall be SDR 35 or better, and shall have the A.S.T.M. specification, nominal diameter, and name or trade mark of the manufacturer imprinted on the outside of the pipe.

301.06 CORRUGATED HIGH DENSITY POLYETHYLENE PIPE

1. Corrugated high density polyethylene Pipe (HDPE) may be used on storm sewer projects which are not under the pavement within City right-of-way.

2. Corrugated high density polyethylene pipe (HDPE) shall be manufactured in accordance with AASHTO M294, or MP7. Clean reworked material may be used.

3. Type S pipe shall be used for storm sewer projects. Type S pipe has a full circular cross section, with an outer corrugated pipe wall and a smooth inner liner.

4. The minimum parallel plate stiffness values when tested in accordance with ASTM D2412 shall be as follows:

Diameter (nominal)	Pipe Stiffness (minimum) (pii)
12”	50
15”	42
18”	40
24”	34
30”	28
36”	22
42”	20
48”	18
60”	14

5. Watertight joints shall meet a laboratory test pressure of 10.8 psi per ASTM D3212 and shall have a bell and spigot or bell-bell design with an elastomeric gasket meeting the requirements of ASTM F477

6. Pipe and resin producers shall be certified according to the Plastic Pipe Institute/Corrugated Polyethylene Pipe Association Third Party Certification Program. All corrugated polyethylene pipe, twelve (12) inches in diameter and larger, shall contain the appropriate program mark, either an official label or permanent affixation prior to shipment.

7. All pipe shall be clearly marked at intervals no more than ten (10) feet with manufacturers name or trademark, nominal size, AASHTO specification designation, plant designation code, and date of manufacture or code.

301.07 A-2000 PVC STORM SEWER PIPE

1. A-2000 PVC storm sewer pipe may be used on storm sewer projects which are not under the pavement within City right-of-way.

2. This specification includes materials, test methods and installation requirements for four (4) to thirty six (36) inch diameter polyvinyl chloride (PVC) corrugated pipe with a smooth interior. The requirements of this specification are intended to provide pipe and fittings suitable for underground use in non-pressure applications such as irrigation, sanitary sewers, storm sewers, drainage and under drains.

3. PVC corrugated pipe with a smooth interior shall conform to the requirements of ASTM Designation F949, F794 Dual Wall Corrugated Profile (DWCP), or AASHTO M304 (latest revision). Pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. Pipe shall be manufactured to 46 psi stiffness when tested in accordance with ASTM Test Method D2412. There shall be no evidence of splitting, cracking or breaking when the pipe is tested per ASTM Test Method D24`1 at 60% flattening. The pipe shall be made of PVC compound having a minimum cell classification of 12454B as defined in ASTM Specification D1784.

4. All fittings for PVC corrugated pipe with a smooth interior shall conform to ASTM F949, Section 5.2.3. To insure compatibility, the pipe manufacturer shall provide all fittings.

5. All joints shall be made with integrally-formed bell and spigot gasketed connections. The manufacturer shall provide documentation showing no leakage when gasketed pipe joints are tested in accordance with ASTM Test Method D3212. Elastomeric seals (gaskets) shall meet the requirements of ASTM Designation F477.

6. Pipe shall have a minimum pipe stiffness as follows:

Diameter	Stiffness (#/in/in)
12”	46
15”	46
18”	46
21”	46
24”	46
30”	46
36”	46

301.08 ALUMINIZED STEEL ULTRA FLO STORM SEWER PIPE – 16 GAGE OR THICKER, pH 5-9, RESISTIVITY GREATER THAN OR EQUAL TO 1500 ohm-cm

1. Aluminized Steel Ultra Flo Storm Sewer Pipe may be used on storm sewer projects outside from under the pavement within City right-of-way.

2. This specification covers the manufacture and installation of the Type 2 ALUMINIZED ULTRA FLO pipe detailed in the project plans.

3. The Type 2 ALUMINIZED STEEL coils shall conform to the applicable requirements of AASHTO M274 or ASTM A929.

4. The ULTRA FLO shall be manufactured with the ¾” x ¾” x 7-1/2” external ribs in accordance with the applicable requirements of AASHTO M-36 or ASTM A760. The pipe sizes, gauges and corrugations shall be as shown on the project plans.

5. The handling and assembly shall be in accordance with National Corrugated Steel Pipe Association’s (NCSPA) recommendations.

6. The installation shall be in accordance with AASHTO Standard Specifications for Highway Bridges, Section 26, Division II or ASTM A798 and in conformance with the project plans and specifications. If there are any inconsistencies or conflicts, the contractor must bring them to the attention of the project engineer. It is always the contractors’ responsibility to follow OSHA guidelines for safe practices.

7. Construction loads may be higher than final loads, follow the manufacturer’s or NCSPA’s guidelines.

301.09 ALUMINUM ULTRA FLO STORM SEWER PIPE – 14 GAGE OR THICKER, pH 4-9, RESISTIVITY GREATER THAN OR EQUAL TO 500 ohm-cm

1. Aluminum Ultra Flo storm sewer pipe may be used on storm sewer projects which are not under the pavement within City right-of-way.

2. This specification covers the manufacture and installation of the Type 2 ALUMINIZED ULTRA FLO pipe detailed in the project plans.

3. The Type 2 ALUMINIZED STEEL coils shall conform to the applicable requirements of AASHTO M197 or ASTM A744.

4. The ULTRA FLO shall be manufactured with the ¾" x ¾" x 7-1/2" external ribs in accordance with the applicable requirements of AASHTO M-196 or ASTM A745. The pipe sizes, gauges and corrugations shall be as shown on the project plans.

5. The handling and assembly shall be in accordance with manufactures recommendations.

6. The installation shall be in accordance with AASHTO Standard Specifications for Highway Bridges, Section 26, Division II or ASTM A788 and in conformance with the project plans and specifications. If there are any inconsistencies or conflicts, the contractor must bring them to the attention of the project engineer. It is always the contractors' responsibility to follow OSHA guidelines for safe practices.

7. Construction loads may be higher than final loads, follow the manufacturer's or NCSPA's guidelines.

301.10 POLYMERIC ULTRA FLO STORM SEWER PIPE – 16 GAGE OR THICKER, pH 5-9, RESISTIVITY GREATER THAN OR EQUAL TO 1500 ohm-cm

1. Polymeric Ultra Flo storm sewer pipe may be used on storm sewer projects which are not under the pavement within City right-of-way.

2. This specification covers the manufacture and installation of the polymer coated ULTRA FLO pipe detailed in the project plans.

3. The polymer coated STEEL coils shall conform to the applicable requirements of AASHTO M246 or ASTM A742.

4. The ULTRA FLO shall be manufactured with the ¾" x ¾" x 7-1/2" external ribs in accordance with the applicable requirements of AASHTO M-245 or ASTM A762. The pipe sizes, gauges and corrugations shall be as shown on the project plans.

5. The handling and assembly shall be in accordance with NCSPA's recommendations.

6. The installation shall be in accordance with AASHTO Standard Specifications for Highway Bridges, Section 26, Division II or ASTM A798 and in conformance with the project plans and specifications. If there are any inconsistencies or conflicts, the contractor must bring them to the attention of the project engineer. It is always the contractors' responsibility to follow OSHA guidelines for safe practices.

7. Construction loads may be higher than final loads, follow the manufacturer's or NCSPA's guidelines.

301.11 MANHOLE MATERIAL

1. Manholes shall be constructed as specified under these specifications. Drop manholes are allowed for storm drainage improvements. No outside drops are allowed on manholes and the engineer may restrict the difference in height between the incoming pipe invert and the outgoing pipe invert.

2. No manholes may be located in areas where ponding or storm detention basins are to be used. Manholes must be spaced no farther apart than four hundred (400) feet for pipes

with inside diameters of fifteen (15) inches to thirty six (36) inches, and five hundred (500) feet apart for pipes with inside diameters of forty two (42) inches and larger.

3. Manholes shall be at least forty eight (48) inches diameter for pipes between fifteen (15) inches to thirty six (36) inches diameter. Manholes shall be at least sixty (60) inches diameter for pipes between forty two (42) inches to forty eight (48) inches diameter. Manholes shall be at least seventy two (72) inches diameter for pipes between fifty four (54) inches to sixty (60) inches diameter. Manholes shall have a box base or precast tee for pipes larger than sixty (60) inches diameter.

4. Manhole covers shall have the words "Storm Sewer, Confined Space, Entry Permit Required" cast on the cover.

301.12 END SECTION AND OUTFALL MATERIAL

1. All storm sewers end sections and outfalls shall have a cast-in-place reinforced concrete headwall or a premanufactured flared end section as approved by the engineer. Premanufactured end sections shall be manufactured of the same materials as the pipe to which they are connected and shall meet the minimum material specifications applying to the pipe.

2. All storm sewer openings that are larger than eighteen (18) inches or subject to unauthorized entrance or trash accumulation will have a designed trash rack with a galvanized coating.

301.13 INSTALLATION OF PIPE AND APPURTENANCES

1. All pipe, fittings, and accessories shall be carefully lowered into the trench with suitable equipment in a manner that will prevent damage to the pipe. Under no circumstances shall pipe or accessories be dropped or dumped into the trench. Pipe and accessories shall be inspected for defects prior to being lowered into the trench. All foreign matter or dirt shall be removed from the interior of the pipe and the accessories before lowering into the trench. The pipe shall be kept clean by means approved by the Engineer during and after installation.

2. Pipe shall be laid to a true line and at uniform rates of grade as shown on the approved plans. Fine grading of the trench shall proceed ahead of pipe laying.

3. Pipe laying should proceed upgrade with the spigot ends of the pipe pointed in the direction of flow. The contractor shall make all pipe connections to the manholes. When connecting to existing storm drains, the contractor shall take every precaution necessary to prevent dirt or debris from entering the existing storm drainage system.

4. Bedding material shall meet the requirements of Section 112.02, and shall be properly placed in accordance with Section 112.03 of these Standard Specifications.

301.14 CONSTRUCTION OF MANHOLES

1. Manholes shall be constructed as specified under the Storm Drainage Improvements Specifications.

2. Manhole covers shall be lined up with the pipeline inlet and outlet to allow the maintenance jetting equipment access to the pipelines.

3. Manholes shall be located in areas which are not subject to flooding from surface runoff. If the possibility of surface runoff cannot be avoided a solid manhole cover, having an integral O-ring type gasket, that can be bolted closed, must be used.

4. Manholes shall be located in areas which allow direct access via all-weather drives by maintenance vehicles.

5. All manholes located outside the dedicated street right-of-way or within the 100-year flood plane shall be designed and constructed with a watertight, bolted type cover and the manhole ring shall be bolted to the manhole cone.

6. Manholes will be located under asphalt, not concrete pans, sidewalks, or gutters.

7. Flat top manholes are not an approved alternative. A variance is needed for special instances.

8. New holes for pipeline connections to existing manholes must be cored, not broken open with sledge hammers.

301.15 CONSTRUCTION OF STORM WATER INLETS AND STRUCTURES

1. All concrete and steel reinforcing work shall be in accordance with the Colorado Department of Transportation Sections 601 and 602, except as modified by Section 217 of these standard specifications. Additives for concrete, other than those specified in the mix design, shall not be used without prior approval of the engineer. When approved for use, chemical admixtures or additives shall comply with applicable ASTM or AASHTO standards. Calcium chloride or admixtures containing chloride shall not be allowed in reinforced concrete.

2. All casting used shall sit flush with the surrounding concrete.

3. The bottom of all inlet structures shall be formed to drain to the outlet pipe as per the inlet details.

4. All inlet structures shall be flushed with water after completion of construction. The inlets are not acceptable if water remains in the invert of the structure.

5. The minimum size of the outlet pipe from the inlet structure shall be eighteen (18) inches in diameter. The outlet pipe shall be laid to provide a minimum velocity in the pipe of three (3) feet per second.

6. Access covers will be located above the pipelines so the City's jetting equipment can access the pipelines.

7. Inlets and headwalls must be cast in place, no precast inlets or headwalls are acceptable.

8. New holes for pipeline connections to existing inlets must be cored, not broken open with sledge hammers.

301.16 TESTING AND FLUSHING PIPE

1. Prior to final acceptance of each section of the storm sewer line, the storm drains shall be cleaned by appropriate methods approved by the engineer. All dirt and debris shall be prevented from entering the existing storm drain system by means of watertight plugs or other suitable methods. The engineer may require the storm sewer line be air pressure tested prior to final acceptance. When an air tested air pressure test is required the contractor shall adhere to the test procedure called out by the engineer. A water test for manholes may also be required by the engineer. This test will be subject to less than a 1"/hour rise or fall to pass.

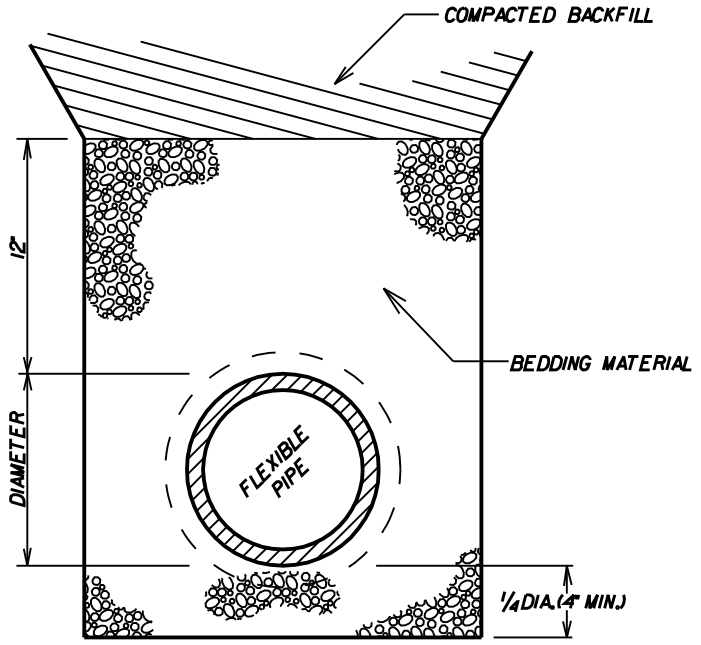
2. Any visible infiltration which the engineer considers to be detrimental to the system shall be repaired in a manner approved by the engineer before the work will be accepted. No manhole will be accepted that has any visible infiltration.

3. Upon completion of the construction, the engineer will carefully inspect all storm drains and appurtenances. Any unsatisfactory work shall be removed and replaced in a proper manner. The invert of the storm drain and manholes shall be left smooth, clean, and free from obstructions throughout the entire length. Manhole rings and covers must be raised to finished grade before acceptance of the storm drain.

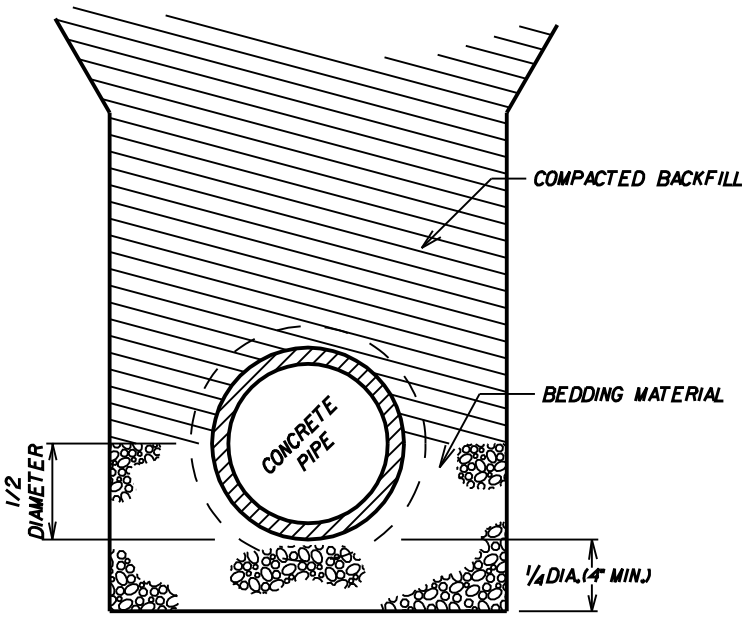
4. The storm sewer pipelines may be inspected by camera instead of air tested if approved by the engineer.

301.17 VIDEO OF COMPLETED STORM SEWER PIPE

1. The completed storm sewer line shall be recorded by a camera by the contractor prior to final acceptance. The recording shall be submitted to the engineer for review.



FLEXIBLE PIPE



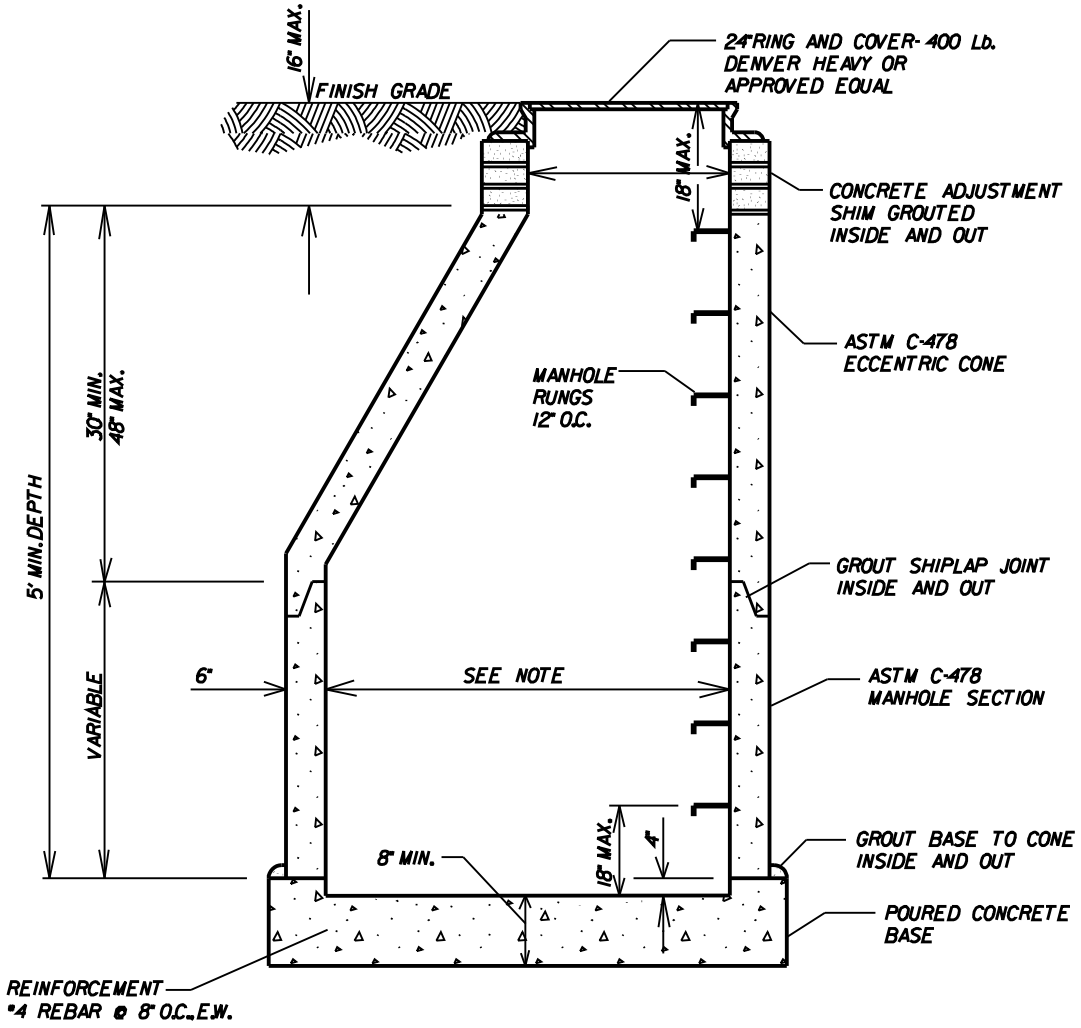
CONCRETE PIPE

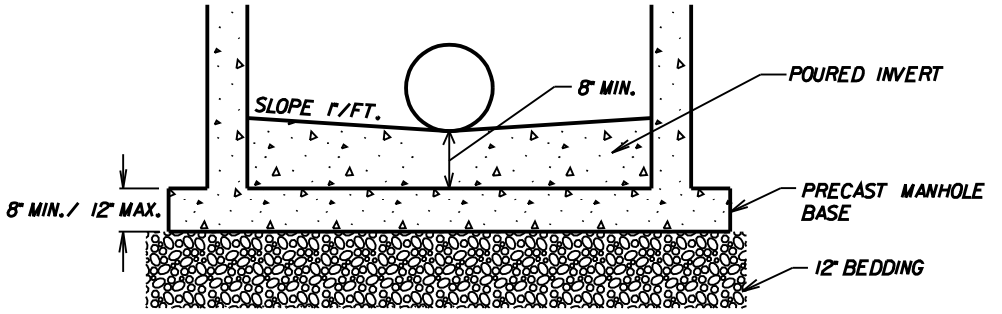
PUBLIC WORKS DIVISION

STORM DRAINAGE
TYPICAL PIPE BEDDING
DETAIL 300-01

REB

DATE: NOV., 2000 **SCALE:** NOT TO SCALE





ALTERNATE BASE

NOTE: MINIMUM INSIDE DIAMETER OF MANHOLE SHALL BE AS FOLLOWS.

PIPE SIZE	MIN. MANHOLE DIAMETER
15" TO 36"	48"
42" TO 48"	60"
54" TO 60"	72"

MAX. 400' APART FOR 15" TO 36" LINES
MAX. 500' APART FOT 42" > LINES.

REVISED 11/2003

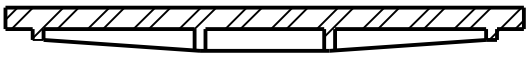
CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

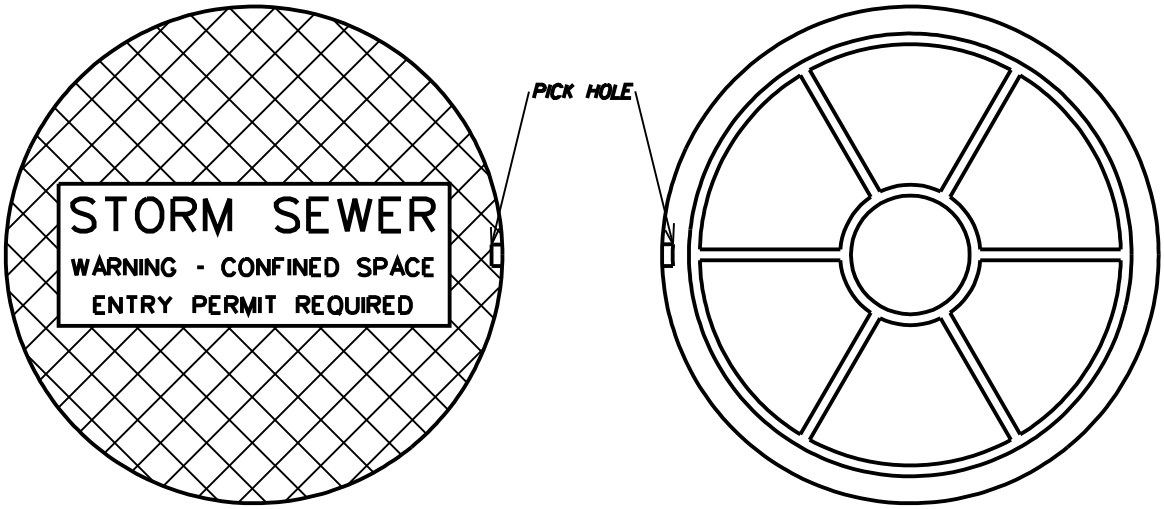
STORM DRAINAGE
STANDARD MANHOLE
DETAIL 300-02

REB

DATE: FEB., 2001 **SCALE:** NOT TO SCALE



PROFILE



TOP VIEW

BOTTOM VIEW

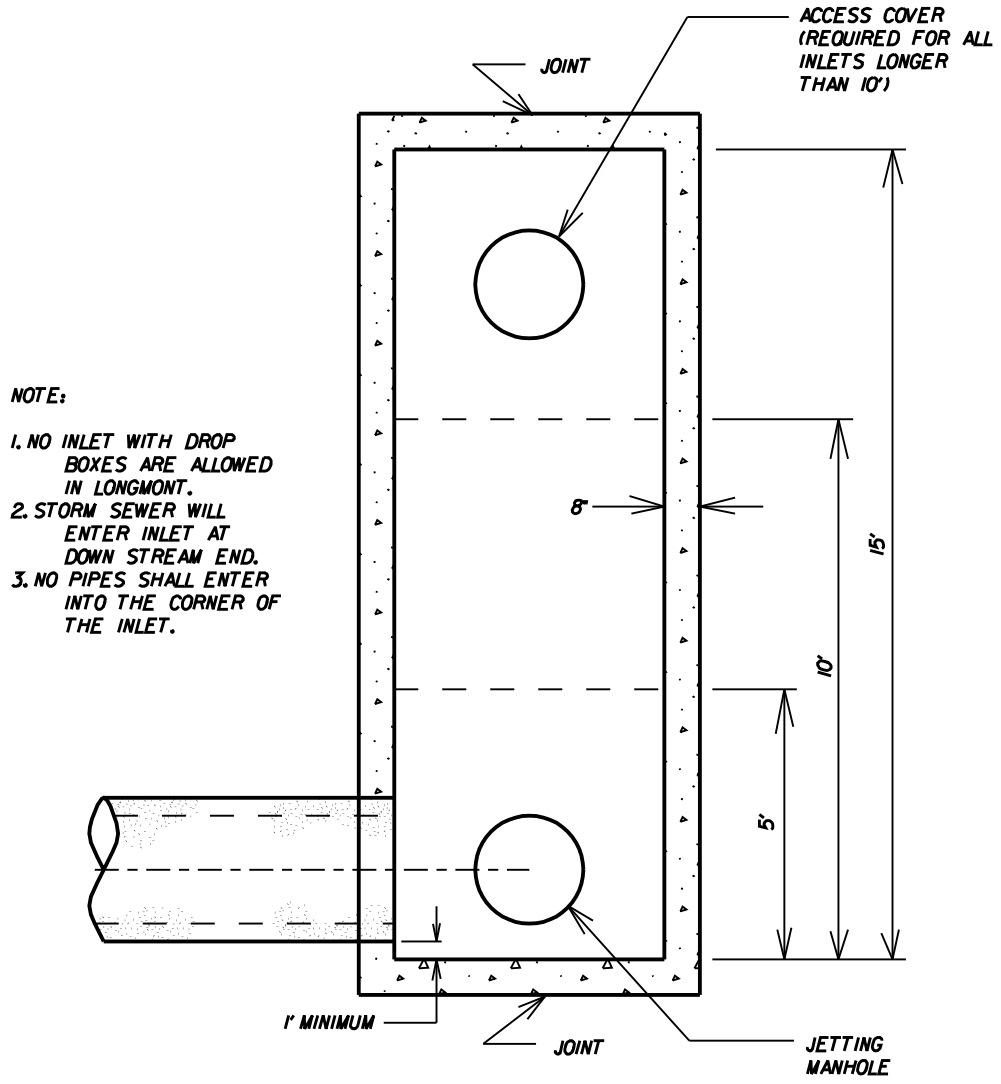
CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

STORM DRAINAGE
STANDARD MANHOLE COVER
DETAIL 300-03

REB

DATE: NOV., 2000 **SCALE:** NOT TO SCALE



NOTE:

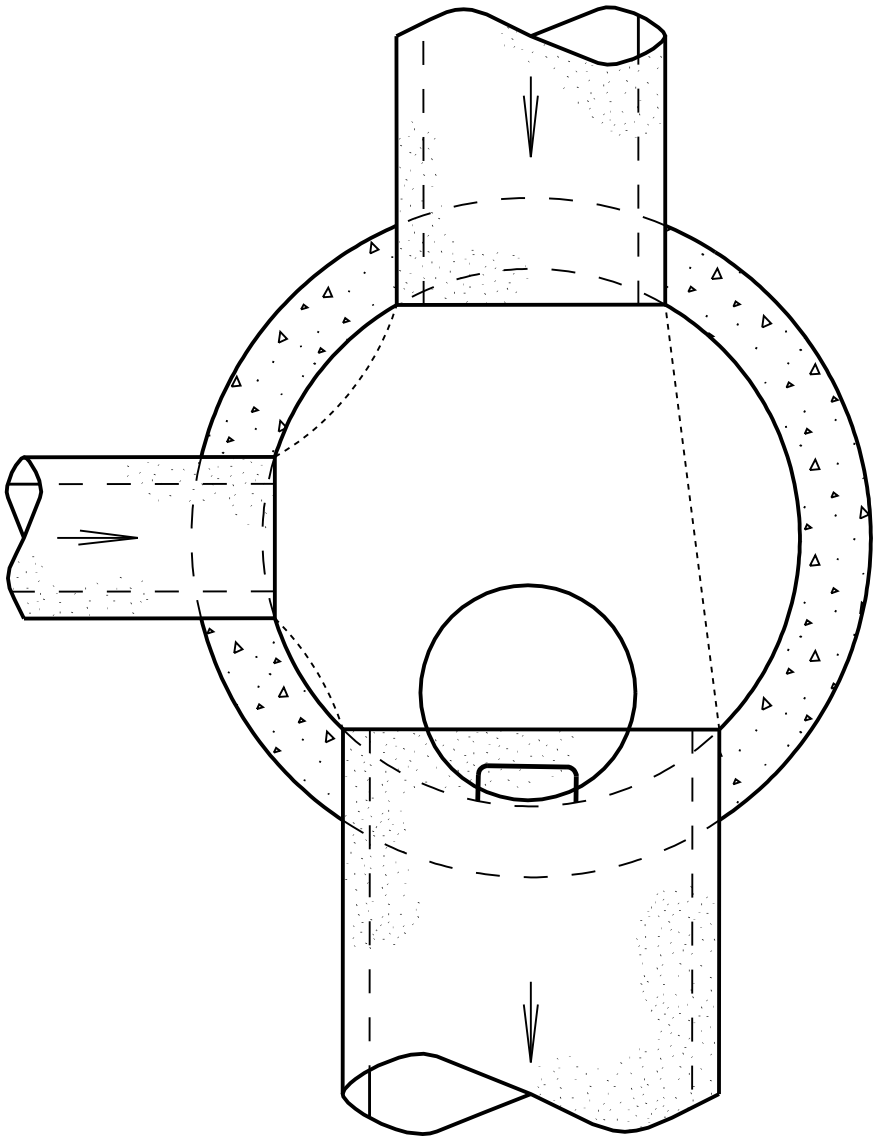
1. NO INLET WITH DROP BOXES ARE ALLOWED IN LONGMONT.
2. STORM SEWER WILL ENTER INLET AT DOWN STREAM END.
3. NO PIPES SHALL ENTER INTO THE CORNER OF THE INLET.

PUBLIC WORKS DIVISION

STORM DRAINAGE
TYPE R INLET ACCESS LOCATION
DETAIL 300-04

REB

DATE: FEB., 2001 **SCALE:** NOT TO SCALE



NOTES:

1. THE MANHOLE COVER SHALL BE LOCATED OVER THE DOWNSTREAM STORM SEWER PIPE EXITING THE MANHOLE.
2. THIS ALLOWS FOR THE JET NOZZLE TO BE INSERTED DOWN THE MANHOLE COVER, MAKE ONE 90° BEND AND ENTER THE UPSTREAM PIPE LINE. IT IS FED INTO THE PIPE TO THE UPSTREAM MANHOLE. THE WATER JET IS TURNED ON AND PULLED BACK THROUGH THE PIPELINE. THE DIRT AND WATER ARE VACUUMED OUT OF THE MANHOLE INTO A STORAGE TANK.
3. IF TWO (OR MORE) PIPES ARE ENTERING THE MANHOLE, THE COVER SHALL BE LOCATED OPPOSITE OF THE TWO PIPES. THE LARGER PIPE BEING THE MORE IMPORTANT.
4. STEP ALIGNMENT SHALL BE COORDINATED WITH THE CITY INSPECTOR FOR PIPES GREATER THAN 36".

REVISED 11/03

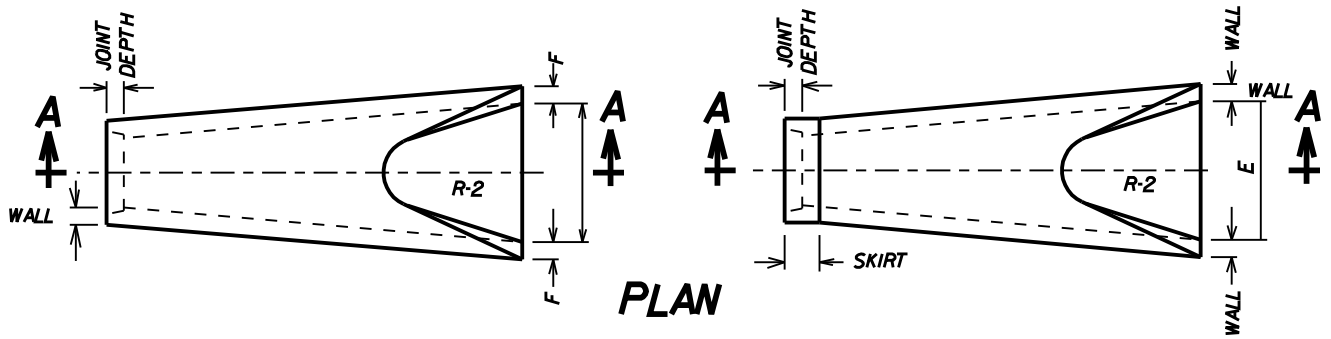
CITY OF LONGMONT COLORADO

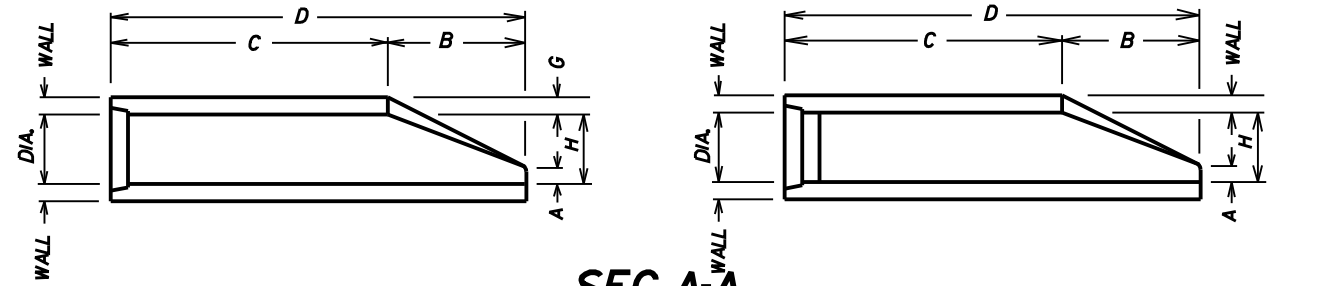
PUBLIC WORKS DIVISION

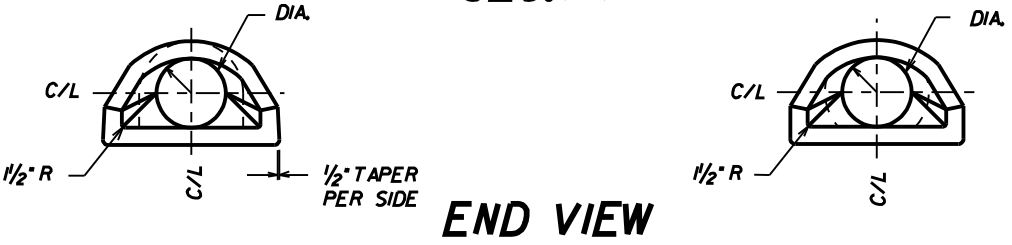
STORM DRAINAGE
MANHOLE COVER LOCATION
DETAIL 300-05

REB

DATE: NOV., 2000 **SCALE:** NOT TO SCALE







DIAMETER	WALL THICKNESS	JOINT DEPTH	WEIGHT	A	FLAIR LENGTH B	BARREL LENGTH C	LAY LENGTH D	FLAIR WIDTH E	F	G	H	R-1	R-2	SKIRT
12"	4"	3¾"	530#	4"	24"	45⅜"	73⅛"	24"	2¾"	3⅛"	13"	10 1/16"	9"	NA
15"	4"	3¾"	740#	6"	27"	42½"	69½"	30"	3"	4"	16"	12½"	11"	NA
18"	4½"	4"	2440#	9"	27"	46"	73"	36"	3¼"	3¾"	19"	15½"	12"	NA
24"	5½"	4¼"	3260#	9½"	43½"	29¾"	73¼"	48"	3¾"	4¾"	25"	16 1/16"	14"	NA
30"	5¾"	4¼"	4200#	12"	54"	19"	73"	60"	4¼"	5¾"	31"	18 5/16"	15"	NA
36"	6⅝"	4½"	7880#	15"	63"	33¾"	96¾"	72"	4¾"	6 1/16"	37"	24 1/16"	20"	NA
42"	4½"	4⅝"	5380#	21"	63"	29"	92"	78"	NA	NA	43"	27¼"	22"	13"
48"	5"	4⅝"	6550#	24"	72"	20"	92"	84"	NA	NA	48½"	28⅛"	22"	11"
54"	6¼"	4¼"	8040#	27"	65"	27"	92"	90"	NA	NA	55"	32⅞"	24"	11"
60"	6¾"	4¼"	8750#	30"	60"	32"	92"	96"	NA	NA	61"	36¾"	24"	11"
72"	7"	5½"	12520#	34"	78"	21"	99"	108"	NA	NA	73"	38⅝"	24"	7¾"

CITY OF LONGMONT COLORADO

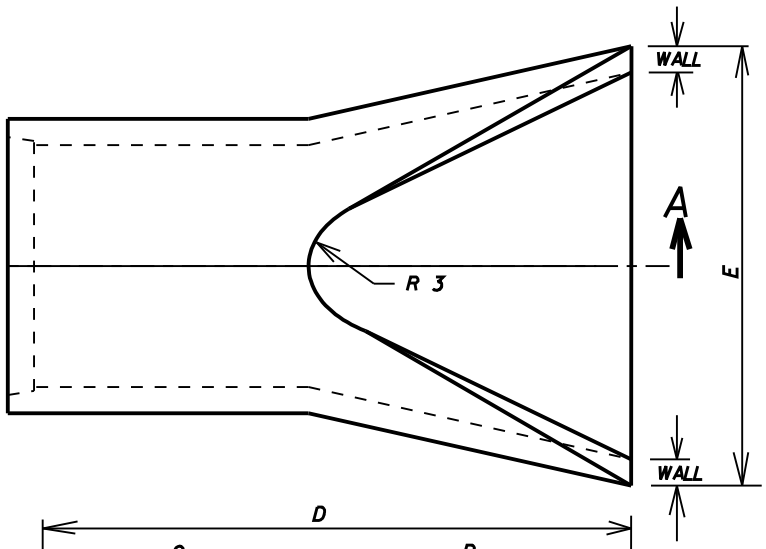
PUBLIC WORKS DIVISION

STORM DRAINAGE
STANDARD FLARED END SECTION
DETAIL 300-06A

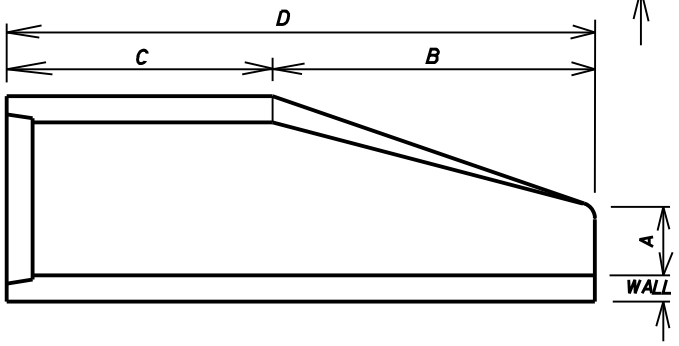
REB

DATE: FEB., 2001 **SCALE:** NOT TO SCALE

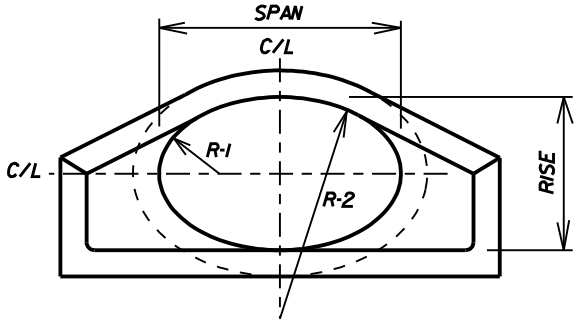
PLAN



SEC. A-A



END VIEW



EQUIVELENT CIRCULAR PIPE DIAMETER	NOMINAL INSIDE RISE X SPAN	WALL THICKNESS	WEIGHT	A	FLAIR LENGTH B	BARREL LENGTH C	LAY LENGTH D	FLAIR WIDTH E	R - 1	R - 2	R - 3
18"	14"X23"	2 3/4"	1300#	8"	2'-4"	3'-9"	6'-1"	36"	6 3/32"	19 5/16"	6"
24"	19"X30"	3 1/4"	1675#	8 1/2"	3'-4"	2'-9"	6'-1"	48"	8 7/32"	26 1/4"	7"
30"	24"X38"	3 3/4"	2450#	9 1/2"	4'-6"	1'-6"	6'-0"	60"	10 1/4"	32 13/16"	9"
36"	29"X45"	4 1/2"	4840#	11 1/2"	5'-1"	3'-0"	8'-1"	72"	12 5/8"	39 3/8"	12"
42"	34"X53"	5"	6456#	15 3/4"	5'-0"	3'-0"	8'-0"	78"	14 9/32"	45 29/32"	13"
48"	38"X60"	5 1/2"	7870#	21"	5'-0"	3'-0"	8'-0"	84"	15 7/8"	51 9/32"	14"
54"	43"X68"	6"	9990#	25 1/2"	5'-0"	3'-0"	8'-0"	90"	18 21/32"	58 9/32"	16"

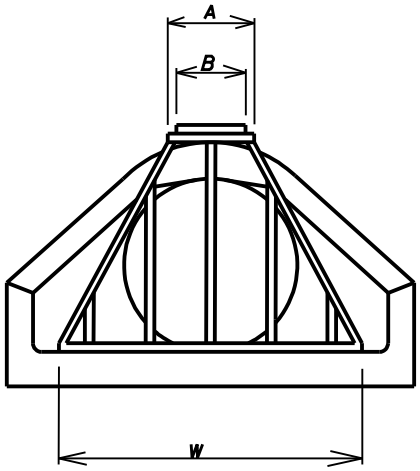
CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

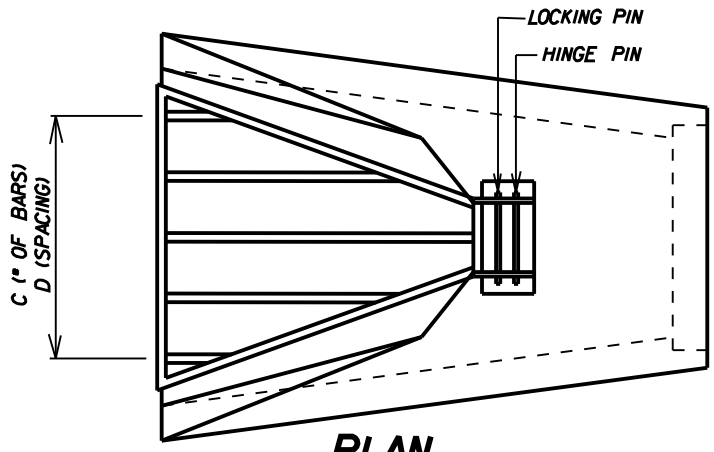
STORM DRAINAGE
ELLIPTICAL FLARED END SECTION
DETAIL 300-06B

REO

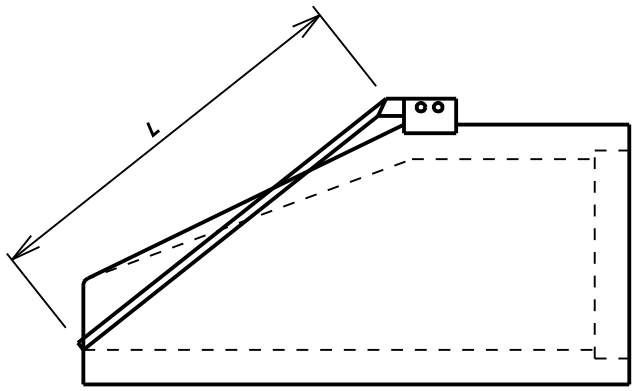
DATE: FEB., 2001 **SCALE:** NOT TO SCALE



END VIEW



PLAN



SIDE VIEW

PIPE DIAMETER	A	B	C	D	W	L
12"	11"	7.5"	3	6"	21"	30"
15"	9"	5.5"	3	6.5"	27"	28"
18"	10"	6.5"	3	8"	28"	31"
24"	12"	9.5"	5	8"	40"	47.5"
30"	15"	12.5"	5	9"	52"	59.75"
36"	18"	15.5"	7	8.5"	58"	71.25"
42"	21"	18.5"	7	9"	64"	75"
48"	24"	21.5"	9	8"	70"	82.75"
54"	24"	21"	14	6"	84"	84"
60"	24"	21"	22	6"	132"	108"
72"	24"	21"	22	6"	132"	108"

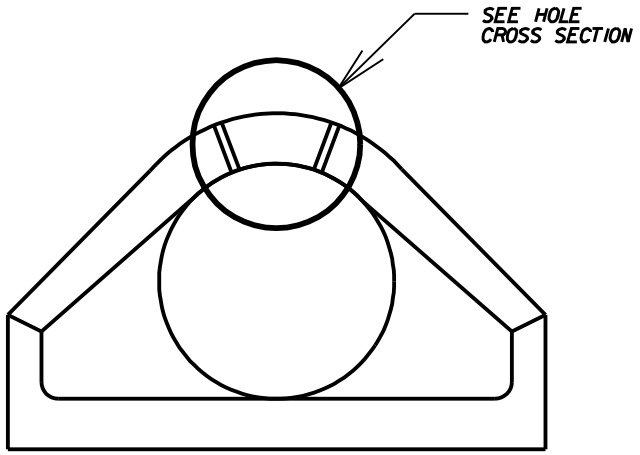
CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

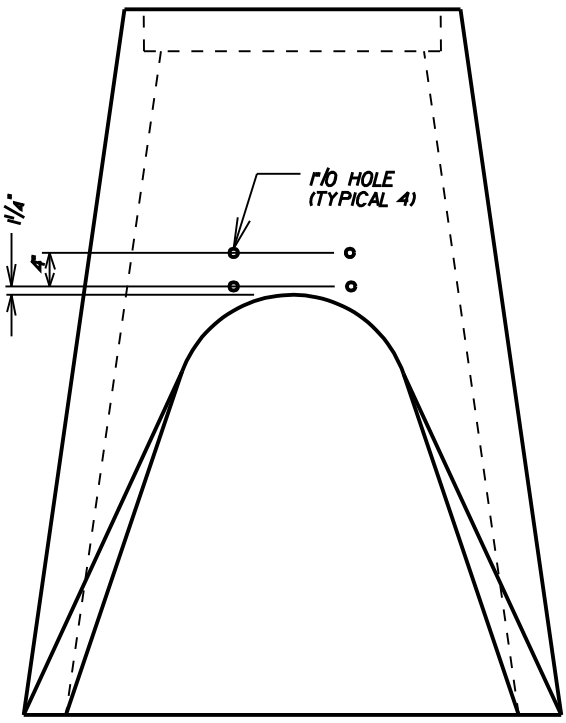
STORM DRAINAGE
FLARED END SECTION TRASH RACK (CIRCULAR PIPE)
DETAIL 300-06C

REB

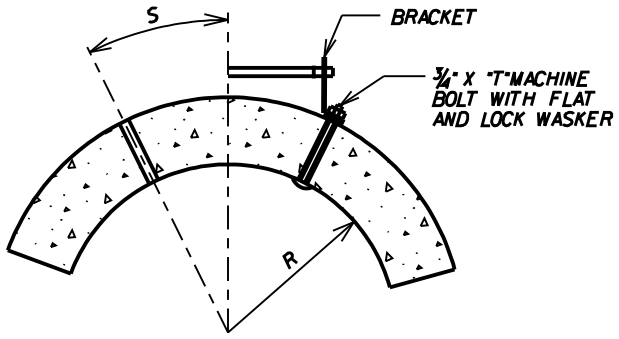
DATE: FEB., 2001 **SCALE:** NOT TO SCALE



END VIEW



PLAN



HOLE CROSS SECTION

PIPE DIAMETER	R	S	T
12"	8"	5.25"	4.5"
15"	9.75"	3.5"	4.75"
18"	11.5"	5"	5"
24"	15"	6.5"	5.5"
30"	18.5"	8"	6"
36"	22"	9.5"	6.5"
42"	25.5"	11"	7"
48"	29"	12.75"	7.5"
54"	33.25"	14.5"	8.5"
60"	36.75"	16.25"	9"
72"	43.75"	19.75"	11"

CITY OF LONGMONT COLORADO

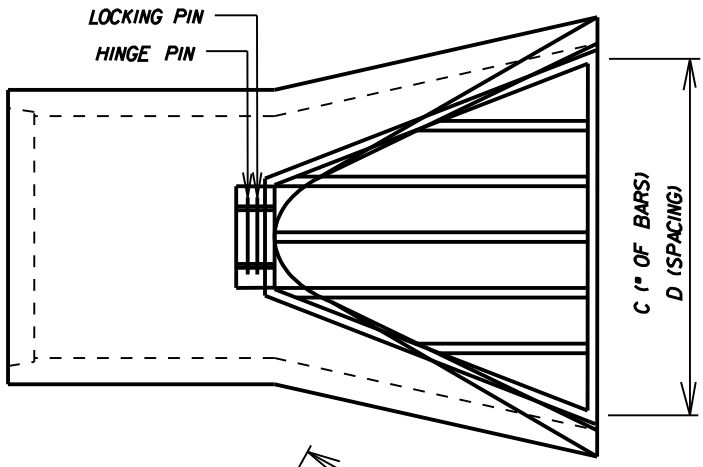
PUBLIC WORKS DIVISION

STORM DRAINAGE
TRASH RACK MOUNTING DETAIL
(CIRCULAR FLARED END SECTION)
DETAIL 300-06D

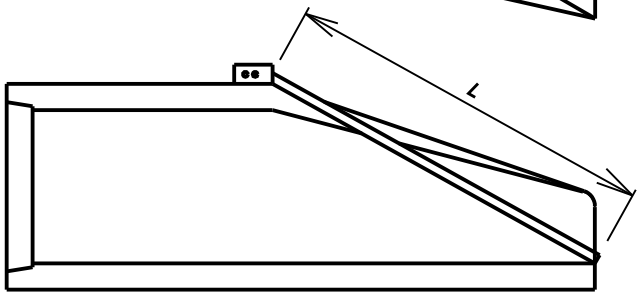
REB

DATE: FEB., 2001 **SCALE:** NOT TO SCALE

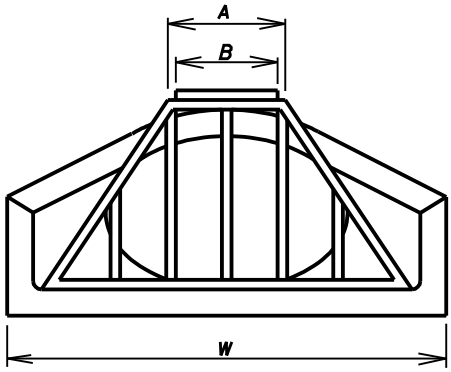
PLAN VIEW



SIDE VIEW



END VIEW



EQUIVELENT CIRCULAR PIPE DIAMETER	SPAN	RISE	A	B	C	D	W	L
18"	23"	14"	15"	12"	4	9.5"	38"	30"
24"	30"	19"	20"	17"	4	8.5"	40"	39.5"
30"	38"	24"	25"	21.75"	5	9"	52"	55"
36"	45"	29"	30"	26.75"	6	9.5"	64"	62.75"
42"	53"	34"	35"	31.5"	6	9.5"	64"	65"
48"	60"	38"	39"	36.38"	7	9"	70"	67"
54"	68"	43"	45"	42"	10	10"	80"	69"
60"	76"	48"	50"	47"	10	10"	90"	71"

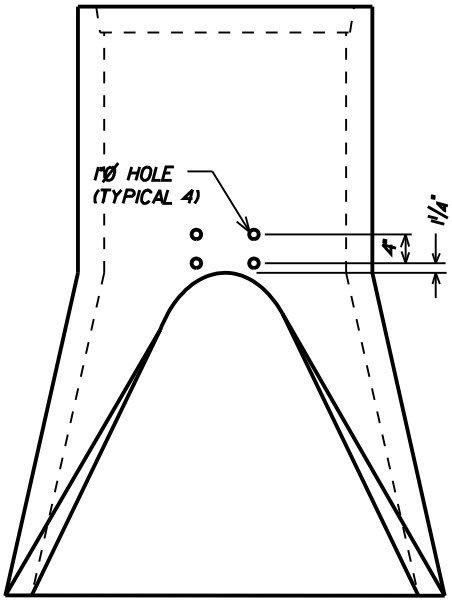
CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

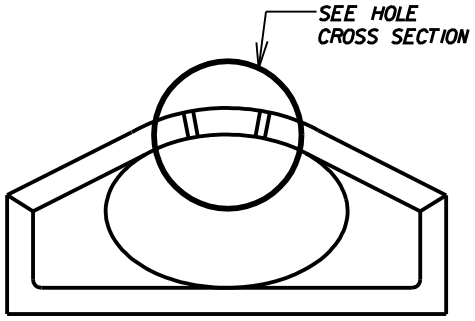
STORM DRAINAGE
FLARED END SECTION TRASH RACK
(ELLIPTICAL PIPE)
DETAIL 300-06E

REB

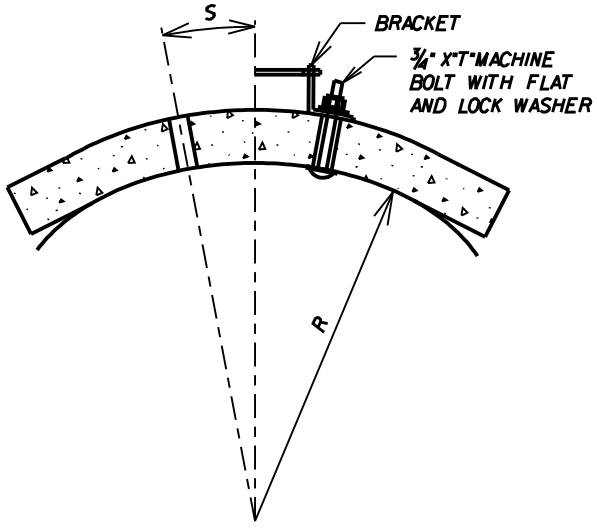
DATE: FEB., 2001 **SCALE:** NOT TO SCALE



PLAN VIEW



END VIEW



HOLE CROSS SECTION

EQUIVELENT CIRCULAR PIPE DIAMETER	SPAN	RISE	R	S	T
18"	23"	14"	23"	7.75"	4.25"
24"	30"	19"	29"	10.25"	5.75"
30"	38"	24"	36.25"	12.75"	6.25"
36"	45"	29"	43.5"	15.25"	7"
42"	53"	34"	50.5"	17.75"	7.5"
48"	60"	38"	57.63"	20"	8"
54"	68"	43"	63"	23"	8.5"
60"	76"	48"	70"	26"	9"

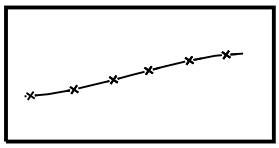
CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

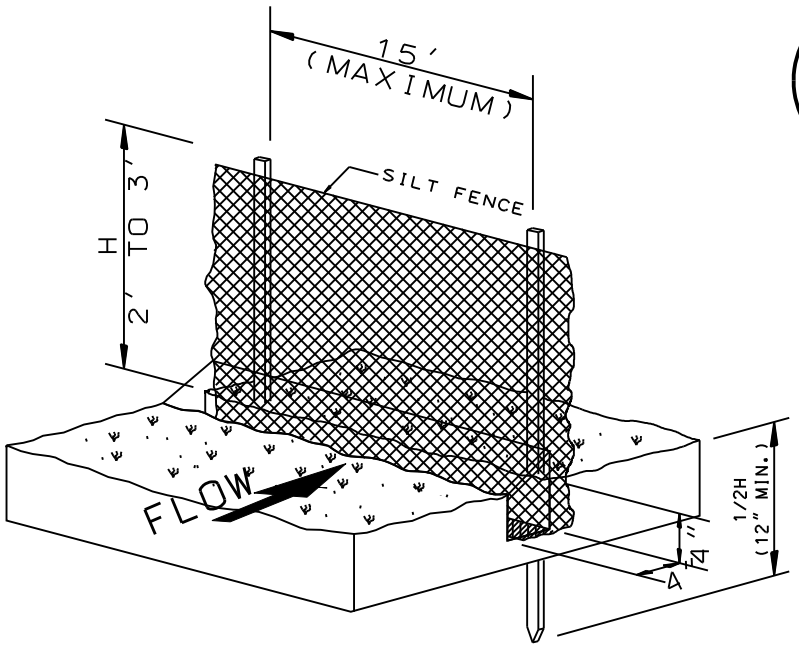
STORM DRAINAGE
TRASH RACK MOUNTING DETAIL
(ELLIPTICAL FLARED END SECTION)
DETAIL 300-06F

REB

DATE: FEB., 2001 **SCALE:** NOT TO SCALE

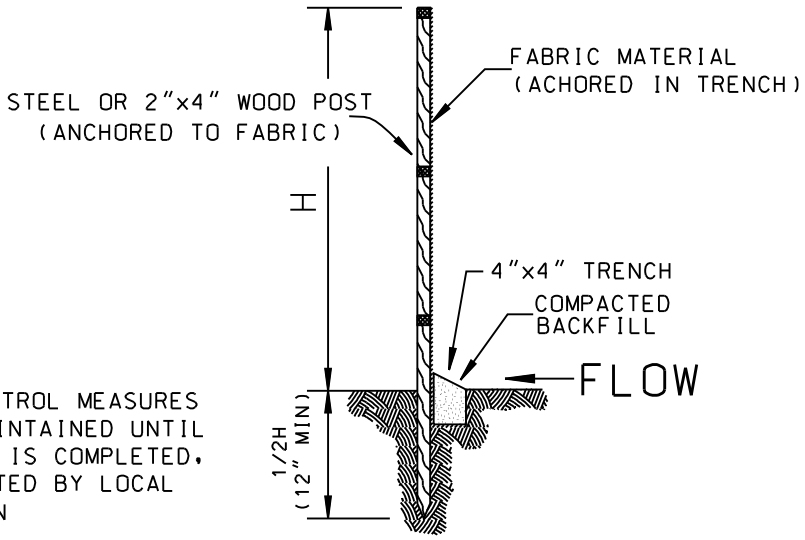


SF



SILT FENCE INSTALLATION

-NTS-



NOTE: EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL LANDSCAPING IS COMPLETED, OR AS DIRECTED BY LOCAL JURISDICTION

SECTION

-NTS-

Urban Drainage and Flood Control District
Drainage Criteria Manual (V.3)

CITY OF LONGMONT COLORADO

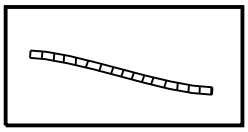
PUBLIC WORKS DIVISION

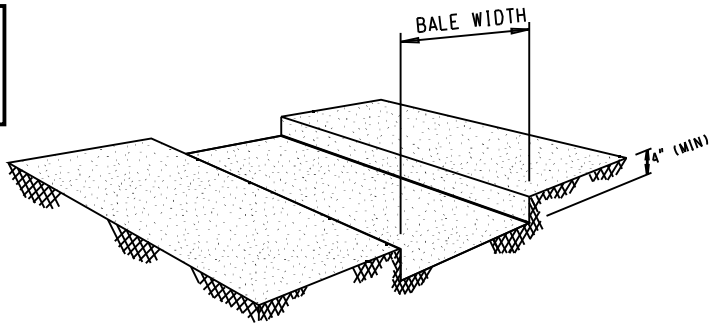
STORM DRAINAGE
SILT FENCE EROSION BARRIER
DETAIL 300-07

REB

DATE: SEPTEMBER 2005

SCALE: NOT TO SCALE

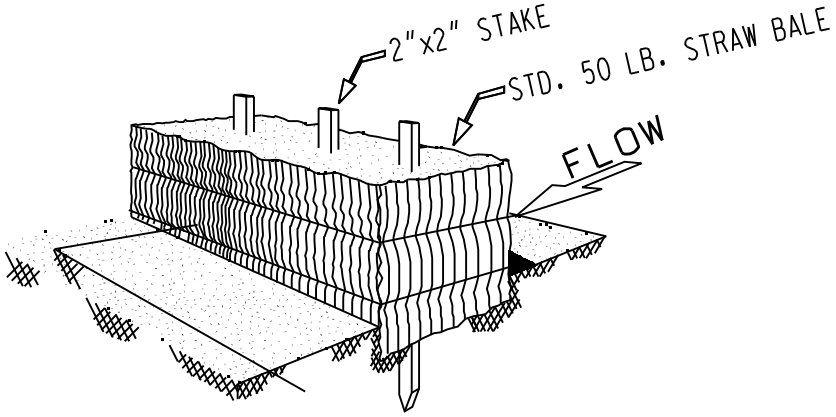




STB

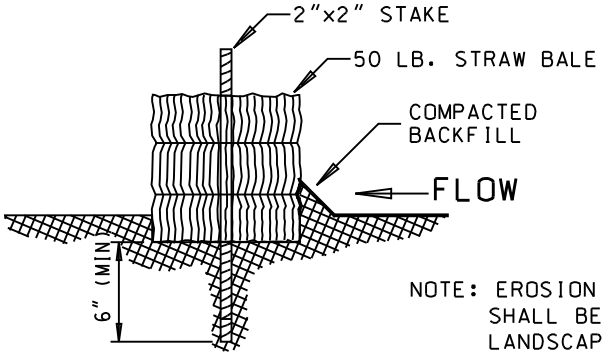
TRENCH EXCAVATION

-NTS-



STRAW BALE INSTALLATION

-NTS-



NOTE: EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL LANDSCAPING IS COMPLETED, OR AS DIRECTED BY LOCAL JURISDICTION

SECTION

-NTS-

Urban Drainage and Flood Control District
Drainage Criteria Manual (V.3)

CITY OF LONGMONT COLORADO

PUBLIC WORKS DIVISION

STRAW BALE EROSION BARRIER

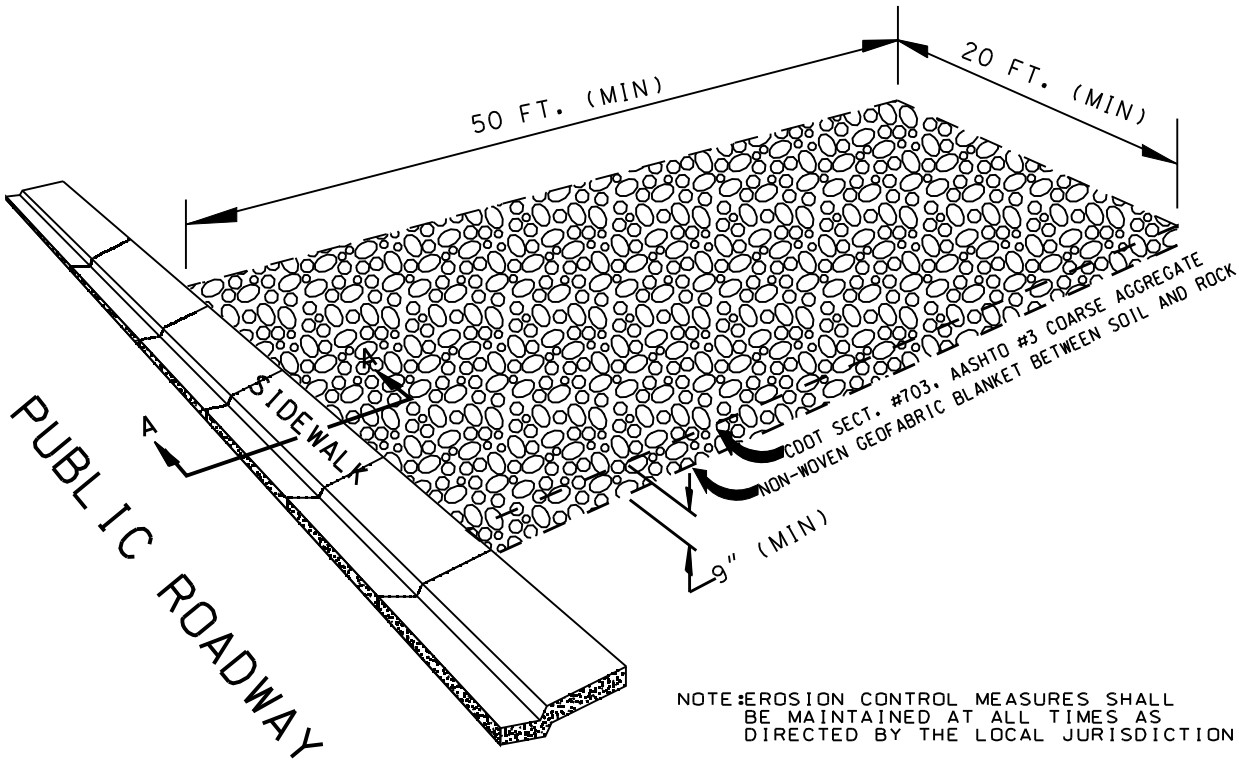
DETAIL 300-08

REB

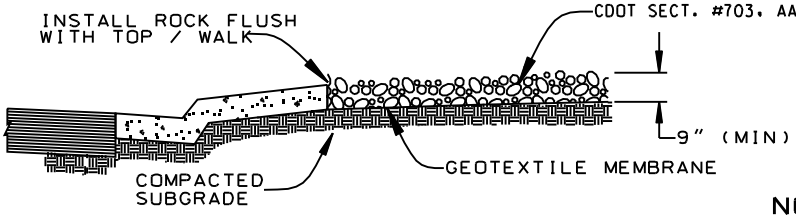
DATE: SEPTEMBER, 2005

SCALE: NOT TO SCALE

CE



NOTE: EROSION CONTROL MEASURES SHALL BE MAINTAINED AT ALL TIMES AS DIRECTED BY THE LOCAL JURISDICTION



SECTION A-A

-NTS-

NOTES

1. ALL ROCK TO BE REMOVED UPON COMPLETION OF CONSTRUCTION.
2. PUBLIC ROADWAY TO BE KEPT CLEAN AND FREE OF MUD, DIRT AND DEBRI AT ALL TIMES.

Urban Drainage and Flood Control District
Drainage Criteria Manual (V.3)

PUBLIC WORKS DIVISION

STORM DRAINAGE
CONSTRUCTION STAGING PAD
DETAIL 300 09

REB

DATE: SEPTEMBER, 2005

SCALE: NOT TO SCALE

CITY OF LONGMONT
SECTION 400 - WASTEWATER COLLECTION
TABLE OF CONTENTS

400.00 MINIMUM DESIGN CRITERIA 1

400.01 GENERAL 1
400.02 QUANTITY OF WASTEWATER 1
400.03 DESIGN VELOCITIES AND GRADES 2
400.05 SERVICE LINE SIZES AND GRADES 2
400.06 DEPTH 3
400.07 ALIGNMENT 3
400.08 FUTURE EXTENSION OF MAINS 3
400.09 MANHOLE SIZE AND SPACING 3
400.10 ABANDONMENT OF EXISTING SEWER LINES OR "STUBS\ 4
400.11 SETTLING TANKS AND GRIT/GREASE TRAPS 4

410.00 MATERIALS 4

411.00 POLYVINYL CHLORIDE PIPE (P.V.C.) 5

411.01 DESCRIPTION OF PIPE 5
411.02 CLASS AND TYPE 5
411.03 PIPE LENGTHS 5
411.04 JOINT TYPE 5
411.05 PIPE BARREL DIAMETER DEFLECTION 5
411.06 PIPE QUALITY 6

412.00 DUCTILE IRON PIPE 6

412.01 DESCRIPTION 6
412.02 JOINT TYPE 6
412.03 CORROSION PROTECTION 6

413.00 VITRIFIED CLAY PIPE 6

413.01 DESCRIPTION 6

414.00 ASBESTOS CEMENT PIPE (A.C.P.) 6

414.01 DESCRIPTION 6

415.00 FITTINGS FOR SEWER PIPE 7

416.00 CLEAN-OUTS IN SERVICE LINES 7

417.00 UNDERDRAINS 7

418.00 MANHOLES 7

418.01 DESCRIPTION 7
418.02 MISCELLANEOUS MATERIALS 7
418.03 CASTINGS 7

419.00 CONCRETE AND REINFORCING STEEL 7

420.00 PLUGS OR STOPPERS 8

430.00 CONSTRUCTION INFORMATION 8

432.00 CONNECTION TO THE EXISTING SYSTEM 8

433.00 TAPPING 8

434.00 GENERAL PIPE INSTALLATION 9

434.01 LOWERING OF PIPE AND ACCESSORIES INTO TRENCH 9
434.02 INSTALLATION OF PIPE 9
434.03 CUTTING OF PIPE 9
434.04 JOINING OF PIPE 9
434.05 JOINT DEFLECTION 9

435.00 SERVICE LINES 9

438.00 SETTING OF MANHOLES AND FITTINGS 10

438.01 MANHOLES 10
438.02 BASES 10
438.03 PIPE CONNECTIONS 11
438.04 DROP MANHOLES 11
438.05 MANHOLE STEPS 11
438.06 PRECAST MANHOLES 11
438.07 RAISING MANHOLES 12

439.00 TESTING 12

439.01 INFILTRATION TESTING 12
439.02 AIR TESTING 12
439.03 MANHOLE LEAKAGE TEST 13
439.04 VISUAL INSPECTION 13

440.00 UTILITY MARKER SIGNS 14

441.00 LIFT STATIONS - GENERAL 14

441.01 DESCRIPTION 14
441.02 TYPE OF LIFT STATIONS 14
441.03 QUALITY ASSURANCE 14
441.04 FACILITY DESIGN REQUIREMENTS 15

442.00 LIFT STATIONS - PRODUCTS 15

442.01 LIFT STATION PUMPS 15
442.02 WET WELL 18
442.03 MOTOR CONTROL CENTER 20
442.04 GENERATOR/VALVE VAULT BUILDING 22
442.05 VALVE VAULT 25
442.06 GENERATOR 30
442.07 SITE SECURITY 30
442.08 SITE 30
442.09 INTERCEPTOR 31
442.10 FORCE MAIN 31

443.00 LIFT STATIONS - EXECUTION 32
443.01 INSTALLATION 32
443.02 MANUFACTURER'S FIELD SERVICES 33
443.03 SPARE PARTS 34

SECTION 400 - WASTEWATER COLLECTION
INDEX OF DETAILS

400-01	Standard Manhole Detail
400-02	Manhole Raising Detail
400-03	Sewer Service Connection
400-04	Manhole Abandonment Detail
400-05	Inside Drop Manhole Detail
400-06	Sanitary Sewer Service Line Installation

WASTEWATER COLLECTION

400.00 MINIMUM DESIGN CRITERIA

400.01 GENERAL

1. All Wastewater collection systems will comply with the requirements of the Standards and Specifications for sanitary sewer and service line construction and may include criteria established by the Engineer for the overall hydraulics of the wastewater utility system. Other criteria may be outlined in PIP as determined by the Engineer.

2. Design and planning criteria shall be in conformance with the City's Wastewater Master Plan (W.W.M.P.), as amended.

3. These standards and specifications apply to pipe sizes up to and including fifteen (15) inches in diameter. Sizes larger than fifteen (15) inches shall be as determined by the Engineer on a project by project basis.

4. Groundwater barriers or other precautions may be required by the Engineer in trenches which are below the groundwater table.

5. Sewer interceptors (pipes larger than twelve (12) inch diameter) will have flows no greater than a ratio of 1.0 of flow depth to pipe diameter (d/D)[1].

400.02 QUANTITY OF WASTEWATER

1. Residential wastewater flows will be determined by using an average daily flow of seventy five (75) gallons per person per day and averaging 2.2 persons per dwelling unit. Industrial and commercial area flows will be determined using 1833 gallons per day per acre, unless actual data is given that exceeds the above figures.

2. Design shall be based upon peak daily flows found by using peaking factors as noted below or as determined by the Engineer. These factors may differ throughout the City. Design flow shall be the sum of the peak flow and the flow due to infiltration and inflow.

   Total peak flow, Qt, mgd shall be as determined by the following formula, in accordance with the Wastewater Master Plan.

$$Q_t, mgd = \frac{\left[\frac{3.54}{\left[\frac{\sum(Q_a \times A_n)}{1{,}000{,}000}\right]^{0.168}}\right] \times \sum(Q_a \times A_n) + Q_a 7 \times A_7 + (Q_b + Q_c) \times A}{1{,}000{,}000}$$

   where: A, in acres = sum of the individual land use areas, An SUM (Qa*An) in gpd = the sum of six individual calculations where the area, An, within each of six land use

[1] Quality of Life Benchmark

categories is multiplied by the average daily base sewage flow, Qa, that corresponds to that land use category.

For example,

SUM (Qa*An) = Qa1*A1 + Qa2*A2 + Qa3*A3 + Qa4*A4 + Qa5*A5 + Qa6*A6

Qb, in gpd/acre = design infiltration rate.

Qc, in gpd/acre = design inflow rate.

In accordance with the INTERC computer model, flow from the open space land-use category and inflow and infiltration is not peaked and is not included in the term SUM (Qa*An). Also note that all Q*A calculations are done for both existing and future areas and the corresponding base sewage flows are added together prior to application of the peaking factor.

3. Final design to include calculations based upon projected or actual usage, whichever is higher.

400.03 DESIGN VELOCITIES AND GRADES

1. All sanitary sewers shall be designed to insure that the peak day flows velocities within the pipe will be two (2) feet per second as a minimum and ten (10) feet per second as a maximum. The minimum and the maximum grades of the sewer lines shall be as follows:

Pipe Diameter (inches)	Minimum Slope (%)	Maximum Slope (%)
8	0.40	7.5
10	0.25	5.5
12	0.20	4.5

1. Sanitary Sewer mains constructed under these Standards and Specifications shall be designed so as to adequately serve the entire area when fully developed. The minimum allowable size for a main is eight (8) inch diameter. The Engineer reserves the right to resize any sewer main that is inadequate for the proposed use, based on standard engineering practices.

400.05 SERVICE LINE SIZES AND GRADES

1. Service lines shall be designed with a minimum fall of one quarter (1/4) inch per foot, (2%), and a maximum velocity of ten (10) feet per second. In the event that site conditions do not allow a 2% slope, the Engineer may grant a variance to the minimum slope requirements. The minimum allowable service line size is four (4) inches, any building requiring larger than a four inch service shall be sized by the Design Engineer based on standard engineering practices. All service line sizes will be subject to review and approval of the Engineer.

400.06 DEPTH

1. Unless otherwise approved by the Engineer because of site specific conditions, sanitary sewer mains should be designed deep enough to accommodate service line installations and a maximum cover of fifteen (15) feet. Without exceeding maximum flow velocities, service lines shall be a maximum of ten (10) feet deep at the back of walk.

400.07 ALIGNMENT

1. Sewer mains shall be laid whenever possible at the center line of the street. Sewer mains shall be located a minimum of ten (10) feet horizontally from existing or proposed water mains (edge to edge distance) and shall be located a minimum of five (5) feet horizontally from lip of gutter. No sewer mains shall be installed within fifteen (15) feet of any existing building, retaining wall, or structure unless approved by the Engineer. No structure or retaining wall shall be constructed within a minimum of fifteen (15) feet from any sewer main unless approved by the Engineer. All weather vehicular access shall be provided to manholes and valve boxes installed in areas outside of the public roadway. This shall consist of a minimum ten (10) foot wide gravel, asphalt, or concrete path or roadway constructed to the thicknesses shown in the standard City details with a minimum fifty five (55) foot center line radius on curves. If there is a water and sanitary sewer crossing, the requirements of these standards and specifications must be followed (refer to General section 107.09 " Utility Line Crossing").

400.08 FUTURE EXTENSION OF MAINS

1. When a sewer line under construction is anticipated to be extended at a future date, the end of the line shall have a manhole and a plugged stub out installed in the direction(s) of future extension. Sanitary sewers must be extended to the far edge of the property to be serviced, or to the edge of the platted subdivision or as directed by the Engineer. All extension lengths shall be subject to the approval of the Engineer. When a sewer line is not to be extended at some future date, the line being installed shall extend a minimum of ten (10) feet into the last property to be served and a manhole shall be installed. No services shall be placed on an extension of the upstream side of a manhole.

400.09 MANHOLE SIZE AND SPACING

1. Manholes should be located at all changes in grade, size and alignment. For changes in pipe size, the crowns of the pipes shall be at the same elevation, or the drop across the manhole between the incoming and outgoing flow shall be 0.2 feet whichever is greater. No curved sewer pipe may be used. Manholes shall be located at street intersections whenever possible.

2. Manholes are to be four (4) foot in diameter for pipe up to and including fifteen (15) inches, larger pipe or multiple large pipes may require manholes with a five (5) foot diameter or larger. See Detail 400-01.

3. Manholes must be spaced no farther than four hundred (400) feet apart, unless approved by the Engineer.

4. Manholes should be located in areas which are not subject to flooding from surface runoff. No manholes may be located in areas where ponding or storm detention basins are to be used.

5. Manholes must be located in areas which allow direct, all-weather, vehicular access for maintenance vehicles.

6. If the possibility of surface runoff cannot be avoided, a solid manhole cover, having an integral O-ring type gasket and a waterproof insert that can be bolted closed, must be used.

7. All manholes located outside dedicated street rights-of-way and/or within the one-100 year flood plain shall be designed and constructed with a watertight, bolted type cover and the manhole ring shall be bolted to the manhole cone.

8. When a tree invert is constructed, the invert coming into the straight through channel must be at least two tenths (0.2) of a foot higher than the out invert.

9. A 0.10 feet drop between the inverts may be used when the sewer flows straight through the manhole without any bends or branches.

400.10 ABANDONMENT OF EXISTING SEWER LINES OR "STUBS"

1. All four (4) inch sewer service lines that were installed and will not be used shall be abandoned at or near the property line. In certain cases, abandonment at the main may be requested by the Contractor or may be required by the Engineer. This shall include excavating the line and installing a concrete or P.V.C. plug in the line, tap or wye. Abandonment of a sewer service line at the main, must occur prior to final lift paving.

2. All sewer lines that were installed and will not be used that tie directly into a manhole, either main lines or service lines and regardless of size, shall be abandoned at the manhole. These shall be plugged with concrete inside the manhole.

400.11 SETTLING TANKS AND GRIT/GREASE TRAPS

1. The installation of settling tanks and grit and grease traps will be required under the provisions outlined in Section 14.08.415 of the Longmont Municipal Code.

2. All settling tanks and grit and grease traps shall be designed, installed, operated, and maintained in accordance with the requirements set forth in Section 14.08.416 of the Longmont Municipal Code.

410.00 MATERIALS

1. For a specific list of materials accepted by the City Water/Wastewater Department see APPROVED MATERIALS LIST. A copy of the APPROVED MATERIALS LIST can be obtained from the Water/Wastewater Department.

411.00 POLYVINYL CHLORIDE PIPE (P.V.C.)

411.01 DESCRIPTION OF PIPE

1. All PVC pipe sizes four (4) inch through fifteen (15) inch shall meet the requirements of ASTM D3034 "Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings", sizes eighteen (18) inch through twenty-seven (27) inch shall meet the requirements of ASTM F-679.

411.02 CLASS AND TYPE

1. All sizes of PVC pipe shall be SDR 35, and shall have the A.S.T.M. Specification, nominal diameter, and name or trade mark of the manufacturer imprinted on the outside of the pipe.

411.03 PIPE LENGTHS

1. Pipe sections will be furnished in lengths of twelve and one-half (12 ½) feet except service tees and closure pieces.

411.04 JOINT TYPE

1. Except as may be authorized by the Engineer, pipe joint assemblies shall be bell and spigot push-on joints using elastomeric gaskets with an O-ring rubber gasket conforming to ASTM F477. Joints shall conform to ASTM D 3212. Solvent cement joints are strictly prohibited.

411.05 PIPE BARREL DIAMETER DEFLECTION

1. The diameter indicated on the Drawings shall mean the inside diameter of the pipe.

2. Test each reach of sewer pipe between manholes for vertical ring deflection after backfill has been completed.

3. Pipe shall be constructed so that the maximum initial vertical diameter does not decrease by more than 5% of the base internal diameter.

4. The maximum allowable deflection at the time of City Final Acceptance of the line shall be 7½% of the base internal diameter. The contractor shall uncover and repair sections exceeding the maximum allowable deflections.

5. Mandrel outside diameters in inches are as follows:

PIPE SIZE	BASE I.D.	5% DEFLECTION	7½% DEFLECTION
MANDREL		MANDREL	
6	5.742	5.455	5.311
8	7.665	7.282	7.090
10	9.563	9.085	8.846
12	11.361	10.793	10.509
15	13.898	13.203	12.856

6. The contractor shall uncover all pipe sections exceeding the above maximum allowable deflections and replace the bedding and backfill to prevent excessive deflection. Retest repaired sections.

411.06 PIPE QUALITY

1. In addition to any deficiencies covered by D3034, PVC which has any of the following visual defects will not be accepted.

    a. Straight pipe, measured from the concave side, shall not deviate from straight greater than 1/16 inch per foot of length.

    b. Pipe which is sufficiently out-of-round to prohibit proper jointing.

    c. Improperly formed bell and spigot ends.

    d. Fractured, cracked, chipped, or otherwise sufficiently damaged pipe.

    e. Pipe that has been damaged during shipment or handling. Acceptance of the pipe at point of delivery will not relieve the Contractor of full responsibility for any defects in material of the completed pipeline.

412.00 DUCTILE IRON PIPE

412.01 DESCRIPTION

1. Pipe shall be ductile iron, Class 50, double thickness cement lined or polylined, designed in accordance with AWWA C-151, C-150. Fittings shall be cast iron pipe.

412.02 JOINT TYPE

1. Whenever ductile iron pipe is to be used, the joints shall be mechanical joint or push-on joint unless authorized by the Engineer.

412.03 CORROSION PROTECTION

1. Reference the water section of these Standards for requirements on Corrosion Protection.

413.00 VITRIFIED CLAY PIPE

413.01 DESCRIPTION

1. The installation of vitrified clay pipe is not permitted.

414.00 ASBESTOS CEMENT PIPE (A.C.P.)

414.01 DESCRIPTION

1. The installation of Asbestos Cement Pipe is not permitted.

415.00 FITTINGS FOR SEWER PIPE

1. Fittings used in new sewer construction, unless authorized by the Engineer, shall be of the same material and class as the pipe to which it is attached.

2. Transitions between dissimilar pipe materials shall be approved by the Engineer.

416.00 CLEAN-OUTS IN SERVICE LINES

1. All clean-outs will be P.V.C. or cast iron pipe. Clean-outs shall be placed two (2) feet outside of the structure and at a maximum of one hundred feet apart and at each change in direction of one hundred and thirty five degrees or greater as per the I.P.C. If the clean-out conflicts with structures it can be placed in alternate locations conforming to specific site conditions. Clean-outs in traffic areas shall be cast iron and be designed to carry the appropriate weight loads without damage to the pipe or clean-out.

417.00 UNDERDRAINS

1. Under drains placed next to sanitary sewer mains shall be solid walled rigid pipe. Refer to the Municipal Code for under drain requirements.

2. Under drains are not a part of the sanitary sewer system and they shall not connect to the system at any time.

418.00 MANHOLES

418.01 DESCRIPTION

1. All manholes shall be constructed using precast concrete sections fabricated from type II cement and otherwise conforming to C-478. Manhole steps shall be polypropylene meeting the following requirements. They shall be Grade 60 steel-reinforced, corrosion-resistant polypropylene plastic conforming to ASTM C478. They shall be fabricated with positive-friction lock system for being hand driven by hammer into performed holes. Manhole cones shall be of the eccentric type. See Detail 400-01.

418.02 MISCELLANEOUS MATERIALS

1. Mortar; non-shrink, non-metallic grout; and preformed plastic gaskets shall be in accordance with the approved material list.

418.03 CASTINGS

1. All castings for manhole heads, covers and frames and for other purposes must be of rough gray iron, and have a workman like finish free from blow-holes. Manhole frames and covers shall be as indicated on the APPROVED MATERIALS LIST.

419.00 CONCRETE AND REINFORCING STEEL

1. All concrete unless otherwise specified on the plans shall use type II cement and have a minimum compressive strength of 4000 p.s.i. in twenty-eight (28) days. The concrete design mix will be subject to the Engineer's approval. An air entraining agent must be

used in all concrete. Metal reinforcement shall be deformed steel bars sized according to their application by the Design Engineer, subject to the approval of the Engineer. All steel reinforcement shall Conform to ASTM A615, Grade 60.

420.00 PLUGS OR STOPPERS

1. Water-tight P.V.C. plugs or stoppers shall be furnished for all temporary or permanent stub-outs and all unused branch pipes. The size of the stopper shall be determined by the size of the pipe in which it is installed.

430.00 CONSTRUCTION INFORMATION

432.00 CONNECTION TO THE EXISTING SYSTEM

1. The physical connection to the existing sewer system shall be plugged until a construction acceptance has been issued for the project. If improper construction methods or materials are used, or excess infiltration occurs, the Engineer may require the sewer be plugged until satisfactory corrections are made. Forty-eight (48) hours notice must be given to the Inspector prior to any connection to the existing system.

433.00 TAPPING

1. No one is permitted to tap the existing sewer system, except Water/Wastewater Department personnel. Where tapping is necessary, the Contractor shall apply for the tap and pay the prevailing fee. The only size tap directly allowed on a sanitary sewer pipe in accordance with the City of Longmont Municipal Codes, is four (4") inch. Any larger size line must be brought into the City System through a manhole.

2. Taps will be scheduled when the Water/Wastewater Operations and Maintenance Division is contacted by the Contractor. No tap will be scheduled less than 48 hours, or two working days, from the time the Water/Wastewater Operations and Maintenance Division is contacted for the tap. No tap will be scheduled until all fees have been paid.

3. When the tapping crew arrives at the site, they will inspect the preparation of the trench for safety, as defined by current O.S.H.A. Standards.

4. The pipe must be sufficiently exposed to accommodate the tapping equipment.

5. When all conditions are deemed safe as described in Paragraph three and four (3 & 4), Water/Wastewater personnel will physically make the tap(s).

6. If the conditions of Paragraph three and four (3 & 4) are not satisfied, the Water/Wastewater personnel will not perform the tap and a new time will have to be scheduled.

7. If rescheduling is necessary due to the fault of the Contractor, all costs for time lost on the originally scheduled tap may be billed to the Contractor.

8. Taps are only made Monday through Thursday and until 12:00 p.m. (noon) on Fridays.

434.00 GENERAL PIPE INSTALLATION

434.01 LOWERING OF PIPE AND ACCESSORIES INTO TRENCH

1. All pipe, fittings, and accessories shall be carefully lowered into the trench with suitable equipment in a manner that will prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench. Pipe and accessories shall be inspected for defects prior to their being lowered into the trench. All foreign matter or dirt shall be removed from the interior and machined ends of pipe and accessories before it is lowered into position in the trench. Pipe shall be kept clean by means approved by the Engineer during and after installation.

434.02 INSTALLATION OF PIPE

1. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in line. The end of the pipe will be plugged or capped with approved materials when work stops. Pipe shall be installed working downstream to upstream with the bell end facing upgrade. All pipe installed must be to the required line and grade and checked to insure there is no variation from that line and grade. No pipe shall be laid when, in the opinion of the Engineer or the Inspector, trench conditions are unsuitable, such as unstable bedding, pipe subgrade, or trench walls or the presence of contaminated soil or liquids.

434.03 CUTTING OF PIPE

1. The cutting of pipe for inserting into fittings, shall be done in a neat and workmanlike manner without damage to the pipe or lining and so as to leave a smooth end with beveled edges recut to match the original pipe. Flame cutting of ductile pipe shall not be allowed. Asbestos cement pipe shall not be cut. An entire section of pipe shall be removed and replaced with a nonasbestos type pipe.

434.04 JOINING OF PIPE

1. Push on and mechanical joints shall be accomplished in accordance with the manufacturer's recommendations.

434.05 JOINT DEFLECTION

1. Sewer pipe shall not have any deflections. All pipe shall be laid and maintained to the required lines and grades. No deviation shall be made from the required line or grade except with the written consent of the Engineer. Manholes and other necessary appurtenances shall be at the required locations. All pipe shall be laid to the depth shown on the construction drawings or as directed by the Engineer in writing.

435.00 SERVICE LINES

1. Each structure and each subdivided lot shall be served by a separate service line. No compound taps are allowed in the City as per City ordinance Section 14.08.230.

2. It is the responsibility of the owner of the premises to service and maintain the service line from the structure to the connection in the main.

3. Sewer service lines shall not be installed in trenches containing conduits which carry potable water without written permission of the Engineer, service lines shall be separated laterally from conduits which contain potable water by a minimum of ten (l0) feet edge to edge.

   Exception: For water and sanitary sewer services, where it is not possible to achieve a ten (10) foot separation of the water and sewer services due to the size, location or other physical restraints of the lot, the Engineer may allow deviation on a case-by-case basis if supported by data from the design engineer. Such deviation may allow installation of the water service closer to the sanitary sewer, provided the water service is laid in a separate trench or on an undisturbed earth bench located on one side of the trench at such an elevation that the bottom of the water service is at least (eighteen) 18 inches above the top of the sewer.

4. All service lines must be inspected by the Inspector. It is the responsibility of the Contractor or developer to provide to the City as-built drawings indicating actual locations of all service stubs, prior to the issuance of a final acceptance.

5. Sanitary sewer service rehabilitation work will require that a forty eight (48) hour notification be given to the City prior to commencing work. All rehabilitation work on sanitary sewer services must be inspected by the City.

6. All six (6) inch or larger sewer service connections into manholes shall channel their influent to flow with the main stream at no greater angle than 45 degrees with a minimum drop of a 0.2' and a maximum drop of eighteen (18) inches without a drop manhole. Service line drops within manholes will not be allowed.

7. Service line bedding, trench backfill, and compaction shall be the same as for the mainline sewer.

8. All services smaller than six (6) inches must connect into a sewer main.

438.00 SETTING OF MANHOLES AND FITTINGS

438.01 MANHOLES

1. Manholes shall be constructed of concrete in accordance with the Standard Details. The materials, operations, excavation, and backfilling shall conform to the applicable sections of these Specifications.

438.02 BASES

1. Contractor may provide cast in place manhole inverts or precast manhole inverts at Contractor's option. In case of any change in alignment or elevation of manholes Contractor is responsible for making all changes to the approval of the Engineer.

2. All cast-in-place concrete bases for manholes shall be constructed such that they are level conforming to the dimensions as shown on the standard details. Invert channels shall be smooth and semi-circular in shape conforming to the inside of the adjacent sewer section. These must be formed directly in the concrete of the base, or for a straight through

manhole with no other inlets the channel may be constructed by laying full section sewer pipe through the manhole and by cutting out the top half of the pipe after the surrounding concrete has hardened. Changes in direction of flow shall be made with a smooth curve having as large a radius as the manhole will permit. Manhole bases shall be thoroughly bonded to the barrel of the pipe. Provide a rubber water-stop on pipe barrel for PVC pipe. All connections with pipe shall be made without projections or voids. The pipe shall not penetrate more than two inches (2") beyond the interior wall. See Standard Details. Inverts must meet the requirements of the Engineer.

3. All precast concrete bases for manholes shall be constructed level with the precast base and first barrel section monolithic, conformance ASTM C478, Type II cement. The pipe penetration gaskets shall be as specified in the approved material list. No modification of precast sections will be permitted on the job site, all such fabrication must be accomplished at the point of manufacture. Have manufacturer cut openings to receive entering pipes of sufficient size to provide 3/4 inch annular space around pipe or as required by manufacturer of penetration gaskets. Invert within the precast base shall have the same requirements as the invert for the cast-in-place manhole bases.

4. Pipe size changes shall be accomplished by matching pipe crowns and forming the channel to accommodate the pipe size differential. The floor of the manhole outside of the channels shall be smooth and shall slope toward the channels at not less than one (1) inch per foot.

438.03 PIPE CONNECTIONS

1. Manholes shall be thoroughly bonded to the barrel of the pipe. Provide a rubber gasket on pipe barrel for PVC pipe. All connections with pipe shall be made without projections or voids. Where shown on the plans a piece of pipe of the proper size shall be built into the manhole where future laterals may be connected. This pipe shall be sealed with a plug or stopper at its outer end and an invert shall be built into each manhole for such lateral connections.

438.04 DROP MANHOLES

1. No outside drop manholes will be allowed. Inside drop manholes, if necessary, shall be constructed in accordance with Detail 400-05.

438.05 MANHOLE STEPS

1. Manholes shall be provided with polypropylene coated reinforced steps not less than fifteen (15) inches in width, built into or thoroughly anchored in the walls at the time of fabrication or installation (See Section 418.01). No steps shall be installed in the grade rings. These steps shall be positioned, as shown on the standard details. Steps or rungs shall not be required unless the depth of manhole from ring to invert exceeds three (3) feet. Steps shall be vertically plumb. See Detail 400-01.

438.06 PRECAST MANHOLES

1. All precast cones shall be of the eccentric type. Precast sections conforming to section 418.01 shall be placed on the manhole base, after it has reached sufficient compressive strength. No modification of precast sections will be permitted on the job site, all such

fabrication must be accomplished at the point of manufacture. The manhole base shall be thoroughly cleaned, to prepare for the placing of the precast sections. Preformed plastic gaskets or approved equal, or a full mortar bed at least one (1) inch thick is to be applied to the precast section bearing seat. The first precast section shall be carefully lowered onto the base so that the preformed plastic gaskets or mortar is evenly seated on all sides. The interior side of the first, and if deemed necessary by the Inspector, other joints shall be grouted with a nonshrink grout. Each succeeding precast section shall be jointed in a similar manner. See Detail 400-01.

2. In areas where the manhole will be exposed to groundwater, damp-proofing shall be provided consisting of an approved waterproofing applied to the thicknesses and recommendations of the manufacturer. The waterproofing shall only be applied to clean surfaces free of oils, greases, and foreign matters and shall not be placed on surfaces when the ambient air temperature is less than 50 degrees Fahrenheit, unless approved by the manufacturer. See the APPROVED MATERIALS LIST. A copy of the APPROVED MATERIALS LIST can be obtained from the Water/Wastewater Department.

438.07 RAISING MANHOLES

1. Manhole frames shall be raised using precast reinforced concrete rings or cast in place concrete; No other material will be allowed. The first step will be no lower than twenty-four inches (24") from the finished grade of the street. Drop-in type risers are not allowed for new construction. Drop-in type risers may be used on rehabilitation or overlay projects, but only one riser may be used and it shall not exceed 4 inches in height. No steps are allowed on the riser section. See Detail 400-02.

439.00 TESTING

439.01 INFILTRATION TESTING

1. After the compaction of fill material has been completed, tested, and approved, the contractor will check for infiltration and exfiltration in the main. This check will begin at the furthest upgrade end of the system and proceed downgrade in the main from section to section. A section shall be defined as any portion of installed sewer line between two adjacent manholes.

2. Conduct infiltration tests where groundwater is 5 feet or more above the top of the sewer pipe at any point in the sewer trench. If groundwater is less than 5 feet above the top of the pipe, conduct air testing.

3. Conduct test by placing a calibrated V-notched weir in the line as it enters the manhole and plugging the line as it enters the higher manhole. Allow sufficient time for the water level behind the weir to stabilize before reading. Remove any foreign matter hanging on the weir being read. Take successive readings until consistent results are obtained.

4. No visible infiltration is allowed.

439.02 AIR TESTING

1. The air test shall be made when the sewer is clean. The pipe, or sections of pipe to be tested, may be wetted before the air test. The line shall be plugged at each manhole with

pneumatic plugs. Low pressure air shall be introduced into the plugged line until the internal pressure reaches four (4.0) p.s.i.g. greater than the average back pressure of any ground water pressure that may submerge the pipe. At least two (2) minutes shall be allowed for the air temperature to stabilize before readings are taken and the time is started.

2. The portion being tested shall pass if it does not lose air at a rate to cause the pressure to drop from 3.6 to 3.0 p.s.i.g. (greater than the average back pressure of any ground water that may submerge the pipe) in less than the time listed below. If failure of the test occurs in any section that section must be repaired and retested until satisfactory results are achieved.

Pipe Diameter in inches	Minimum Allowable Minutes 3.6 – 3.0 psig Pressure
4	2.0
6	3.0
8	4.0
10	5.0
12	6.0
15	7.5

3. All service plugs shall be secured in place to prevent displacement during testing operations.

439.03 MANHOLE LEAKAGE TEST

1. Manholes shall be tested by vacuum testing. Vacuum test after assembly and backfilling, but prior to paving. Care shall be taken to effect a seal between the vacuum base and the manhole rim. Pipe plugs shall be secured to prevent movement while the vacuum is drawn. A vacuum of 10 inches of mercury shall be drawn. The time for the vacuum to drop to 9 inches of mercury shall be recorded. If preformed plastic gaskets are pulled out during the vacuum test, the manhole shall be disassembled and the gaskets shall be replaced. Acceptance shall be defined as when the time to drop to 9 inches meets or exceeds the following:

Diameter	Time to Drop One Inch (1”) Hg
4 ft.	60 seconds
5 ft.	75 seconds

2. No manhole will be accepted if there is any visible infiltration when empty.

3. All manholes installed will be tested. Any manhole whose test is unsatisfactory shall be repaired and retested until satisfactory results are obtained.

4. Failure of any test is considered failure of the manhole involved.

439.04 VISUAL INSPECTION

1. All new sewer lines shall be subject to inspection by lamping or other visual means. All new pvc pipe shall be subject to mandrel testing in accordance with section 1111.05.

2. All newly constructed sanitary sewer lines shall be completely jetted to remove dirt and debris prior to Construction Acceptance. The contractor will be responsible for removing all of the dirt and debris from the lines during the jetting operation and not allow any debris into any active City sewer line. Jetting shall be done after first lift of asphalt is completed. Please note that if City inspectors feel a problem exists with the line or if unusual problems occur during construction, the City, at its sole discretion, may require the lines to be videotaped by City personnel or by private contractor, at the developer's expense, prior to construction acceptance.

3. Contractor/Developer may, at his expense, hire an independent firm to videotape the sewer line. A designated City employee will be assigned to observe the camera work and video tapes of the line will be supplied to the City for further review.

4. Prior to the issuance of Final Acceptance, all of the sanitary sewer lines being considered shall be videotaped by City personnel. All defects found in the lines at the time of the camera operations shall be repaired prior to the City granting Final Acceptance. Please note that this work should be scheduled with the City by the Developer well in advance of final lift asphalt paving.

5. Manholes and sewer lines must be clean prior to scheduling video inspection. If rescheduling is necessary due to the fault of the Contractor, all costs for time lost on the originally scheduled camera inspection may be billed to the Contractor.

440.00 UTILITY MARKER SIGNS

1. Utility marker signs, provided by the City, shall be installed by the contractor next to manholes located in open fields or unpaved areas. Signs shall be spaced no more than four hundred feet (400') apart.

441.00 LIFT STATIONS - GENERAL

441.01 DESCRIPTION

This Section is a design guide for sewage lift stations and appurtenances. All sewage lift stations constructed in the City or areas serviced by the City shall conform with this Section.

441.02 TYPE OF LIFT STATIONS

Unless required otherwise, sewage lift stations shall be wet well stations with submersible pumps.

441.03 QUALITY ASSURANCE

Definition of terms and other hydraulic considerations are as set forth by the Hydraulic Institute Standards.

In the event of a conflict between the text portion of this document and the figures included in this document, the text portion shall govern. The electrical system shall be designed and stamped by an electrical engineer licensed in the state of Colorado. The hydraulic system shall be design and stamped by a civil engineer licensed in the state of Colorado. Unless noted otherwise, the materials used and methods of construction shall conform to the Standards and

Specifications. The City reserves the right to specify specific makes and models of equipment during the design or construction phase of any lift station. The final design documents shall be submitted to all applicable State and Local agencies for their review and approval.

441.04 FACILITY DESIGN REQUIREMENTS

The lift station design shall meet the criteria of the CDPHE design standards. The generator/valve vault building design shall meet all applicable UBC, ACI, Aluminum Associates (AA), IPC, UFC, National Electrical Code (NEC), and Uniform Mechanical Code (UMC) design codes and standards. Early in the design process, the City shall be contacted in order to coordinate the required flows and service area of the lift station. The City reserves the right to require that the lift station be designed as a regional facility.

442.00 LIFT STATIONS - PRODUCTS

442.01 LIFT STATION PUMPS

1. Performance and Design Requirements:

    a. Pumping unit shall have a stable head capacity curve and be free of cavitation and objectionable noise throughout the full head and capacity range. Pumping unit shall be capable of handling raw, unscreened sewage, stormwater, and other similar solids-ladened fluids without clogging.

    b. Number of units:

        1. Lift stations shall consist of a minimum of two (2) pumps.

        2. The pumps shall be designed such that the station will remain fully operational and able to handle the design flows if one (1) pump fails or is removed from service.

        3. The pumps installed in each station shall be identical.

        4. One (1) spare pump shall be supplied with each station. Said pump shall be delivered to and stored at a location determined by the City.

    c. Design pumps in accordance with the following:

        1. Pump Type: Submersible and Explosion Proof

        2. Number of Stages: Single

        3. Impeller Type: See paragraph 442.01.2.a.2

        4. Min. Suction Size (in): 4

        5. Min. Discharge Size (in): 4

        6. Min. Solid Size to Pass (in): 3

2. Construction

a. Materials:

1.	Casing:	ASTM A48, Class 40 Cast Iron
2.	Impeller:	ASTM A48, Class 40 Cast Iron; Double shrouded, single vane design or Semi-open, single vane design
3.	Impeller Coating:	PVC Epoxy Primer
4.	Shaft:	420 Stainless Steel
5.	External Hardware:	316 Stainless Steel
6.	Oil Chamber:	Cast Iron
7.	Motor Housing:	Cast Iron
8.	Volute:	ASTM A48, Class 40 Cast Iron

b. Components:

1. Casing - Discharge connections shall be standard class 125 cast iron flange. Mounting of pump to discharge pipe shall be an automatic connection when lowered into place. There shall be no need for personnel to enter wet well to connect or disconnect pumps. Sealing of the pumping unit to the discharge connection elbow shall be accomplished by a single linear downward motion of the pump. No portion of the pump shall bear directly on the floor of the wet well.

2. Mechanical Seal - Shaft sealing shall be accomplished by means of a tandem mechanical seal, the upper seals shall be either a tungsten carbide seal or a tool steel on carbon seal. The lower seal shall be either a tungsten carbide or a silicon carbide on tungsten carbide or silicon carbide Seal. Seals shall run in an oil reservoir.

3. Seal Gland - The bearing cover shall be machined to accept the seal cup to assure positive alignment of the seal faces.

4. Motor

a. The motor shall be submersible, induction shell type design, air filled, watertight chamber, and be in accordance with the latest NEMA standards. It shall have the following characteristics:

1.	Type:	Enclosed Submersible and Explosion Proof
2.	Switches:	Bimetallic

3. Number of Phases: Three

4. Cycles: 60 Hz

5. Voltage: 480 Volt

6. Insulation: Type F with Class B rise

b. Each motor shall have a sufficient horse power rating to operate the pump at any point on the pump's head capacity curve without overloading the nameplate horsepower rating of the motor regardless of service factor. The motor shall have a service factor of 1.15. The service factor is reserved for variations in voltage and frequency.

c. The motor shall be designed for continuous duty and be capable of sustaining 15 evenly spaced starts per hour.

d. Each phase of the motor shall contain a bimetallic temperature monitor in the upper portion of the stator windings. Monitors shall be connected in series. Temperature setting shall be 140° C ± 5° C. Monitors to automatically reset when stator temperature returns to normal.

e. Provide either electrical float in motor chamber or electrical probe in seal oil chamber for detecting the presence of water. A solid state device in the control panel shall send a low voltage, low amperage signal to probe. The presence of water in the motor chamber or oil chamber shall send a signal to the telemetry system.

5. Bearings - Pump shaft shall rotate on two (2) permanently lubricated bearings. The upper bearing shall be a single row ball bearing and the lower bearing a two row angular contact ball bearing.

6. Wear ring - shall be installed to provide efficient sealing between the volute and the impeller. The wear ring shall consist of a stationary ring which is to be drive fitted to the volute inlet.

7. Self Cleaning Front Plate - In lieu of a wear ring, a self cleaning front plate (wear plate) may be used. If so, it shall be ASTM A48, Class 40 ductile iron, adjustable with wave shaped inlet and outward spiraling V-shaped groove facing the impeller.

c. Accessories:

1. Rail Mounting System

a. Rail mounted system shall be type 316 stainless steel. The connecting hardware and anchor bolts shall be type 316 stainless

steel. System shall be designed for removing pumps without entering wet well.

b. Guide rails and bracket sizes shall be in accordance with the manufacturers recommendations.

c. Support and installation shall be in accordance with manufactures guidelines and recommendations.

d. The discharge connection elbow and piping shall be permanently installed in the wet well.

2. Lifting Chain

a. A lifting chain shall be provided to raise and lower the pump. The chain shall be type 316 stainless steel. The chain shall have sufficient strength to support the pump, break the seal between the pump and the discharge piping, and support any fluid which may remain in the pump as it is being lifted.

3. Manufacturers: See APPROVED MATERIALS LIST.

442.02 WET WELL

1. Layout

a. The wet well shall consist of one (1) chamber. Exceptions to this rule shall be at the discretion of the City.

b. If more than one chamber is allowed, they shall be configured in a manner such that detention times are minimized. Also, fillets shall be provided in all the chambers in order to reduce deposition of solids.

c. There shall be a manhole installed on the interceptor sewer immediately upstream of the wet well. Said manhole shall be ten to fifteen (10-15) foot clear distance from the wet well. This manhole shall be used for emergency bypass pumping.

d. There shall be an emergency bypass line installed next to the wet well.

1. The bypass line shall be constructed of coated DIP. The line shall be sized to carry the design flow if it is pumped continuously by a single emergency pump.

2. The bypass line shall terminate in a valve box.

3. The bypass line shall have a flanged end capped with a blind flange.

2. Materials - Concrete

a. The wet well shall be constructed of either cast-in-place or precast concrete. The concrete shall meet the following requirements regardless of whether the concrete is cast-in-place or precast.

1. f'c = 4000 psi @ 28 days

2. slump = 3" ± 1"

3. entrained air = 6% ± 1%

4. cement: Type VA

5. maximum water to cement ratio = 0.45

6. reinforcement: ASTM A615, Grade 60

7. calcium chloride is not allowed as an admixture

8. fly ash is not allowed as an admixture

9. calcareous aggregate shall be used

b. Interior Coating System

1. The interior of the wet well shall be coated with one of the following products.

a. See APPROVED MATERIALS LIST.

2. Epoxy and bituminous systems are not allowed.

c. Exterior Coating - The exterior should be coated using approved waterproofing material.

3. Appurtenances

a. Wall penetrations

1. Wall penetrations in the wet well shall be accomplished by coring the concrete or by the use of temporary block-outs during the casting process.

2. All pipe sections which are to pass through the wall penetrations shall be DIP.

3. The gap between the DIP passing through the penetration and the concrete shall be sealed with two (2) Segmental Sealing units with type 316 stainless steel hardware. Cover the Sealing units with non-shrink grout. Grout shall be installed such that it is smooth with the face of the wall.

4. There shall be a flexible joint outside the wet well within twelve to eighteen (12-18) inches of the exterior face of the wall.

b. Hatches

1. There shall be one (1) hatch per chamber in the top slab to allow for pump removal and personnel access. Additional hatches may be allowed at the discretion of the City.

2. The hatch shall be lockable and no smaller than the minimum size required by the pump manufacture in order to adequately service and remove the pumps with a minimum clear opening of forty eight (48) inches in any direction.

3. See APPROVED MATERIALS LIST for allowed models.

4. The hatch shall be equipped with a recessed hasp covered by a hinged lid flush with the surface of the hatch.

5. Pipe the frame drain such that it flows into the wet well.

c. There are to be no access steps or ladders permanently installed within the wet well.

d. Discharge piping in the wet well shall be made up of flanged sections. Pipe shall be DIP. DIP pipe shall have an exterior bituminous coating and a double cement mortar lining.

e. Work platforms - None required.

f. All interior electrical systems inside the wet well shall be explosion proof.

g. No air vents are to be installed in the wet well.

h. Lights - None required.

i. A trash rack and/or bar screen are not permitted.

442.03 MOTOR CONTROL CENTER

a. The contractor will provide two (2) inch conduit from control house to wet well for level sensor and high water alarms.

b. The contractor will provide two (2) inch conduit from motor control center in control house to city installed Remote Terminal Unit (RTU) cabinet.

c. The contractor will provide conduit and 120 VAC power to RTU cabinet.

d. The contractor will install HOA switches for each pump on front of Motor starter bucket.

e. The contractor will wire hand contacts and the city will wire to auto contacts.

f. The city will install RTU cabinet, level sensor, float switches, radio antenna and cable.

1. Panel enclosure shall be NEMA 4. Inner door shall be provided. It shall be fabricated from 5052-H32 .080 marine alloy brushed aluminum. It shall be completely removable and held closed by at least two, 1/4 turn fasteners. It shall be capable of being locked shut by either an integral lock or pad lock. Supply the lock and two (2) keys. Locks shall be keyed per City's requirements. Provide heating system which will maintain temperature 2º to 3º F above ambient temperature in order to prevent condensation within the enclosure.

2. Provide fused 120 VAC control power circuit derived from incoming 480 VAC power. Transformer shall be sized to handle all load within the control panel. Provide transformer output with 15 AMP circuit breaker.

3. All labeling both within the enclosure and external shall be laser screened laminated Mylar.

4. Motor and control circuit breakers shall be molded case. Minimum interrupting rating 18,000 AMPs RMS SYM at 480 volts. Acceptable manufacturers are:

   a. See APPROVED MATERIALS LIST.

5. Motor starters shall be full-voltage, non-reversing NEMA HP rated and equipped with a minimum of one n.o. auxiliary contact for customer's use. Acceptable manufacturers are:

   a. See APPROVED MATERIALS LIST.

6. Provide ambient compensated overload relays of the bimetallic type. Overload relays to have electrically isolated n.o./n.c. contact to annunciate motor overload condition.

7. Relays shall be plug-in design with transparent polycarbonate dust cover. All relays to have 3PDT contacts and molded nylon coil rated for continuous duty. Coil voltage to be 24 VAC or 120 VAC. Relay contacts shall be rated for 10 amps at 300 VAC.

8. Provide phase monitor relay to monitor loss of phase, phase reversal and under voltage. Unit shall stop pump motors after detection of fault. Unit shall automatically reset after fault is cleared.

9. Provide a running time meter for each pump. Non-resettable, reading in hours and tenths up to 99999.9

10. Provide a lightning arrestor/surge capacitor at the panel service entrance. Solid state type. Capable of clamping in 5 nanoseconds and absorb 25KA peak surge current. Life expectancy of 10,000 occurrences at 200 amps.

11. Provide a duplex GFCI convenience receptacle on a dedicated 20 AMP 120 VAC branch circuit within the panel.

12. The panel manufacturer shall be U/L certified as a U/L 508 manufacturing facility and certified to install a serialized label for quality control and insurance liability considerations. Panel shall meet the following standards as a minimum:

    a. Institute of Electrical & Electronic Engineers

    b. National Electric Code

    c. National Electrical Manufacturers Association

    d. American National Standards Institute

    e. Underwriters Laboratories 508

13. In the event that a motor over-temperature switch is activated, the pump shall shut down until the switch is automatically reset.

442.04 GENERATOR/VALVE VAULT BUILDING

The emergency generator and valve vault shall be housed in a single building. The building shall be designed by an Architect licensed in the state of Colorado. The design of the building will be one such that it will blend into its surroundings. During the design process, the Architect shall provide a rendering of the proposed building to the City for review. The City reserves the right to reject or request modifications to any architectural design. The building shall be submitted to all of the City's applicable planning review processes. The architecture of the building shall blend with adjacent buildings.

1. Layout

    a. The building shall be sized to provide sufficient room for the emergency generator, control panels, jib crane, sink, water heater, unit heater, and valve vault.

    b. Minimum clearances shall be provided around the following equipment (clearances may overlap):

1.	Emergency generator:	4' (2' is allowed along intake side of generator)
2.	Control panels and electric equipment:	per code
3.	Between generator and valve vault:	6'
4.	Width of main entry way:	6'
5.	Between piping and wall and/or stairs:	3'
6.	Between face of flange and face of wall:	18"

c. Pitch of roof shall be 4:12 minimum and 8:12 maximum, unless otherwise approved by City.

d. Install gutters and downspouts in order to control drainage coming off of roof.

2. Materials

a. Acceptable interior finish - concrete masonry units

b. Acceptable exterior finishes - Facade

1. Fluted or split face block

2. Brick

c. Trim

1. Aluminum

2. Masonry

3. Painted Plastic

d. Roof

1. Asphalt shingles

2. Concrete tiles

3. Clay tiles

4. Composite shingles

5. Or other material as approved by the City.

e. Gutters and downspouts

1. Aluminum

2. Painted plastic

f. Lights - Provide photocell switch with lights on the exterior of the building in order to illuminate the entranceway.

3. Appurtenances

a. Plumbing

1. The building shall be supplied with potable water.

2. All applicable IPC requirements are to be followed.

3. Provide a stainless steel utility sink with hot and cold water taps. The drain from the sink shall be plumed to drain into the wet well. Provide a p-trap on the sink drain line. Provide a rubber stopper for the sink drain.

4. Provide a hose bib, 50' hose, and hose rack inside the building.

5. Provide backflow preventers and meters on all service lines to building.

6. Provide a single toilet water closet.

b. Vents

1. Provide motor controlled intake and exhaust louver vents in the walls of the building as required in order to meet all applicable code imposed air exchange requirements and in order to provide necessary air flow to and from the emergency generator.

2. The louvers shall automatically open when the emergency generator starts.

c. Doors

1. Provide a set of metal double doors.

2. Each door shall be 3'-0" wide by 6'-8" tall or wide enough to get generator in and out.

3. Provide thief proof hinges

4. Doors shall contain dead bolt passage set. Locks shall be keyed per City's requirements.

5. Provide a bumper and hook for each door to secure door in open position.

d. Lighting

1. Provide adequate overhead lighting to illuminate the entire building, including corners and the recessed valve vault.

2. The light switch(s) for the overhead lighting shall be located next to the double doors.

3. The lighting panel shall be 120 volt, 3 phase.

e. Electrical Outlets

1. Provide a duplex GFCI outlet on each interior wall of the building.

f. Jib Crane

1. Install a jib crane in the building in a location which does not interfere with the operation of any of the equipment in the building, however still allowing the jib crane to reach any portion of the piping in the valve vault and any portion of the emergency generator.

2. Jib crane shall have a minimum capacity of 1000 pounds when fully extended.

3. Jib crane shall have sufficient capacity and length of chain to pick a 1000 pound object off the floor of the valve vault.

4. Manufacturer – See APPROVED MATERIALS LIST.

g. Water Heater

1. Install a five (5) gallon, natural gas or electric water heater in the building.

2. Vent the water heater per code requirements.

h. Unit Heater

1. Install a natural gas unit heater in the building.

2. The unit heater shall be sized such that it can warm the entire interior of the building to 80° F during the winter months. The unit heater shall be controlled by a thermostat.

442.05 VALVE VAULT

1. Material - The valve vault shall be constructed of either cast-in-place or precast concrete. The concrete shall meet the following requirements regardless of whether the concrete is cast-in-place or precast.

a. f'c = 4000 psi @ 28 days

b. slump = 3" ± 1"

c. entrained air = 6% ± 1%

d. cement: Type IIA

e. maximum water to cement ratio = 0.45

f. reinforcement: ASTM A615, Grade 60

g. calcium chloride is not allowed as an admixture

h. fly ash is not allowed

2. Exterior Coating System - The exterior of the valve vault shall be coated with a coal tar damp-proofing agent. Damp-proof agent shall be applied in one coat and be 14 mils minimum dry film thickness.

    a. Manufacturers

        1. See APPROVED MATERIALS LIST.

3. Layout

    a. The valve vault shall be housed inside a single building with the emergency generator.

    b. The valve vault shall be made up of a below grade, open basement. The basement shall be designed to support construction loads caused by backfilling operations and the loads produced by vehicles driving around the basement after construction is completed.

    c. Access to the valve vault shall be accomplished by a stairway.

        1. Stairs shall be either concrete, aluminum, or stainless steel.

        2. Maximum rise of stairs shall be seven (7) inches.

        3. Minimum run of stairs shall be eleven (11) inches.

        4. Minimum width of stairs shall be forty eight (48) inches.

        5. Provide a handrail along stairs.

        6. Provide a 4’-0” x 4’-0” minimum landing (clear area) at the bottom of the stairs.

    d. General - Provide a removable, aluminum handrail around the perimeter of the valve vault.

        1. Conform to applicable AA & UBC standards.

        2. Protect aluminum in contact with other metals, grout, and concrete by a heavy brush coat of alkali-resistant bituminous coating, or a nonporous tape or gasket. Coating is not required for aluminum in contact with stainless steel bolts. Apply bituminous coating at 15-mil minimum dry-film thickness.

        3. Bituminous coating shall be one of the following:

            a. See APPROVED MATERIALS LIST.

        4. After installation and cleaning, protect aluminum with a clear methacrylate lacquer coating.

e. Rails and Posts.

1. Conform to ASTM B221.

2. 1-1/2 inch nominal diameter (1.9 inch o.d.), Schedule 40, aluminum Alloy 6063-T6 with clear anodized finish AA-M32C22A41 (exterior use).

3. Cope intersections of rails and posts, weld joints, and grind smooth to a pleasing appearance, taking care not to excessively remove weld material.

4. Butt-weld end-to-end joints, or use welding connectors.

5. Provide linear expansion joints a maximum of 40'-0" on center.

6. Space posts at a maximum of 5'-0" on center.

7. Firmly attach each rail to adjacent walls.

f. Fittings and Accessories - Fasteners and anchors of stainless steel and of type as required by substrate.

g. Toeboard (Kick Plate).

1. Extruded, beveled aluminum 4 inch height, aluminum Alloy 6063-T6, with splice plates and corner connectors or equal. (See APPROVED MATERIALS LIST)

2. Furnish required stainless steel clamps and fasteners for complete installation.

3. Install toeboards (kick plates) and anchor to each post with clamps and bolts. Allow 1/4 inch space between bottom of toeboard and top of floor surface.

h. Mechanical handrail system using stainless steel set screws (See Approved Materials List) may be used in lieu of an all welded handrail system.

i. Provide a floor drain in valve vault.

1. Pipe the drain line into the wet well.

2. Provide a p-trap and ball-float check valve at floor drain. (See APPROVED MATERIALS LIST)

4. Appurtenances

a. Piping shall be flanged ductile iron and shall be double cement mortar lined.

1. Exterior coating shall be alkyd enamel, gloss.

a. Alkyd Enamel, Gloss System; F.S. TT-E-489, Cl. A. Surface Prep: SSPC-SP6, Commercial Blast.

b. Use a primer and/or tie-coat as recommend by coating manufacturer.

c. There shall be a minimum of at least three coats of paint including primer at the conclusion of field painting. At least two of the coats must be field applied.

d. Dry film thickness shall be 5 to 7 mils.

2. Install piping a minimum of 2'-0" above finished floor elevation.

b. Swing Check Valves

1. Install a swing check valve on each line from the wet well and on the emergency bypass line.

2. Swing check valves must comply with the requirements of AWWA C508.

3. Construction

a. Single disk, horizontal swing type valves, quick closing with unobstructed waterway.

b. Tight closing with external spring and lever.

c. Body: Cast iron (semi-steel), ASTM A126, Grade B; or cast steel, ASTM A216.

d. Shaft: Stainless steel with bronze bushed bearings and outside stuffing boxes.

e. Valve Ends: Flanged.

f. Seats, seat rings, pins, and bushings: Bronze.

g. Disc: Cast iron (semi-steel), ASTM A126; cast steel, ASTM A216; or type 304 stainless steel.

h. Disc Facing: Bronze.

4. Manufactures

a. See APPROVED MATERIALS LIST.

c. Eccentric Plug Valves - Install an eccentric plug valve on each line from the wet well, the end of the discharge manifold, and the emergency bypass line.

1. Manufacturer – See APPROVED MATERIALS LIST..

d. Flow Meter - to be supplied by the City

1. Install a magnetic flow meter on the discharge manifold.

2. Meter is to be placed such that all flow entering the force main will be measured whether the flow is originating from the pumps in the wet well or if the flow is originating from the emergency bypass line.

3. Installation of the meter shall meet all of the meter manufacturer's requirements for minimum length of upstream and downstream straight pipe around the meter, in order to isolate the meter from turbulence. At a minimum, the meter shall be installed with 5 diameter lengths of pipe upstream and 2 diameter lengths of pipe downstream.

e. Wall penetrations

1. Wall penetrations in the valve vault shall be accomplished by coring the concrete or by the use of temporary block-outs during the casting process.

2. All pipe sections which are to pass through the wall penetrations shall be DIP.

3. The gap between the DIP passing through the penetration and the concrete shall be sealed with two (2) Segmental Sealing units with type 316 stainless steel hardware. Cover the Sealing units with non-shrink grout. Grout shall be installed such that it is smooth with the face of the wall.

4. There shall be a flexible joint outside the valve vault within 12" to 18" of the exterior face of the wall.

5. All pipe passing through wall penetrations shall be restrained by means of stainless steel restraining rods and hardware.

f. Blower

1. Install a blower (discharge fan) in the valve vault.

2. The on/off switch for the blower shall be located next to the on/off switch for the overhead lights.

3. The intake for the blower shall be twelve inches above the floor of the valve vault to assure removal of any gases which are heavier than oxygen.

4. Size the blower such that it will be able to provide the recommended number of air changes for the valve vault as called out in "Design Criteria Considered in the Review of Wastewater Treatment Facilities" as published by the Colorado Department of Public Health and Environment.

5. The blower shall discharge through the wall of the valve vault.

g. Install a GFCI protected electric outlet in the valve vault.

442.06 GENERATOR

Generator shall be powered by means of natural gas or diesel unless otherwise approved. Generator controls are to be per manufacturer's requirements and recommendations. Provide a cooling system for the generator. The cooling system shall be designed to prevent the generator from raising the ambient air temperature inside the building above 105° F. Generator shall be capable of delivering 125% the amount of power required to operate all electrical equipment and outlets in both the generator/valve vault building and the wet well. The equipment to be powered shall include, but is not limited to the pumps, telemetry and control systems, lights, louvers, air vent, electric outlets, and jib crane. Generator shall startup after a power loss lasting a specified period of time. The time delay before generator startup shall be controlled by equipment supplied by the generator manufacturer. Equipment shall be capable of a time delay of 0 seconds to 15 minutes. Said equipment shall be capable of being reset and shall be field adjustable. Generator shall shutdown after the power has returned for a specified period of time. The time delay before the generator shuts down shall be controlled by equipment supplied by the generator manufacturer. Equipment shall be capable of a time delay of 0 seconds to 15 minutes. Said equipment shall be capable of being reset and shall be field adjustable. Contractor shall provide a minimum one day fuel reserve tank.

1. Manufacturers

a. See APPROVED MATERIALS LIST.

442.07 SITE SECURITY

The site shall have a security system which will monitor unauthorized access to the generator/valve vault building and to the wet well. The security system shall consist of a limit switch on the access hatch(s) to the wet well and a limit switch on the doors to the building. When a door or hatch is opened, an alarm signal shall be sent to the telemetry system. The security system shall include a lock and key operated, manual override system. The manual override lock shall be mounted inside the building on the wall next to the control panel. Locks for the manual override shall be keyed per City's requirements. The security system shall include a time delay to allow maintenance personnel time to operate the manual override before an alarm signal is sent to the telemetry system. The delay shall be field adjustable with a minimum time range of 0 seconds to 5 minutes.

442.08 SITE

Landscaping shall meet current City Standards and Specifications. All facilities (i.e., the valve vault building, wet well, and first upstream manhole) shall be located on one lot. The lot shall be of sufficient size to accommodate all facilities and minimum required clearances around facilities. The lot shall be deeded over to the City after all construction has been completed and approved by the City. There shall be a minimum of 20'-0" clear between all facilities or equipment and the nearest lot line.

a. Concrete Drive - The drive to the valve vault building shall be constructed of polypropylene fiber reinforced concrete. Drive shall be a minimum of 6" thick.

Expansion and contraction joints shall be provided as needed. Drive shall be design to support AASHTO HS-20 loads. If required, proved welded wire fabric in drive to provide required strength. Drive shall be a minimum of 20'-0" wide.

b. Grass-Crete - In order to provide a stable driving surface around the site, the site shall be landscaped with grass-crete (grass grown in a masonry unit base). The grass-crete shall be in all locations not otherwise occupied by structures or the access drive. The type of grass to be used in the grass-crete shall be per the City's requirements.

442.09 INTERCEPTOR

1. The interceptor consists of the section of pipe entering the manhole immediately upstream of the wet well and section of pipe from said manhole to the wet well.

2. The interceptor shall be C900 PVC in locations where trench conditions can be maintained. Trench conditions will not be considered maintained if there is more than 6" of excavation beneath the interceptor. The City reserves the right to stipulate the use DIP at any location along the interceptor.

   a. Provide appropriate coupling when switching from C900 PVC to DIP. Match inverts to maximum extent possible when switching between the two pipe materials.

3. The section of the interceptor from the manhole immediately upstream of the wet well to the wet well shall be a plane end by flanged end section. The flanged end of the pipe shall be installed in the wet well. The flange shall be a minimum of six (6) inches clear from the wet well wall. Restrain the flanged end of the pipe by means of stainless steel restraining rods and hardware.

442.10 FORCE MAIN

The force main begins at the flexible joint leaving the valve vault. At the City's discretion, more than one force main may be required at any lift station. The flow velocity of the sewage in the force main shall meet the following criteria, unless approved otherwise by the City:

a. Minimum Velocity: 3.5 feet per second.

b. Maximum Velocity: 5 feet per second.

1. Pipe Materials

   a. C900 PVC unless otherwise approved.

2. Termination of force main

   a. The force main is to continue until it discharges into a gravity sewer.

   b. The force main connection to the gravity sewer manhole is to be per City Standards and Specifications.

c. Termination manhole is to be a standard precast manhole, if it does not already exist.

d. The force main is to connect into the manhole at the same elevation as the gravity sewer and along an alignment which will minimize the turbulence created in the sewage as it discharges from the force main.

e. The force main is to enter the manhole at a positive grade in order to avoid creating a siphon in the line.

3. High points are to be avoided in the force main. However, if they cannot be avoided, sewage air release valves with ball valves are to be installed at all high points.

4. Testing - Force main shall be pressure tested in accordance with section 529.00 of these Standards and Specifications.

5. Tracing Wire

a. The force main shall be installed with tracing wire taped securely to the top of the pipe and shall extend along the entire length of the pipe installed. The tracing wire shall be a minimum 14 AWG direct bury solid copper wire. See Trench Detail 100-01. The tracing wire shall be tested prior to and as a condition of construction acceptance.

b. Tracing wire shall be brought to grade at all eccentric plug valves or at test stations as shown on the approved plans. The tracing wire shall be securely affixed to the body of the valves and coiled around the body with an excess length of approximately 16" (sixteen inches).

c. For pipe located outside a roadway, the same as above shall be done and there shall also be a warning tape installed 18" (eighteen inches) directly above the pipe.

6. Eccentric plug valves shall be placed in force main with maximum spacing of 1000 feet.

a. Valves are to be specifically designed to be used on a wastewater pipeline.

b. Ball valve is be installed between the force main and the air relief valve.

c. Ball valve is be rigidly attached to the force main to allow the removal of the air relief valve.

d. Air Relief Valve Manufacturer – See APPROVED MATERIALS LIST.

e. Valves are to be placed in City standard manholes or valve boxes.

443.00 LIFT STATIONS - EXECUTION

443.01 INSTALLATION

1. Mount each pump and drive assembly on a single heavy baseplate.

2. Level, plumb, align and wedge each pumping unit into position to fit the connecting piping.

3. Install as recommended by pump manufacturer, Hydraulic Institute Standards, and as required in this document.

4. Grout each pump base after initial fitting alignment but before final bolting of connecting piping.

5. Take special care to maintain alignment of pumping unit components.

6. Transmit no stress to pump flanges.

7. Test pump connections for applied piping stresses, after final alignment and bolting, by loosening flange bolts.

8. Adjust piping to proper fit if movement or opening of joints is observed.

9. Realign couplings between motors and pumping units after grouting.

10. Shimming between machined surfaces will not be permitted.

11. All equipment shall be furnished by a single supplier who shall be responsible for equipment compatibility.

443.02 MANUFACTURER'S FIELD SERVICES

Pumps:

1. Manufacturer's field representatives shall visit the site during construction at appropriate times to assist contractor in installing and operating the equipment. The manufacturer’s services shall include, but not be limited to, the following:

    a. Perform a check of the completed installation; supervise initial startup, adjustments, and testing.

    b. Instruct City's personnel in proper operation and maintenance.

        1. After equipment is operating satisfactorily.

        2. Schedule instruction period independently of other field services.

    c. Measure three-phase line currents and phase voltages to demonstrate balanced electrical operating conditions.

        1. Motor readings shall be taken at the motor.

Contractor shall furnish skilled workmen and attendants as required to complete activities that must be performed. Manufacturer's field representatives shall furnish to City, with copies to contractor, a written Equipment Checkout Report.

a. Certify that the equipment:

1. Has been properly installed and lubricated.

2. Is in accurate alignment.

3. Is free from any undue stress imposed by connecting piping or anchor bolts.

4. Has been operated satisfactorily under full load conditions.

b. Include table of measured line currents and corresponding phase-to-phase voltages.

1. State motor nameplate amps

c. If requested, furnish VHS format instructional video tape.

Emergency Generator

1. Manufacturer's field representatives shall visit the site during construction at appropriate times to assist contractor in installing and operating the equipment. The manufacturer's services shall include, but not be limited to, the following:

a. Perform a check of the completed installation; supervise initial startup, adjustments, and testing.

b. Instruct City's personnel in proper operation and maintenance.

1. After equipment is operating satisfactorily.

2. Schedule instruction period independently of other field services.

2. Contractor shall furnish skilled workmen and attendants as required to complete activities that must be performed.

3. Manufacturer's field representatives shall furnish to City, with copies to Contractor, a written Equipment Checkout Report.

a. Certify that the equipment:

1. Has been properly installed.

2. Has been operated satisfactorily.

443.03 SPARE PARTS

Provide one complete set of spare parts as recommended by the manufacturers of the pumps, control and telemetry system, generator, and jib crane. The spare parts shall include, but not necessarily be limited to, the following:

a. One mechanical seal per pump.

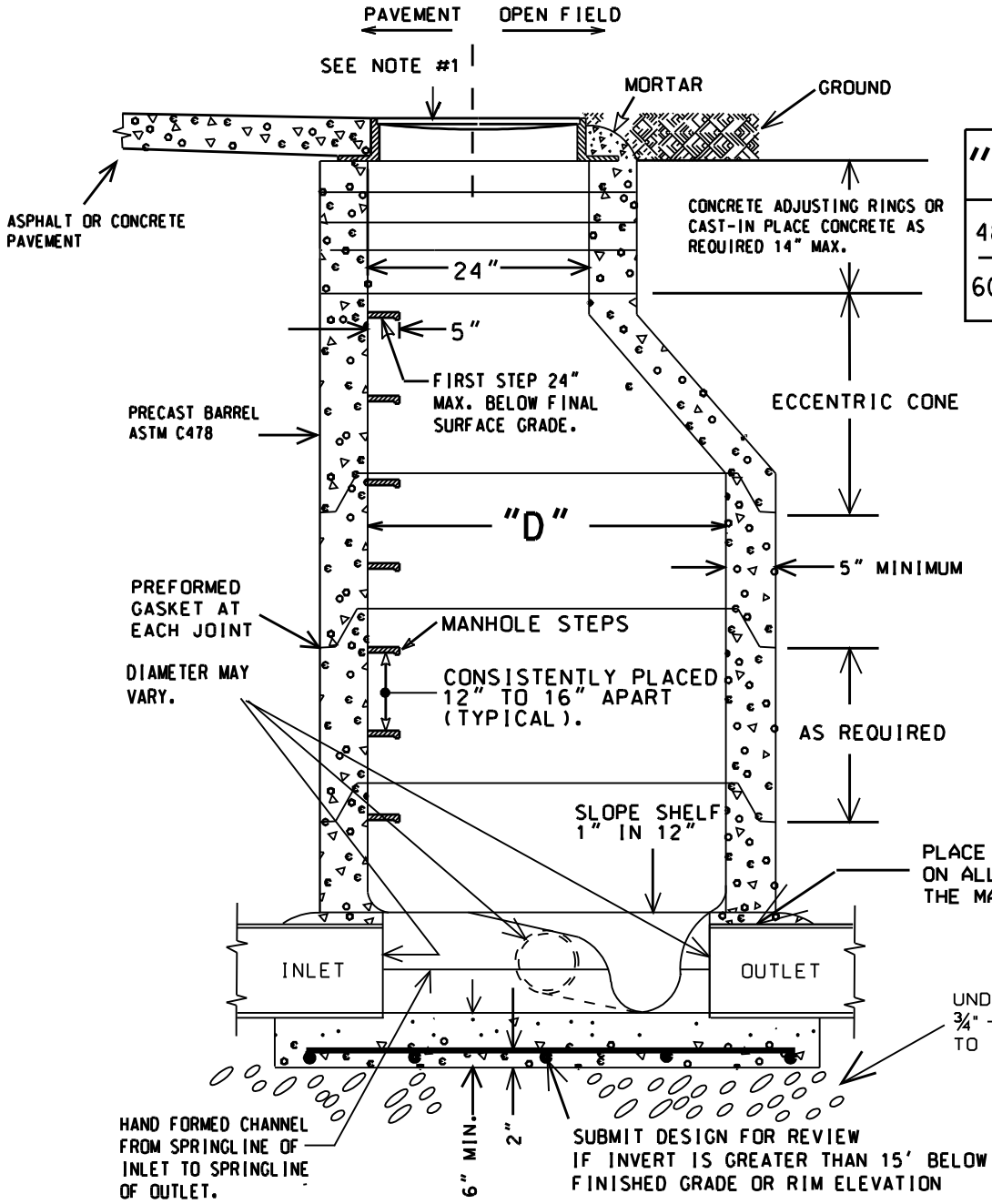
b. One wear ring or wear plate per pump.

c. One complete set of gaskets and O rings per pump.

d. One compete set of fuses.

e. Motor

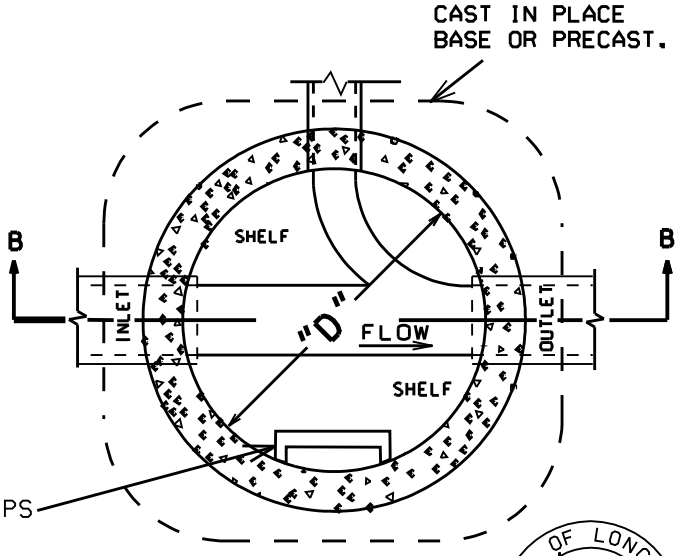
400-01



"D" (DIMENSION)	LARGEST PIPE
48"	8" - 15"
60" or >	18" or >

BACKFILL TO BE HAND PLACED AND COMPACTED WITHIN FOUR FEET OF THE MANHOLE.

SECTION B-B



NOTES:

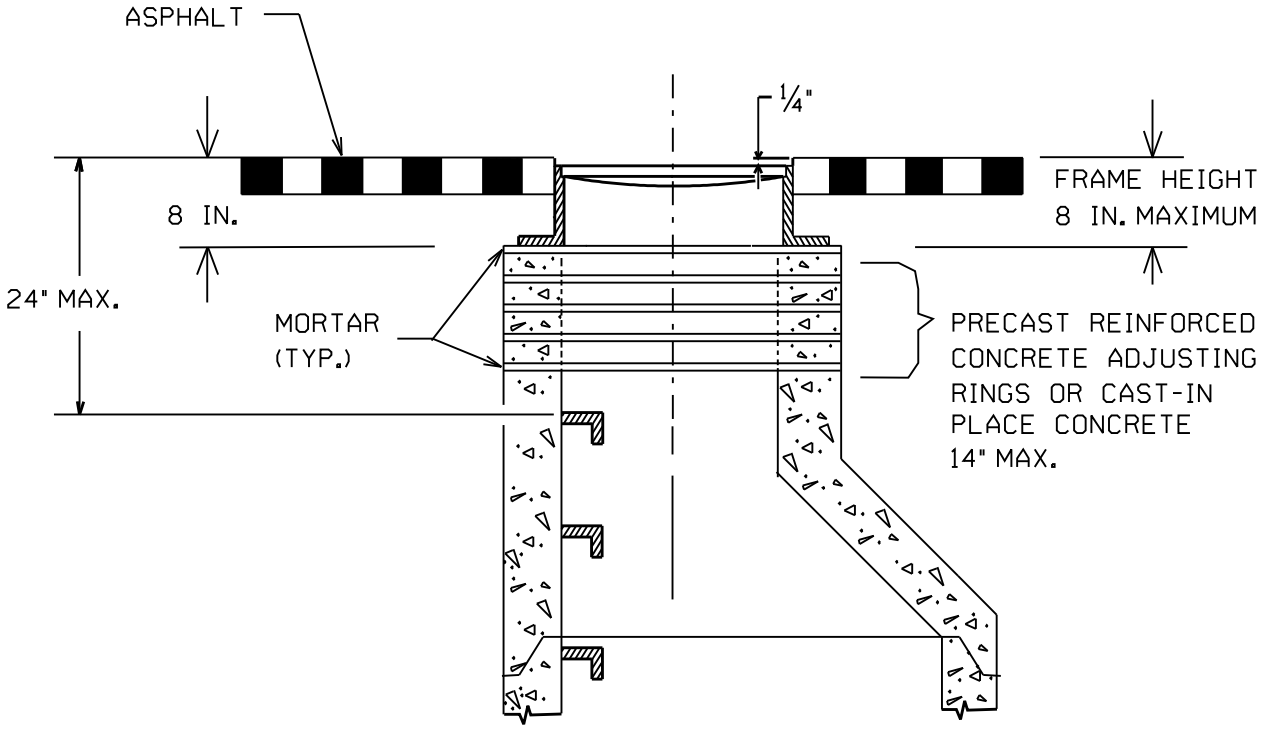
1. FINAL GRADE OF MANHOLE COVERS SHALL BE FLUSH TO ¼" BELOW FINAL STREET GRADE.
2. ALL CHANNELS FLOWING INTO THE MAIN STREAM OF THE SEWER SHALL BE HAND FORMED INTO THE FLOW.
3. STEPS SHOULD BE PLACED OVER THE SHELF NOT OVER THE FLOW. NO STEPS ALLOWED IN THE ADJUSTING RING AREA.
4. MH COVER & FRAME SHALL BE DEETER #1258 OR APPROVED EQUAL, WITH LETTERING DEPICTING "WATER", "SANITARY" OR "STORM".
5. NO 4" SERVICE LINES MAY ENTER MANHOLE.
6. THE PHYSICAL CONNECTION TO THE EXISTING SANITARY SEWER SYSTEM SHALL BE PLUGGED UNTIL CONSTRUCTION ACCEPTANCE HAS BEEN ISSUED FOR THE PROJECT.

STANDARD MANHOLE DETAIL

N.T.S.

REV 4-12-96 JR
REV 1-14-02 JR

CITY OF LONGMONT COLORADO



PROFILE

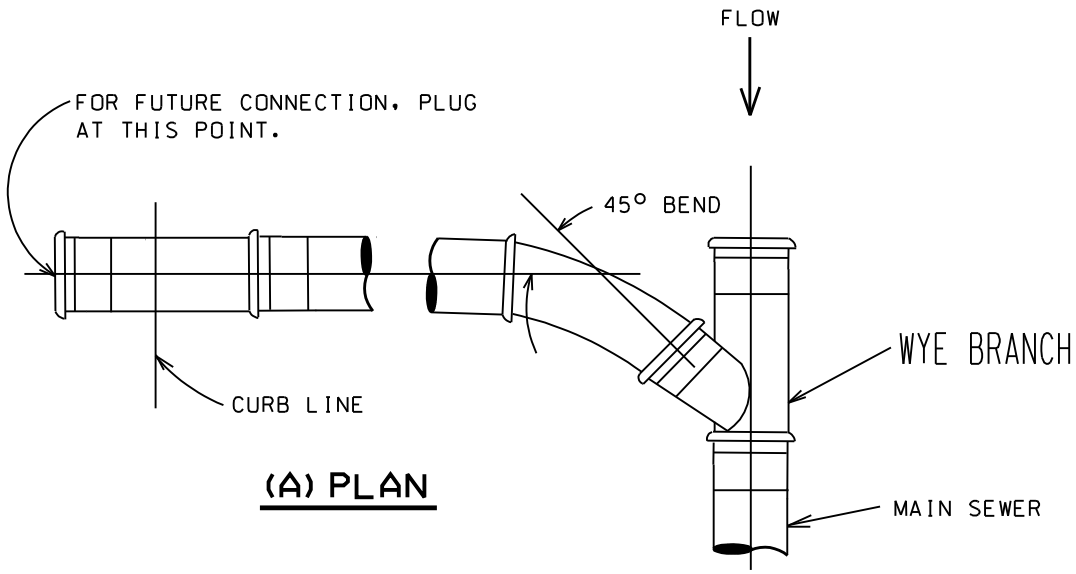
NOTES:

1) FINAL GRADE OF MANHOLE COVERS SHALL BE FLUSH TO 1/4" BELOW FINAL STREET GRADE.
2) ALL ASPHALT IS TO BE CUT IN A NEAT AND VERTICALLY STRAIGHT MANNER.
3) A CONCRETE MORTAR SHALL BE USED BETWEEN ALL ADJUSTING RINGS AS REQUIRED.
4) DROP-IN RISER RINGS NOT ALLOWED ON NEW CONSTRUCTION.
5) DROP-IN RISERS MAY BE USED ON REHABILITATION OR OVERLAY PROJECTS. A MAXIMUM OF ONE RING MAY BE USED NOT EXCEEDING 4 INCHES TOTAL HEIGHT.
6) ANY EXISTING BRICKS OR WOOD USED AS RISERS MUST BE REMOVED AND REPLACED WITH CONCRETE RINGS.

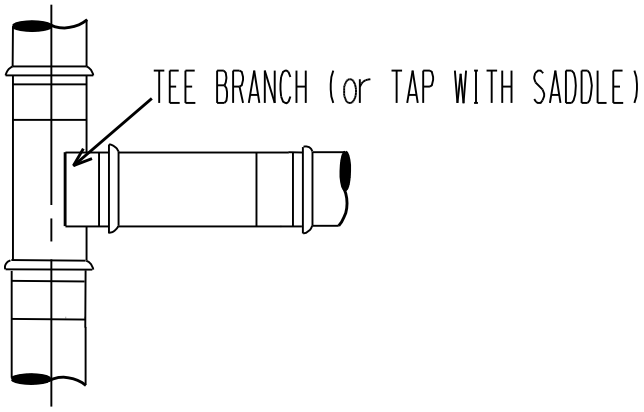
MANHOLE RAISING DETAIL

N.T.S.

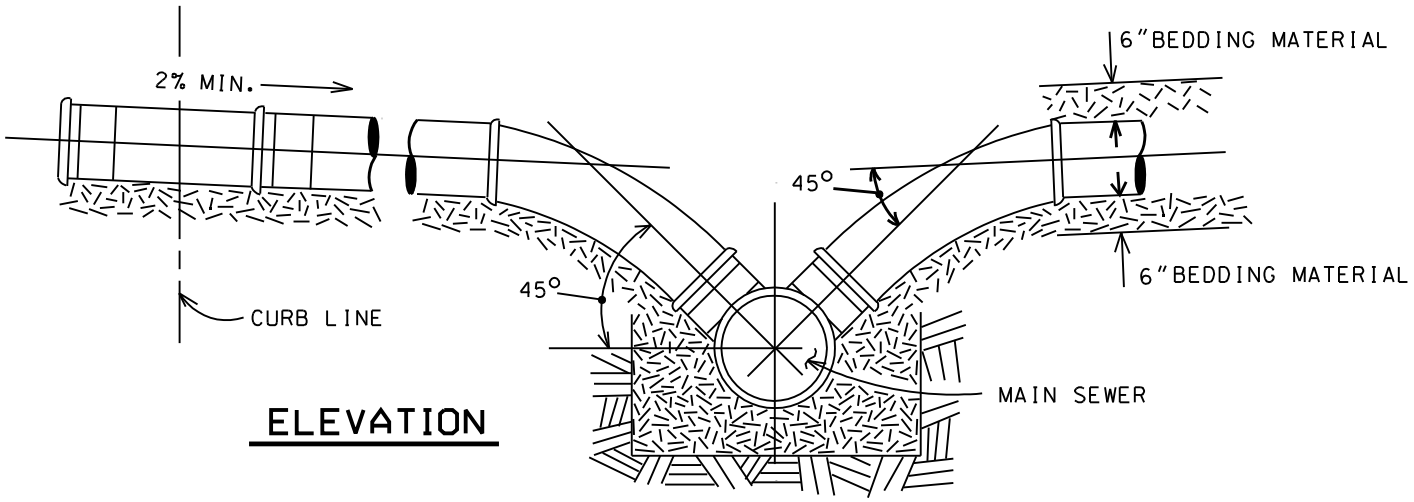
4-23-93 BM
3-12-99 JR



(A) PLAN



(B) PLAN



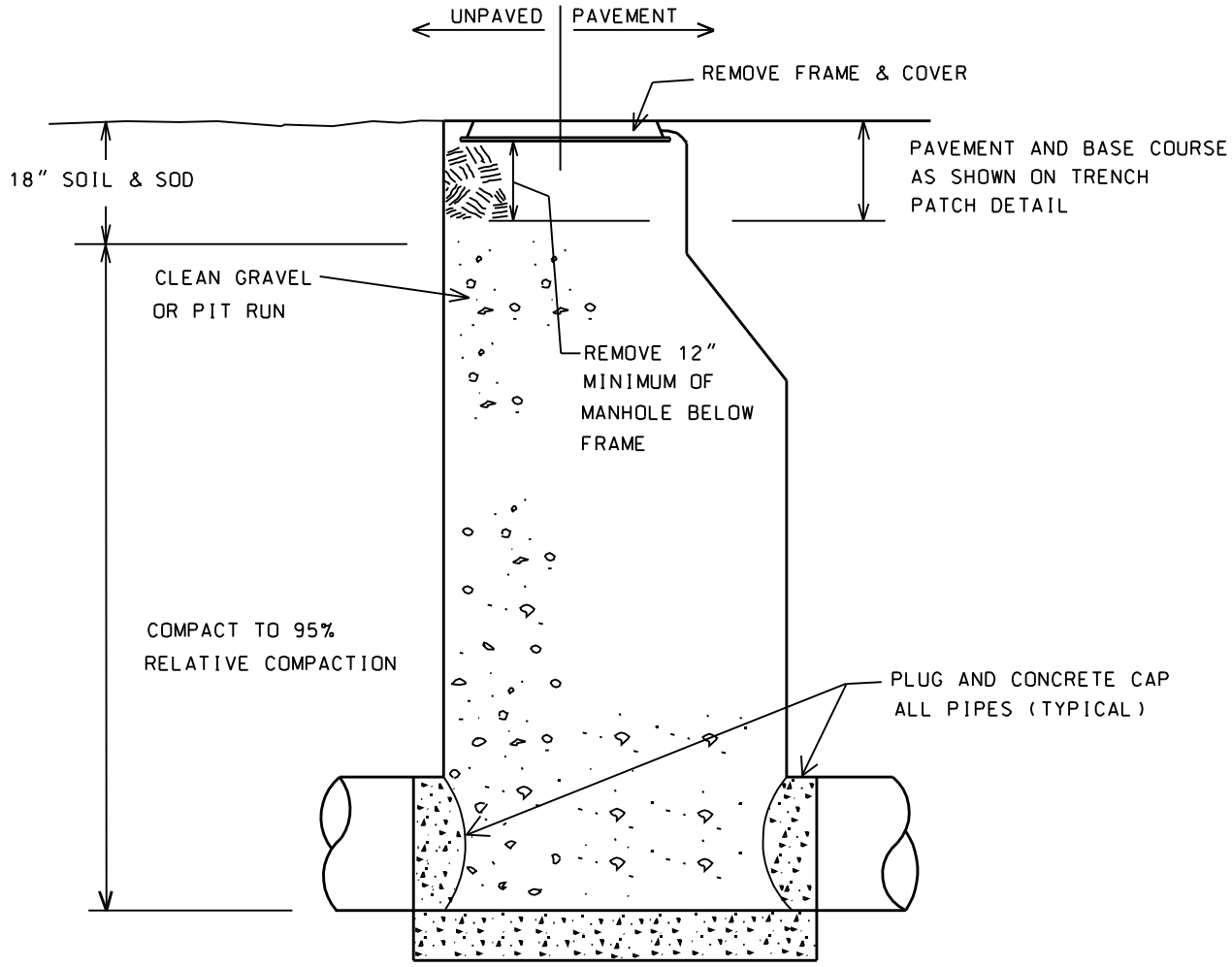
ELEVATION

SEWER SERVICE CONNECTION

N.T.S.

3-19-93 BM
3-12-99 JR

CITY OF LONGMONT COLORADO



NOTES:

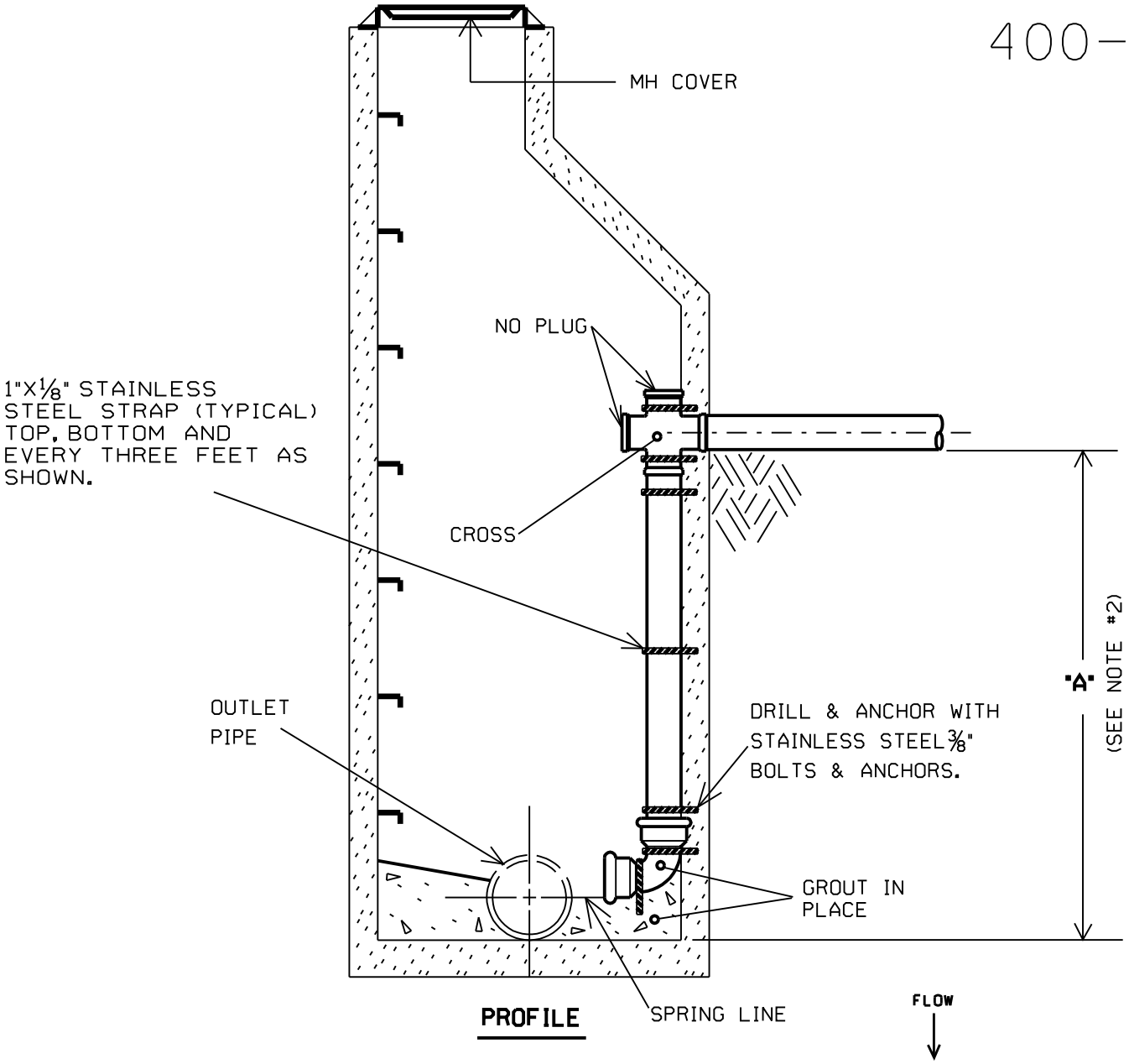
1. FLUSH LINE AND MANHOLE TO REMOVE ANY REMAINING SEWAGE.
2. PLUG ALL MANHOLE OPENINGS WITH CONCRETE OR MORTAR.
3. REMOVE METAL FRAME AND COVER. DELIVER TO THE UTILITY CENTER, 1251 S. BOWEN ST.
4. REMOVE RISERS AND/OR BARREL SECTION TO AT LEAST 12 INCHES BELOW SURROUNDING GROUND/ASPHALT.
5. COMPLETE TO FINISH GRADE AS SHOWN.

MANHOLE ABANDONMENT DETAIL

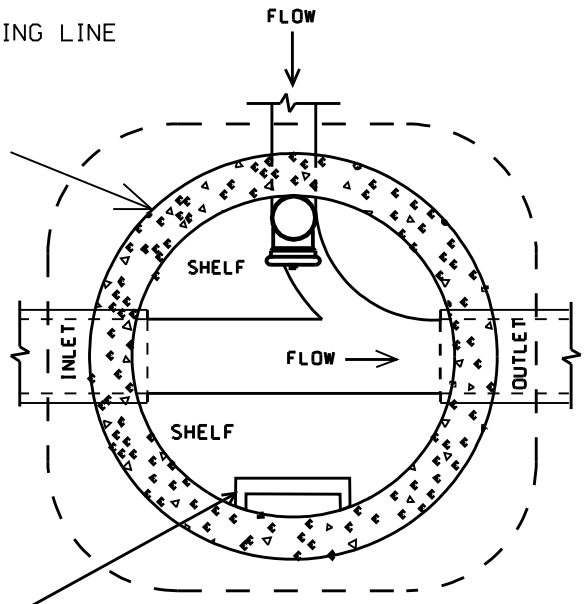
N.T.S.

3-19-93 BM
REV 11-14-96 JR

400-05



PROFILE



TOP

NOTES:

1. SEE STANDARD MANHOLE DETAIL FOR STRUCTURAL. INFORMATION RELATED TO THE MANHOLE, FRAME, AND BASE.

2. A DROP MANHOLE IS REQUIRED WHEN THE "A" DIMENSION SHOWN ABOVE EXCEEDS 18".

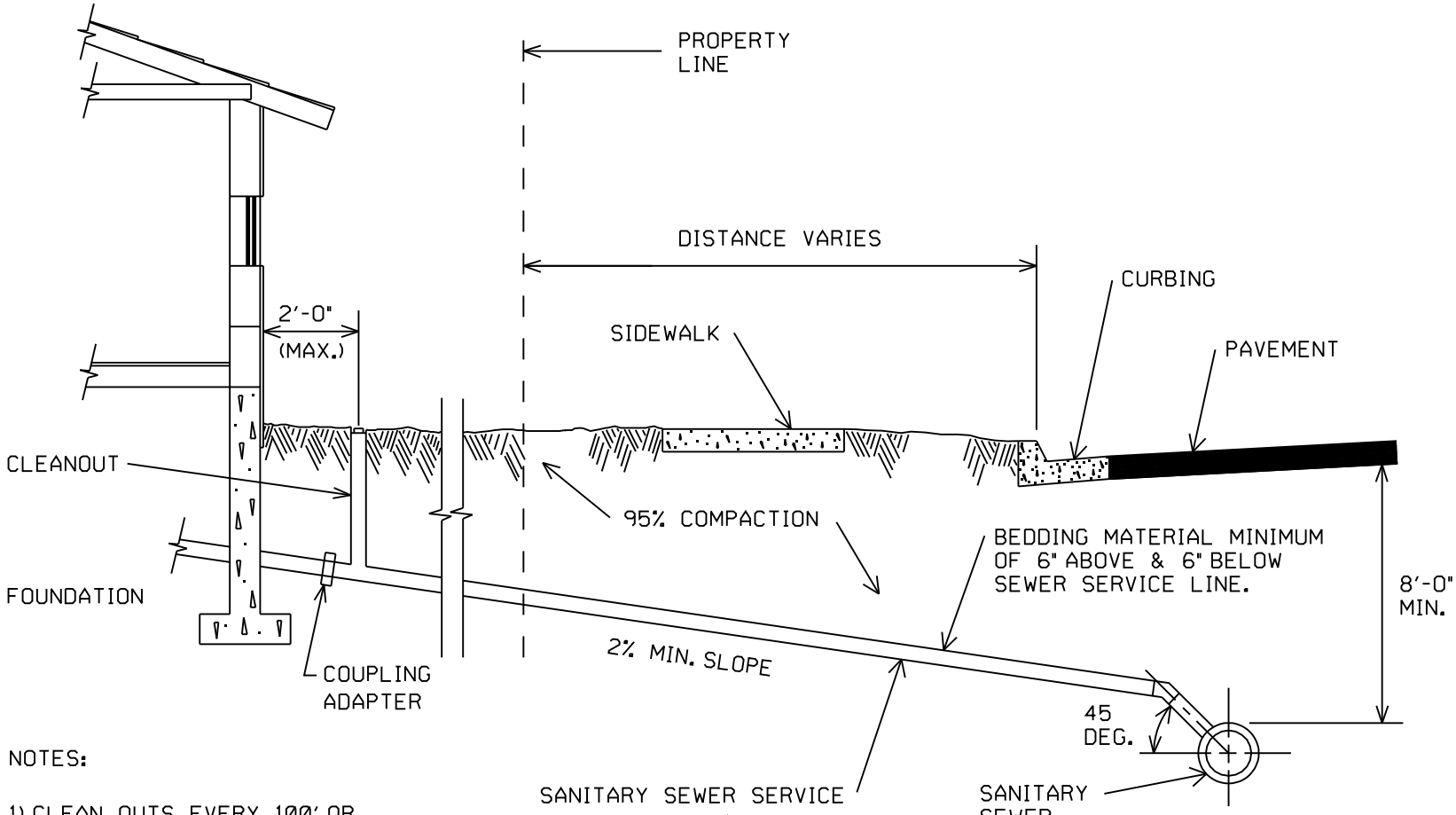
3. A LARGER DIAMETER MANHOLE MAY BE REQUIRED FOR PIPE EXCEEDING 8" IN DIAMETER.

INSIDE DROP MANHOLE DETAIL

N.T.S.

REV 4-10-96 JR
3-19-93 BM

CITY OF LONGMONT COLORADO



NOTES:

1) CLEAN OUTS EVERY 100' OR 135' CHANGE OF DIRECTION.

2) PLACEMENT OF TAP TO BE ABOVE SPRINGLINE OR HIGHER.

3) COUPLING ADAPTER TO BE AT LEAST 6" OUTSIDE OF FOOTING.

SANITARY SEWER SERVICE LINE INSTALLATION

N.T.S.

CITY OF LONGMONT COLORADO

400-06

3-19-93 BM
REV 4-15-96 JR

CITY OF LONGMONT
SECTION 500 - WATER DISTRIBUTION
TABLE OF CONTENTS

500.00 MINIMUM DESIGN CRITERIA 1

500.01 GENERAL 1
500.02 DESIGN GUIDELINES 1
500.03 PIPE SIZES 1
500.04 SERVICE LINES 2
500.05 DEPTH 2
500.06 ALIGNMENT 2
500.07 GRADE 2
500.08 FUTURE CONNECTIONS 2
500.09 VALVE SPACING 3
500.10 FIRE HYDRANT LOCATION 3
500.11 FIRE LINES & FIRE HYDRANT LINES 4

510.00 MATERIALS 4

511.00 DUCTILE IRON PIPE 4

511.01 DESCRIPTION OF PIPE 4
511.02 COATING OF PIPE 5
511.03 CEMENT LINING 5
511.04 TAPPING 5
511.05 CORROSION PROTECTION 5

512.00 POLYVINYL CHLORIDE PIPE 6

512.01 DESCRIPTION OF PIPE 6
512.02 JOINT TYPE 6
512.03 CLASS AND TYPE 6
512.04 TAPPING 6
512.05 TRACING WIRE 7

513.00 ASBESTOS CEMENT PIPE 7

513.01 USE 7
513.02 TAPPING OF EXISTING LINES 7

514.00 CAST AND DUCTILE IRON WATER WORKS FITTINGS 7

515.00 VALVES 8

515.01 GENERAL 8
515.02 GATE VALVES 8
515.03 BUTTERFLY VALVES 8
515.04 TAPPING VALVES 8
515.05 BLOW-OFF VALVE ASSEMBLY 8

516.00 VALVE BOXES 9

517.00 CURB STOP BOXES 9

518.00 FIRE HYDRANTS 9

518.01 APPROVED TYPES 9
518.02 REQUIREMENTS 9

520.00 GENERAL INFORMATION 10

520.01 OPERATION OF VALVES 10
520.02 CONNECTION TO EXISTING SYSTEM 10
520.03 ABANDONMENT OF EXISTING WATER LINES OR "STUBS\ 11

521.00 TAPPING 11

521.01 TAPPING AUTHORIZATION 11

522.00 GENERAL PIPE INSTALLATION 11

522.01 LOWERING OF PIPE AND ACCESSORIES INTO TRENCH 11
522.02 DRAINAGE OF MAINS 12
522.03 LAYING OF PIPE 12
522.04 CUTTING OF PIPE 12
522.05 DISSIMILAR MATERIALS 12
522.06 JOINING OF PIPE 13
522.07 PERMISSIBLE PIPE DEFLECTION 13

523.00 RESTRAINT 13

523.01 THRUST BLOCKS 13
523.02 METAL HARNESS 14
523.03 RESTRAINT FOR HYDRANTS 14

524.00 SERVICE LINES 14

524.01 GENERAL 14
524.02 OWNERSHIP 15

525.00 SETTING OF VALVES AND FITTINGS 15

526.00 SETTING OF VALVE BOXES 16

526.01 VALVE BOXES 16

527.00 SETTING HYDRANTS 16

527.01 LOCATION 16
527.02 POSITION 16
527.03 CONNECTION TO MAIN 16
527.04 HYDRANT DRAINAGE IN PERVIOUS SOIL 16
527.05 HYDRANT DRAINAGE IN IMPERVIOUS SOIL 17
527.06 USAGE AND OPERATION OF HYDRANTS 17
527.07 FILLING THE LINE 17

528.00 DISINFECTION AND FLUSHING 17

529.00 HYDROSTATIC TESTS 18

530.00 WATER METERS 20

530.01 GENERAL 20
530.02 OWNERSHIP 20
530.03 MATERIALS 21

530.04 INSTALLATION 21
530.05 ACCESS - WATER METERS 24

531.00 BACKFLOW CONTROL 24

531.01 GENERAL 24
531.02 BACKFLOW PREVENTION DEVICES REQUIRED 25
531.03 OWNERSHIP 25
531.04 DESIGN REQUIREMENTS 26
531.05 MATERIALS 28
531.06 ACCESS - BACKFLOW PREVENTION 28
531.07 SPACE AND LOCATION REQUIREMENTS 29
531.08 INSTALLATION REQUIREMENTS FOR AIR GAPS 30
531.09 INSTALLATION REQUIREMENTS - REDUCED PRESSURE PRINCIPLE 31
531.10 INSTALLATION REQUIREMENTS FOR DOUBLE CHECK VALVE 32
531.11 INSTALLATION REQUIREMENTS FOR PRESSURE VACUUM BREAKER 33
531.12 INSTALLATION REQUIREMENTS-ATMOSPHERIC VACUUM BREAKER 33
531.13 INSTALLATION REQUIREMENTS FOR IN-LINE DUAL CHECK 34
531.14 BACKFLOW PREVENTION DEVICE SETS 35
531.15 TESTING AND CERTIFICATION OF BACKFLOW CONTROL DEVICES 35
531.16 RECORDS AND REPORTS 36
531.17 CERTIFIED CROSS-CONNECTION CONTROL TECHNICIAN CRITERIA 36
531.18 BACKFLOW PREVENTION DEVICES ON IRRIGATION SYSTEMS 37
531.18 BACKFLOW PREVENTION DEVICES ON FIRE SUPPRESSION LINES 37

532.00 TEMPORARY WATER USE-PERMIT REQUIRED 38

SECTION 500 - WATER DISTRIBUTION
INDEX OF DETAILS

500-01	Valve Box Detail
500-02	Standard Blow-Off Installation for 12" & Smaller Pipe
500-02A	Temporary ¾“ & 1” Blow-Off Installation for 12" & Smaller Pipe
500-02B	Temporary 2” Blow-Off Installation for 12" & Smaller Pipe
500-03	Water Service Line Reconnects
500-04	Upper Vertical Thrust Block Detail
500-05	Horizontal Thrust Block Detail
500-06	Standard Fire Hydrant Installation Profile
500-07	12" or Smaller Waterline, Lowering Detail for Utility Crossings
500-08	Water Service and Outside Meter Installation (Attached Sidewalk Shown)
500-08A	Water Service and Outside Meter Installation (Detached Sidewalk Shown)
500-08B	Rural Water Service and Outside Meter Installation
500-09	1½” – 2” Domestic Meter in Vault
500-10	Ditch Crossing
500-11	Exothermic Weld Cap Installation
500-12	Joint Bond Installation
500-13	Cathodic Test Station - Type 1
500-14	Cathodic Test Station - Type 2
500-15	Cathodic Test Station - Type 3
500-16	Marker Post
500-17	Fire/Domestic Water Supply Combination Detail ¾” – 2” Multi Family
500-18	¾” – 2” Irrigation Meter in Vault
500-19	¾“ – 1” Domestic Meter in Vault

WATER DISTRIBUTION

500.00 MINIMUM DESIGN CRITERIA

500.01 GENERAL

1. All water distribution systems will comply to the requirements of the Standards and Specifications for water main and service line Construction and may include criteria established by the engineer for the overall hydraulics of the water utility system. Additional criteria shall be outlined during public improvement plan review as determined necessary by the engineer.

2. These Standards and Specifications apply to pipe sizes up to and including twelve (12) inches diameter. Sizes larger than twelve (12) inches shall be as determined by the engineer on a project by project basis. Additional details for larger diameter pipes are available from the Water Department.

500.02 DESIGN GUIDELINES

	SINGLE FAMILY	MULTIFAMILY	COMMERCIAL/INDUSTRIAL
MINIMUM FIRE FLOW*	2000 GPM	3500 GPM	3500 GPM
MAX MAIN PIPE VELOCITY	8 FT/SEC	8 FT/SEC	8 FT/SEC
MAX SERVICE LINE VELOCITY**	8 FT/SEC	8 FT/SEC	8 FT/SEC
STATIC MAX. P.S.I.	90 p.s.i.	90 p.s.i.	90 p.s.i.
PEAK DAY MIN. P.S.I.***	55 p.s.i.	55 p.s.i.	55 p.s.i.
PEAK HOUR MIN PRESSURE***	40 p.s.i.	40 p.s.i.	40 p.s.i.
MAXIMUM SYSTEM PRESSURE FLUCTUATION	40 p.s.i.	40 p.s.i.	40 p.s.i.

THE MAXIMUM LENGTH OF A DEAD END LINE SHALL NOT BE GREATER THAN 500 FEET WITHOUT APPROVAL OF THE ENGINEER.

* In accordance with the current Longmont Fire Department standards, however, the required fire flow for some projects may be greater. Refer to the adopted fire code for specific requirements. Minimum residual pressure during fire flow is 20 p.s.i.

** In accordance with the current IBC.

*** This pressure may not be possible for all situations. Quality of Life Benchmark.

500.03 PIPE SIZES

1. Minimum main line size shall be eight (8) inch, except for fire hydrant lines. Dead end water mains with less than the equivalent of ten ¾ inch domestic taps on the line may be six (6) inch diameter. For pipe sizes larger than twelve (12) inches, the Engineer will determine the Specifications.

500.04 SERVICE LINES

1. Service lines shall be of a size which is adequate to supply the requirements of the property being served. The minimum size allowable for a service line shall be ¾ inch. A one (1) inch domestic tap may be installed in areas where a residential fire sprinkler system may be installed. The requirements of the property being served shall be defined as peak demand, as calculated in the IPC, latest edition.

500.05 DEPTH

1. All water lines shall have at least four and one half (4.5) feet of ground cover from the top of the pipe to the finished ground surface.

500.06 ALIGNMENT

1. All water lines shall be laid, when possible, generally ten (10) feet north or west of the center line of the street. If the curves exceed the City's maximum allowed deflections for the type of water pipe, then fittings shall be used. Water and sewer lines shall be installed with a minimum ten (10) foot horizontal separation (edge to edge distance) unless otherwise authorized by the engineer. All weather vehicular access shall be provided to manholes and valve boxes installed in areas outside of the public roadway. This shall consist of a minimum ten (10) foot wide gravel, asphalt, or concrete path or roadway constructed to the thicknesses shown in the standard City details with a minimum fifty (50) foot outside radius and thirty (30) foot inside radius on curves. No water mains shall be installed within 15 (fifteen) feet of any existing building, retaining wall, or structure, unless approved by the engineer. No building, retaining wall, or structure shall be constructed within a minimum of fifteen (15) feet from any water main, unless approved by the engineer.

500.07 GRADE

1. All pipe shall be installed to the lines, grades, and depths specified in the approved plans. Fittings, valves, and hydrants shall be installed at the specified locations with joints centered, and all valve and hydrant stems plumb. No deviation shall be made from the required line or grade except with the written consent of the engineer.

2. Air and vacuum valves may be required at extreme high points on water lines twelve (12) inches and larger. Engineer may require installation on smaller lines as deemed necessary.

500.08 FUTURE CONNECTIONS

1. When future main extensions are possible, the main which can be extended must be valved such that only one valve will have to be closed when the main is extended. The valve must be restrained so that when the one valve is closed and the line to be extended is exposed, the valve will remain safely in place. Restraint may be made by the use of a swivel or flange joint or the following minimum lengths of pipe installed on the extension side of the valve:

4 inch pipe – 29 feet
6 inch pipe – 41 feet
8 inch pipe – 53 feet
10 inch pipe – 64 feet
12 inch pipe – 76 feet

These are minimum lengths and the design engineer shall be responsible for determining if these are acceptable or greater lengths are needed to develop sufficient friction.

500.09 VALVE SPACING

1. Valves shall be placed at locations to minimize water outages in case of a line break or repair. In general, valves will be placed on lines of twelve (12) inch or smaller diameter no more than five hundred (500) feet apart. Each fire hydrant shall have a hydrant valve. For lines larger than twelve (12) inch, the valve location and spacing will be determined by the engineer.

2. The valving of the mainlines between hydrants must be accomplished to prevent more than one hydrant from being out of service in the event of a mainline break or shutdown.

3. A minimum of two (2) valves shall be installed at every tee and three (3) valves installed at every cross, unless approved by the engineer.

500.10 FIRE HYDRANT LOCATION

1. The Developer shall provide fire hydrants which conform to the requirements of these Specifications. Fire hydrant location and spacing shall be determined by the Fire Department in accordance with the adopted Uniform Fire Code. Generally, the number of fire hydrants, their location and spacing shall be as follows:

    a. Residential Areas – Five hundred (500) feet between hydrants starting at street intersections.

    b. Multiple Dwellings – Five hundred (500) feet between hydrants and not more than two hundred (200) feet from the end of required emergency access.

    c. Commercial, Industrial, Storage – Five hundred (500) feet between hydrants and not more than two hundred (200) feet from the end of required emergency access.

    d. No fire hydrant line shall be connected to less than an eight (8) inch water main or to a "dead end" water main unless the hydrant can deliver 1500 G.P.M. with minimum of a twenty (20) P.S.I. residual, or specifically approved by the Engineer.

Variances from the above requirements shall be coordinated with and approved by the Fire Department.

500.11 FIRE LINES & FIRE HYDRANT LINES

1. A fire hydrant line shall extend from the hydrant tee and valve on the water main to the fire hydrant.

2. A private fire service line for use on an internal fire suppression system shall require a valve at the mainline and the valve will be owned and maintained by the City. The valve shall open left. The property owner shall own and maintain the fire service line from the mainline valve to the building or structure.

3. Plans for the installation of either of the above mentioned fire service lines must be submitted to the engineer for approval and must be stamped by a professional engineer. Plans must be submitted and approved by the engineer one week prior to construction.

4. Fire hydrant lines shall be ductile iron pipe or pvc pipe, with flanged or swivel tees. Any fittings used shall be class two hundred fifty (250) (minimum) cast or ductile iron. If the main line is PVC, AC or steel pipe, the fire hydrant run shall be PVC pipe. If the main line is DIP, the fire hydrant run shall be DIP.

5. The use of any private fire service line to supply more than one lot is not allowed.

6. Fire service lines shall be electrically insulated from the public mainline if the main line is metallic pipe.

7. On a case by case basis, as approved by the engineer, domestic taps may be allowed on private fire service lines provided that a valve is installed between the physical domestic tap on the fire service line and the water meter. This valve must remain accessible to the City so that the water may be turned off. The City shall own and maintain the fire service valve at the mainline as specified in Paragraph 2 above. The property owner shall maintain the fire service line from the fire service valve to the building or structure including the domestic service line from the fire service line to the building or structure.

510.00 MATERIALS

For a specific list of materials accepted by the City please see APPROVED MATERIALS LIST. A copy of the APPROVED MATERIALS LIST can be obtained from the Water/Wastewater Department.

511.00 DUCTILE IRON PIPE

511.01 DESCRIPTION OF PIPE

1. Pipe class shall be in accordance with the table below with thickness designed in accordance with A.N.S.I. A21.50 (A.W.W.A. C-150), and manufactured in accordance with A.N.S.I. A21.51 (A.W.W.A. C 151). Alternate thickness designs, when appropriate, may be approved by the Engineer.

TYPE OF PIPE	MINIMUM SPECIAL CLASS OF PIPE (FORMERLY DESIGNATED AS "STANDARD THICKNESS CLASS" IN AWWA C151)
Fire hydrant lines	52
Fire service lines	52
4 inch	51
6 inch	50
8 inch	50
10 inch	50
12 inch	50

2. All buried joints for ductile iron pipe shall generally be mechanical joint or push-on conforming to A.N.S.I. A21.11 (A.W.W.A. C 111).

511.02 COATING OF PIPE

1. Pipe and fittings shall be coated on the outside with a bituminous coating, in accordance with A.N.S.I. A21.51 (A.W.W.A. C l5l).

511.03 CEMENT LINING

1. Pipe and fittings shall be cement lined in accordance with A.N.S.I. A21.4 (A.W.W.A. C l04).

511.04 TAPPING

1. Ductile iron pipe shall be directly tapped up to and including two (2) inches unless otherwise directed by the engineer. Taps made on existing lines six (6) inches in diameter or smaller must be approved by the engineer and may require a tapping saddle.

2. Taps larger than two (2) inches in size shall be made only with approved tapping saddles or sleeves as determined by the engineer. Refer to APPROVED MATERIALS LIST.

3. Service lines shall be electrically isolated from metallic water mains.

511.05 CORROSION PROTECTION

Whenever the installation of metallic mainline pipe is proposed, a soil resistivity survey of the construction area must be performed. The survey data and calculations, shall be submitted to the engineer. Joints of metallic pipe shall be bonded to provide electrical continuity and test stations installed at intervals approved by the engineer. See Details.

Where soils adjacent to construction areas are determined to have a resistivity of less than 1000 Ohm-Cm, or where stray current corrosion is, in the opinion of the engineer, expected to be severe, an approved non-metallic or cathodic protection system shall be installed with the

approval of the engineer. Additional measures may be required to insure protection from corrosion.

1. All metallic pipe, fittings, valves, and other appurtenances shall be wrapped in polyethylene or an approved coating. The polyethylene encasement shall prevent contact between the pipe and surrounding material. See details.

2. The polyethylene shall have a minimum wall thickness of eight (8) mils and be manufactured in accordance with A.W.W.A. Standard C 105, "Polyethylene Encasement for Gray and Ductile Cast-Iron Piping for Water and Other Liquids".

3. The polyethylene shall be applied to the pipe as shown in the Standard Details. A two (2) inch wide ten mil thickness polyethylene pressure-sensitive tape shall be used to close seams or hold overlaps.

4. Pipes of dissimilar metallic materials shall be insulated from each other using insulated flanges or fittings with test stations as approved by engineer.

512.00 POLYVINYL CHLORIDE PIPE

512.01 DESCRIPTION OF PIPE

1. All Polyvinyl Chloride (P.V.C.) pipe shall be manufactured according to A.W.W.A. Standard C 900, "Polyvinyl Chloride (P.V.C.) Pressure Pipe, four (4) inch through twelve (12) inch, for Water. No P.V.C. over twelve (12) inches in diameter will be installed without approval of the engineer. Following are additional requirements or exceptions.

512.02 JOINT TYPE

1. Pipe joints shall be made using an integral bell with an elastomeric gasket push-on type joint or using machined couplings of a sleeve type with rubber ring gaskets and machined pipe ends to form a push-on type joint. Solvent cement joints are strictly prohibited.

512.03 CLASS AND TYPE

1. All sizes of pipe (twelve (12) inches and less) shall be Class 150, dimension ratio eighteen (18) (DR 18) minimum.

512.04 TAPPING

1. Tapping of P.V.C. up to and including two (2) inch shall be done only with approved brass tapping saddles supplied by the Contractor and tapped by the City. All parts including bands, outlet, lugs, nuts and bolts are to be brass or stainless steel.

2. Taps larger than two (2) inches in size shall be made only with approved tapping saddles or sleeves as determined by the engineer. Refer to APPROVED MATERIALS LIST.

512.05 TRACING WIRE

1. All PVC pipe shall be installed with tracing wire taped securely to the top of the pipe and shall extend along the entire length of the pipe installed. The tracing wire shall be a minimum 14 AWG direct bury solid copper wire (see Details). The tracing wire shall be tested prior to and as a condition of construction acceptance.

2. Tracing wire shall be brought to grade at all fire hydrants or test stations as shown on the approved plans. The tracing wire shall be securely affixed to the barrel section of the fire hydrant and brought to grade as described in Section 522.03.

513.00 ASBESTOS CEMENT PIPE

513.01 USE

The installation of asbestos cement pipe is not permitted.

513.02 TAPPING OF EXISTING LINES

1. Existing asbestos cement pipe shall be tapped up to and including two (2) inches with an approved stainless steel tapped repair clamp. The make and model of the clamp shall be approved by the Engineer. When taps are larger than two (2) inches the engineer may require that a full section of pipe be removed and replaced with a non asbestos material. Refer to APPROVED MATERIALS LIST.

514.00 CAST AND DUCTILE IRON WATER WORKS FITTINGS

1. All cast iron fittings shall be manufactured in accordance with the following A.W.W.A. Standards: C104 “Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water”, C110 “Ductile-Iron and Gray-Iron Fittings, 3 In. – 48 In. (76 mm – 1,219 mm), for Water”, C153 “Ductile-Iron Compact Fittings for Water Service”, or C111 “Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings” with the following additional requirements or exceptions.

2. All fittings shall be furnished with mechanical joint ends conforming to referenced specifications, and in addition the tee-head bolts and hexagon nuts shall be fabricated from a high-strength, low alloy steel known in the industry as "Cor-Ten," "Usalloy" or equal. Accessories for the mechanical joint consisting of the gasket, gland and fasteners shall be furnished and packaged separately from the fittings. Each package shall be labeled in such a manner as to provide for proper identification and the number of units per package or bundle. All hydrant tees shall be mechanical by flanged joint or swivel tees.

3. All fittings shall be a minimum of 250 p.s.i. pressure rating and shall conform to the dimensions and weights shown in the tables of above referenced specifications. All fittings shall be made from gray-iron or ductile-iron.

4. All fittings shall be wrapped in polyethylene encasement. See details.

515.00 VALVES

515.01 GENERAL

1. All valve operating wrench nuts shall be installed no deeper than four (4) feet below finished grade. Stainless steel pins or a minimum of two (2) set screws may be used if any extension is necessary to meet this requirement.

2. Mainline valve placement shall be no greater than twenty-four (24) inches from any fitting. In-line tee connections shall have no less than two (2) valves, in-line cross fittings shall have no less than three (3) valves. This does not apply to fire hydrant tees.

3. See APPROVED MATERIALS LIST.

515.02 GATE VALVES

1. Gate valves shall be used on all lines up to and including twelve (12) inch and shall be resilient seated gate valves with non-rising stem, compression seating, double "0" ring stem seals, with two (2) inch square wrench nut, conforming to AWWA C-509 (see approved material list). Valves shall be the same size as the line which they serve and shall open left (counterclockwise). Valve ends shall be mechanical-joint, except for hydrant valves, which shall have one flanged or swivel valve end. See Details.

515.03 BUTTERFLY VALVES

1. All valves having a nominal inside diameter of greater than twelve (12) inches will be geared butterfly valves designed for direct burial and they shall conform to A.W.W.A. C-504, Class 150B. Valves will be tight closing rubber seat type with the seats bonded to the body. No metal to metal surfaces will be permitted. All valves will open left (counterclockwise) with a two (2) inch square nut conforming to A.W.W.A. C-509. The engineer may require butterfly valves to be installed in a vault.

515.04 TAPPING VALVES

1. Tapping valves shall conform to the above standards and any additional requirements requested by the engineer. Wet taps are allowed only on lines approved by the engineer.

2. Wet taps must be at least one nominal pipe size less than the diameter of the pipe being tapped.

515.05 BLOW-OFF VALVE ASSEMBLY

1. In all installations where the main will be permanently dead-ended, such as a cul-de-sac, a permanent blow-off assembly or fire hydrant shall be installed. Where the main will be temporarily dead-ended, for example the boundary of a subdivision filing, a temporary blow-off may be installed, unless a fire hydrant, which can serve additionally as a blow-off, is located at the main's temporary end. All plugs and caps unless otherwise specified, shall be provided with a concrete thrust block, or thrust shall be restrained by attaching suitable metal tie rods and clamps or joint restraints as specified. The blow-off shall be installed at a right angle to the main. See details.

2. Blow-off assembly sizing shall be dependant upon the size of line it is to be attached and will be sized to provide a flushing velocity in the main of at least two (2) feet per second.

3. Temporary blow-offs shall be approved by the engineer.

516.00 VALVE BOXES

1. All valve box sections shall be cast iron, screw type with lid. Bases shall be suitable for the valves furnished and for the depth of cover specified. The box shall have a circular base for support around the valve. See details and refer to APPROVED MATERIALS LIST.

517.00 CURB STOP BOXES

1. The approved list of curb stop boxes is located in the APPROVED MATERIALS LIST.

2. Curb stops installed must conform to A.W.W.A. C - 800 up to two (2) inches in size. Beyond two (2) inches, a gate valve must be used.

518.00 FIRE HYDRANTS

518.01 APPROVED TYPES

See Details and APPROVED MATERIALS LIST for further information.

518.02 REQUIREMENTS

1. All fire hydrants used in the City of Longmont Water System shall meet the following Specifications:

    a. Five (5) inch minimum hydrant valve opening, 5-1/4 inch main valve opening

    b. 2-hose nozzles, 2-l/2 inch National Standard thread

    c. 1-pumper nozzle, 4-l/2 inch National Standard thread

    d. Six (6) inch M.J. Shoe Connection inlet

    e. Operating nut, l-l/4 inch points to flat National Standard pentagon

    f. Open left

    g. Color - red with white caps and bonnet or operating nut

    h. 5.5 foot bury depth

    i. 150 p.s.i. working pressure

    j. Must comply with A.W.W.A. C 502

k. All extension sections must be class 52 ductile or cast iron and installed per the manufacturers recommendations

l. All fire hydrants will be of breakaway construction

m. All hydrants shall be NEW, unless an existing hydrant is in good operating condition and meets or exceeds the above standards. The use of an existing hydrant shall be approved by the engineer.

n. Upon Final Acceptance, hydrants must be painted with approved hydrant paint

520.00 GENERAL INFORMATION

520.01 OPERATION OF VALVES

1. When connecting to the existing water system, mainline valves on the existing system and connecting valves shall be operated by the Water Department personnel ONLY. The Contractor shall notify the Engineer and Inspector at least forty-eight (48) hours prior to needing any valve operated, except in the case of emergencies.

520.02 CONNECTION TO EXISTING SYSTEM

1. At locations where connections to existing water mains are to be installed, the contractor shall locate the existing mains both vertically and horizontally and verify their exact size and material in advance of the time scheduled for making the connections.

2. Prior to connecting to existing water mains, the contractor shall have all personnel, materials, and equipment ready to connect the fitting to the existing main, so as to keep the shutoff time to a minimum. As soon as possible after making the connections, the contractor shall flush the connection so as to prevent contamination of the existing facilities. The Contractor shall take every precaution necessary to prevent dirt or debris from entering the main.

3. Connections to the existing water system shall be completed in a neat and workmanlike manner. The Inspector shall be notified at least forty eight (48) hours in advance and be present at all times during the Construction of the connection. The connection is subject to approval by the Engineer and the Inspector. Under NO circumstances shall a non-disinfected main, which cannot be isolated, be connected to an existing disinfected main.

4. The City does not guarantee the water tightness of its valves on existing facilities. If existing valves leak, the City shall assist in reducing the influx of water, but the Contractor must use methods at his own disposal to dewater the trench and complete any required testing or disinfection of the water line.

5. All connections shall be valved to separate new Construction from the existing system. Valves shall be kept closed until acceptance of the new system.

520.03 ABANDONMENT OF EXISTING WATER LINES OR "STUBS"

1. All water and water service lines that were installed and will not be used (such as a replat or a change in building configurations) shall be abandoned at the main line. This shall include excavating the main and removing any mainline valves on the line to be abandoned and replacing them with a plug. However, if the street was paved within the previous three (3) years and no street asphalt overlay is planned for the next five years, then the developer shall place in cash escrow with the City, sufficient funds for the City to abandon the service line in the future.

521.00 TAPPING

521.01 TAPPING AUTHORIZATION

1. Only City of Longmont Water Department personnel are permitted to tap existing water mains of the City system, up to and including 2" (two inch) taps. Taps greater than two (2) inches, subsequent to Water Department approval, shall be performed by a qualified Contractor. NOTE: no size on size wet taps will be allowed. All appropriate fees shall be paid prior to any tapping.

2. Taps will be scheduled when the Water/Wastewater Maintenance Department is contacted by the contractor. No tap will be scheduled less than forty (48) hours or two working days from the time the Water/Wastewater Maintenance Department is contacted for the tap. No tap will be scheduled until all fees have been paid.

3. When the tapping crew arrives at the site, they will inspect the preparation of the trench for safety, as defined by current O.S.H.A. Standards.

4. The pipe must be sufficiently exposed to accommodate the tapping equipment.

5. When all conditions are deemed safe as described in Paragraph three (3), Water/Wastewater personnel will physically make the tap(s).

6. If the conditions of Paragraph 3 & 4 are not satisfied, the Water/Wastewater personnel will not perform the tap and a new time will have to be scheduled.

7. If rescheduling is necessary due to the fault of the contractor, all costs for time lost on the originally scheduled tap may be billed to the contractor.

8. Taps are only made Monday through Thursday and until 12:00 p.m. (noon) on Fridays.

522.00 GENERAL PIPE INSTALLATION

522.01 LOWERING OF PIPE AND ACCESSORIES INTO TRENCH

1. Implements, tools and facilities satisfactory to the engineer shall be provided and used by the contractor for the safe and efficient execution of the work. All pipe, fittings, valves, hydrants and accessories shall be carefully lowered into the trench with suitable equipment in a manner that will prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench. Pipe and accessories shall be inspected for defects prior to their being lowered into the trench.

Any defective, damaged or unsound material shall be repaired or replaced as directed by the Engineer. All foreign matter or dirt shall be removed from the interior and machined ends of pipe and accessories before it is lowered into position in the trench. Pipe shall be kept clean by means approved by the engineer during and after laying.

522.02 DRAINAGE OF MAINS

1. Mains shall be drained through drainage branches or blowoffs. Drainage branches, blowoffs, air vents, and appurtenances shall be provided with valves and shall be located and installed as shown on the plans. The engineer may require dechlorination.

522.03 LAYING OF PIPE

1. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in line. If that is not possible, the engineer or Inspector may require that before lowering the pipe into the trench, a heavy, tightly woven canvas bag be placed over each end and left there until the connection is to be made. The end of the pipe will be plugged or capped with approved materials when work stops. Pipe shall be laid with bell ends facing in the direction of laying, unless directed otherwise by the engineer. Where pipe is laid on a grade of ten (10) percent or greater, the laying shall start at the bottom and shall proceed upward with the bell ends of the pipe up-grade. No pipe shall be laid when, in the opinion of the engineer or the inspector, trench conditions are unsuitable.

2. A minimum fourteen (14) gage, direct bury, solid copper wire shall be buried directly above all pipe. The copper wire shall be attached to the top of the pipe and surface at each fire hydrant. The wire shall be taped to the front of the hydrant barrel and coiled around the barrel just below the top flange with an excess length of approximately sixteen (16) inches. See Details. If there is no fire hydrant where the tracing wire can be brought up, the wire may be brought up in a valve box as directed in the field.

3. For pipe outside the roadway the same as above shall be done with the following additions. There shall also be a warning tape installed eighteen (18) inches directly above the pipe.

522.04 CUTTING OF PIPE

1. The cutting of pipe for inserting valves, or fittings, shall be done in a neat and workmanlike manner without damage to the pipe or lining and so as to leave a smooth end at right angles to the axis of the pipe. Flame cutting of ductile pipe shall not be allowed. Asbestos cement pipe shall not be cut, but the entire section of pipe shall be removed to the nearest joint and replaced with a non asbestos type pipe.

522.05 DISSIMILAR MATERIALS

1. Cathodic protection and insulation shall be installed as required by the engineer. Particular care shall be taken to insulate between dissimilar materials. Damage to the polyethylene wrap prior to or during backfilling shall be repaired by the Contractor. All damage to the polyethylene wrap caused by tapping the pipe shall also be repaired by contractor.

Whenever it is necessary to join pipe of dissimilar metal, an approved insulated joint shall be installed. The City shall conduct a resistivity test across the joint. If the resistance test fails, the insulated joint shall be removed and repaired. The joint shall then be reinstalled and retested. This procedure shall continue until a successful test result is obtained. A test station shall then be installed near the joint for future testing of continuity.

2. Test stations for metallic mainlines shall be located in vehicular accessible areas no more than five hundred (500) feet apart or less as determined by the engineer. Cathodic protection systems shall be designed by a qualified, licensed engineer, who regularly designs corrosion protection systems of this type.

522.06 JOINING OF PIPE

1. Push on joints shall be accomplished in accordance with A.W.W.A. C600 “Installation of Ductile-Iron Water Mains and Their Appurtenances”, A.W.W.A. C605 “Underground Installation of Polyvinyl (PVC) Pressure Pipe and Fittings for Water”, and A.W.W.A. M23 “PVC Pipe - Design and Installation”. Longitudinal bending of PVC is not allowed. All deflection shall be through fittings or half of the manufacturer’s allowed joint deflection.

2. Mechanical joints shall be accomplished in accordance with A.W.W.A. C-600 "Installation of Ductile Iron Water Mains and Their Appurtenances".

3. Flanged (or swivel) joints shall be accomplished in accordance with A.W.W.A. C-115 "Flanged Ductile Iron and Grey Iron Pipe With Threaded Flanges", and A.W.W.A. C-110 "Ductile Iron and Grey Iron Fittings three (3) inch Through forty (48) inch., For Water and Other Liquids".

4. All requirements for the joining of different types of pipe with an inside diameter greater than eight (8) inches shall be done with an approved sleeve or transition piece. Type and style to be determined by the Engineer on a case by case basis.

522.07 PERMISSIBLE PIPE DEFLECTION

1. Pipe shall not be deflected either vertically or horizontally more than half of the limits allowed by the manufacturer.

523.00 RESTRAINT

523.01 THRUST BLOCKS

1. Concrete thrust blocks shall be designed for the internal pipe pressure, surge pressure and the soil bearing capacity. Thrust blocks shall be placed between solid ground and the fitting to be anchored; the area of bearing on the pipe and on the ground in each instance shall be approved by the Engineer. The thrust blocks shall be so placed that the pipe and fitting joints will be accessible for repair. All fittings and piping shall be protected with a suitable bond breaker prior to pouring a concrete thrust block. (The concrete shall have a minimum twenty eight (28) day compressive strength of 3000 p.s.i.) See Details for typical thrust block installations and sizing. Forms for thrust blocks may be required by the engineer.

523.02 METAL HARNESS

1. Metal harness of tie rods, clamps, and restraining glands of adequate strength to prevent movement may be used instead of concrete blocking, as directed by the engineer. Steel rods or clamps shall be coated and polywrapped. Use of tie rods is only as approved by the engineer.

523.03 RESTRAINT FOR HYDRANTS

1. The bowl of each hydrant shall be well braced against unexcavated earth at the end of the trench with concrete backing, or it shall be tied to the pipe with suitable metal tie rods or clamps, as directed by the engineer.

524.00 SERVICE LINES

524.01 GENERAL

1. Each subdivided lot shall be served by a separate service line and meter except as provided for in the municipal code. Refer to details for a typical service line installation for more information.

2. The meter pit shall be located six (6) feet behind the back of an attached walk. Where no walks or detached walks are to be installed, the location of the meter pit shall be subject to the approval of the engineer.

3. The owner of the premises shall maintain the curb stop box or meter pit so that it will always be conveniently accessible and in good working order, properly capped and clean of debris and other foreign matter, see Standard Detail.

4. All corporation stops shall have Corporation Cock (C.C.) threads.

5. All service lines supplying water from the City's system shall conform to one of the following types of pipe:

    a. Seamless copper tube, "Type K, soft", for service lines ¾ inch through and including two (2) inches.

    b. Ductile Iron Pipe conforming to these Standards for service lines three (3) inches or larger.

    c. PVC pipe conforming to these Standards for service lines four (4) inches and larger.

    d. No other type of pipe shall be allowed without the written approval of the Engineer.

6. Service lines one and one half (1½) inch and larger shall have a curb stop and box installed within six (6) feet of the right-of-way (ROW).

7. Service lines shall not be installed in trenches containing conduits which carry any substances other than potable water without written permission of the engineer, service

lines shall be separated laterally from conduits which contain a potential health hazard by a minimum of ten (10) feet.

Exception: If it is not possible to achieve a ten (10) foot separation of the water and sewer services due to the size, location or other physical restraints of the lot, the lines may be installed in the same trench with the approval of the engineer and under the following conditions:

a. The water service must be installed eighteen (18) inches above the sewer service on a separately excavated shelf of undisturbed soil in the common trench.

b. Four and one half (4½) feet of cover must be maintained as a minimum over the water service.

8. All service lines will be inspected by the inspector. It is the responsibility of the contractor or developer to submit as-built drawings indicating the actual locations of all service stub-outs, prior to issuance of a final acceptance.

9. See Standard Details for a typical service line installation.

10. The installation of pumps directly fed by the City water system in service lines is prohibited.

11. All taps shall be at least eighteen (18) inches from any joint, fitting, valve or other tap unless approved otherwise by engineer.

12. Location of all service lines shall be marked with a "w" chiseled in the sidewalk or curb closest to the property line.

524.02 OWNERSHIP

1. The City shall maintain the water service line from the mainline to the curb stop, excluding the curb stop valve, box and stem, where a curb stop exists. In instances where no curb stop or outside meter exists, the City will maintain the service line from the main to the right-of-way line. In instances where an outside meter exists without a separate curb stop, the City will maintain the service line from the main to the meter, provided the meter is within fifteen feet of the right-of-way line. All remaining portions of the service line are to be maintained by the property owner, excluding the meter and backflow devices. If the domestic service line is tapped onto a private fire service line, as provided for in Section 500.11, the property owner shall maintain the fire service line from the fire service valve to the building or structure including the domestic service line from the fire service line to the building or structure.

525.00 SETTING OF VALVES AND FITTINGS

1. Valves, fittings, plugs, and caps shall be set and joined to pipe in the manner specified above in laying and joining of pipe. Valves in water mains shall be located as shown on the plans.

526.00 SETTING OF VALVE BOXES

526.01 VALVE BOXES

1. A valve box shall be provided for every valve that has no gearing or operating mechanism, or in which the gearing or operating mechanism is fully protected with a cast-iron grease case. The valve box shall be centered and plumb over the wrench nut of the valve, with the box cover one quarter (¼) inch below the surface of the surrounding pavement or such other level as may be directed by the engineer. See Details for valve and valve box installation.

527.00 SETTING HYDRANTS

527.01 LOCATION

1. Hydrants shall be located at least one (l) foot inside the right-of-way or water utility easement and five (5) feet from the side lot line and shall conform to one of the following conditions.

2. When placed behind the curb, the hydrant barrel shall be set so that no portion of the pumper or hose nozzle cap will be less than twenty-four (24) inches nor more than thirty (30) inches horizontal distance from the gutter face of the curb.

3. When set in the lawn space between the curb and the sidewalk, or between the sidewalk and the property line, no portion of the hydrant or nozzle cap shall be within six (6) inches of the sidewalk, or no greater than eighteen (18) inches from the sidewalk.

527.02 POSITION

1. All hydrants shall stand plumb and shall have their nozzles parallel with, or at right angles to, the appropriate curb, with the pumper nozzle facing the fire access. Hydrants shall be set to the established grade, with the safety flange approximately four to six (4 to 6) inches, or as per the manufacturers recommendations, vertically above the ground.

527.03 CONNECTION TO MAIN

1. Each hydrant shall be connected to the main with a six (6) inch flange or swivel joint controlled by an independent six (6) inch flanged by M.J. gate valve, unless otherwise specified. Dependent upon the soil conditions and the length of the hydrant run, the fittings and pipe lengths may require rodding as determined by the engineer.

527.04 HYDRANT DRAINAGE IN PERVIOUS SOIL

1. Wherever a hydrant is set in soil that is pervious, drainage shall be provided at the base of the hydrant by placing one (1) inch washed rock, from the bottom of the trench to at least six (6) inches above the waste opening in the hydrant and to a distance of (l) foot around the elbow.

527.05 HYDRANT DRAINAGE IN IMPERVIOUS SOIL

1. Wherever a hydrant is set in clay or other impervious soil, a drainage pit shall be excavated below each hydrant and filled with one (1) inch washed rock and under and around the elbow of the hydrant and to a level of six (6) inches above the waste opening. The drain pit shall be covered with polywrap prior to backfill.

527.06 USAGE AND OPERATION OF HYDRANTS

1. Water usage from a fire hydrant is strictly prohibited unless a special use permit is issued by the City of Longmont Water/Wastewater Department.

527.07 FILLING THE LINE

The new pipeline shall be filled slowly, filling at a rate which will not cause surges or exceed the rate at which air can be released. All air in the line shall be purged. Where blow-offs or hydrants are not available or effective in purging air from the line, the engineer shall require a tap to purge the line. The location and the size of the tap shall be at the Engineer's discretion. All costs related to make the tap shall be the contractor/developer responsibility. Tapping fees do not apply.

528.00 DISINFECTION AND FLUSHING

1. The chlorination of finished water mains shall be done prior to the hydrostatic testing. Before filling the main with water, the main shall be clean and free from debris to the satisfaction of the engineer.

2. Disinfection by chlorination of the main shall be performed prior to acceptance by the City. The chlorinating agent and method of application shall be approved by the Engineer in accordance with A.W.W.A. C-651.

3. If chlorine tablets are used for disinfection, the tablets shall be attached to the top of the pipe with A.W.W.A. and FDA approved adhesive specific for this purpose just prior to the installation of the pipe in the trench. (See APPROVED MATERIALS LIST)

4. After the water main is filled with water and chlorine, the chlorinated water shall be held in contact with the main for forty-eight (48) hours. At the end of the forty-eight (48) hours, the water in the main shall be tested by the Inspector, to ensure a residual chlorine content of not less than twenty five (25) mg/l and not more than one hundred (100) mg/l. The main shall then be thoroughly flushed to remove the heavily chlorinated water. Care shall be taken in flushing the main to prevent damage or danger to the public and the environment. The engineer may require Contractor to dechlorinate the flushed water.

5. After final flushing and before the new water main is opened to the distribution system, two consecutive sets of acceptable samples, taken at least twenty four (24) hours apart, shall be collected from the new main. The first set of samples shall be collected from every twelve hundred (1200) feet of the new water main and all fire hydrants, plus one set from the end of the line and at least one set from each branch more than one hundred (100) feet long. The first set of samples shall be taken of water that has stood in the new main for at least twenty four (24) hours after final flushing. The second set of samples shall be taken after completion of the hydrostatic testing at the locations(s)

used for hydrostatic testing. All samples shall be collected and tested in accordance with Standard Methods for the Examination of Water and Wastewater, and shall show the absence of coliform organisms, and, if required, the presence of a chlorine residual. Sampling and testing of residual chlorine and coliform organisms will be done by City.

6. If the initial disinfection fails to produce satisfactory bacteriological results or if tests indicate that other water quality parameters do not meet City potable water standards, the new main may be reflushed and shall be resampled. If check samples also fail to produce acceptable results, the main shall be rechlorinated by the continuous-feed or slug method of chlorination in accordance with A.W.W.A. C-651 until satisfactory results are obtained.

7. After completion of disinfection, new water mains with cement mortar linings shall be tested for pH. Mains with pH greater that 8.5 shall be thoroughly flushed until the pH is less than 8.5. pH testing will be done by the City.

529.00 HYDROSTATIC TESTS

1. No hydrostatic tests shall be made on any portion of the pipeline until all field placed concrete has had adequate curing time. Sufficient backfill shall be placed between joints and fittings to stabilize the constructed pipeline, however joints, fittings, valves, etc., may be required by the Inspector to remain uncovered so that visual inspection may be made at the time of testing. Tests shall include testing of service lines to and including the curb stop on new waterline installation.

2. All pipe shall be field tested to a minimum of 150 p.s.i. at all points in the line and 200 p.s.i. in private fire service mains.

3. The engineer shall be notified at least twenty four (24) hours in advance of any testing. All testing shall be done in the presence of the Inspector.

4. The contractor shall furnish the necessary equipment to do the pressure test including a calibrated meter. The pipeline shall be in a state of readiness for testing, having been filled, flushed of high chlorine, and purged of air.

5. While the test pressure is maintained for two (2) continuous hours, the allowable leakage from the pipe shall not exceed the formula listed below. An examination may be made of the pipeline in general during testing, and any leaks shall be repaired. Any pipe or fitting found to be cracked shall be removed and replaced. Cutting and replacing of pavement, excavating and backfilling are a necessary part of locating and repairing leaks discovered by pressure testing of pipe and the costs of these activities shall be borne by the contractor.

6. No leakage is allowed through the bonnet of any valve. Any valve that leaks through the bonnet will be removed and replaced.

   The hydrostatic pressure test shall be performed against each valve within the new piping system.

   Allowable Leakage for PVC Pipe (per AWWA C605):

$$L = \frac{ND\sqrt{P}}{7{,}400}$$

Where:

L = allowable leakage, in gallons per hour
N = number of joints in the length of pipeline tested
D = nominal diameter of the pipe, in inches
P = average test pressure during the leakage test, in pounds per square inch (gauge)

Allowable leakage at various pressures in shown in the following table. The values in the table are calculated on the basis of the above equation.

Allowable leakage per 50 joints of PVC pipe* (gph)

Avg. Test Pressure (psi)	Nominal Pipe Diameter (in)				
	4	6	8	10	12
200	0.38	0.57	0.76	0.96	1.15
175	0.36	0.54	0.72	0.89	1.07
150	0.33	0.50	0.66	0.83	0.99
125	0.30	0.45	0.60	0.76	0.91
100	0.27	0.41	0.54	0.68	0.81

*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

Allowable Leakage for Ductile Iron Pipe (per AWWA C600):

$$L = \frac{SD\sqrt{P}}{133{,}200}$$

Where:

L = allowable leakage, in gallons per hour
S = length of pipe tested, in feet
D = nominal diameter of the pipe, in inches
P = average test pressure during the leakage test, in pounds per square inch (gauge)

Allowable leakage at various pressures in shown in the following table. The values in the table are calculated on the basis of the above equation.

Allowable Leakage per 1,000 feet of pipeline* (gph)

Avg. Test Pressure (psi)	Nominal Pipe Diameter (in)					
	3	4	6	8	10	12
200	0.32	0.43	0.64	0.85	1.06	1.28
175	0.30	0.40	0.59	0.80	0.99	1.19
150	0.28	0.37	0.55	0.74	0.92	1.10
125	0.25	0.34	0.50	0.67	0.84	1.01
100	0.23	0.30	0.45	0.60	0.75	0.90

*If the pipeline under test contains sections of various diameters, the testing allowance will be the sum of the testing allowance for each size.

7. Operational Inspection

   a. At the completion of the project and in the presence of the inspector, the contractor shall operate all valves, hydrants, and water services to ascertain that the entire facility is in good working order; that all valve boxes are centered and valves are opened; that all hydrants operate and drain properly; that all curb boxes are plumb centered; and that water is available at all curb stops.

530.00 WATER METERS

530.01 GENERAL

1. All work and materials must be acceptable to the engineer.

2. All work and materials are subject to inspection by the City of Longmont at all times.

3. There shall be only one City water meter per service tap purchased. Specifically, the City will not provide individual water meters nor metered billing services in multi-unit structures.

4. The tap, water service line between the main and the meter, and water meter may all be the same nominal size. Where the meter size is smaller or larger than the service line size, the water service size shall be considered equal to the water meter size. There shall be installed upstream and downstream of said meter a pipe of the same diameter and 20 (twenty) times that diameter in length. Variation between service line and meter size must be approved by the engineer.

5. The City reserves unto itself sole responsibility for testing and certifying the accuracy of City water meters. No one shall in any way attempt to test, certify, or calibrate a City owned water meter without City approval.

6. Modification, alteration or relocation in metering equipment must be approved by the City.

7. Water meter and offsite reading equipment costs, fees, and repair costs shall be determined by the City of Longmont.

8. The City shall have the sole right to determine the rated size, kind, type, make, and component configuration of water meters and offsite reading equipment.

530.02 OWNERSHIP

1. Water meters and off-site reading equipment shall be obtained from the City of Longmont, upon payment of fees, and shall remain in the City's ownership.

2. City ownership of water meters extends only to the body and register of the meter.

3. Water meters installed at a premise shall remain with that premise and are not transferable.

530.03 MATERIALS

1. Materials shall be in accordance with the APPROVED MATERIALS LIST.

2. Water meter couplers, companion flanges, and jumper bars for sizes 3/4 inch through four (4) inches shall be obtained from the City Water Meter Shop. Larger sizes shall be obtained by special arrangement.

3. The user/customer has the sole responsibility to determine the potential loads a meter pit and meter vault will require and shall provide the structural strength required. The City may require AASHTO HS-20 loading at its option.

4. No solder containing lead shall be used. All soldering fluxes, plumbing pastes, pipe dopes, sealants, coatings, gaskets, and similar material which may come into contact with potable water must be non-toxic and approved for general plumbing use.

530.04 INSTALLATION

1. Whenever possible, the installation of water meter vaults in streets, roadways, driveways, alleys, or parking lots will not be allowed. Meters for residences shall be placed in a pit (for 3/4" or 1" services) outside of the structure as indicated in the detail drawings. Meters for commercial/industrial buildings may be placed inside the building as approved by the Engineer. Meters for larger services (greater than 1") may be placed in minimum four (4) foot diameter vault with a one (1) inch conduit from the vault to the structure with 18-4 bellwire inside. The vault must be within three hundred (300) feet of the structure. Meters for all irrigation taps receiving a waiver (parks, arterial streets and primary greenways) must be placed in a minimum 60 (sixty) inch diameter vault for service lines two (2) inch and less.

2. The water meter shall be situated such that it is protected from freezing and frost damage.

3. Water meter pit locations and installations must be acceptable and meet the approval of the engineer (see details). Water meter pits shall not be installed with the construction of the water service line until such time as the electric service lines, or other adjacent utilities, have been installed unless otherwise approved by the engineer. For installation outside the City limit, the meter pit shall be installed immediately adjacent to right-of-way (ROW).

4. All meter settings must be inspected before backfilling.

5. If the street or ground is not to final grade at the time of installation of the meter, the owner must raise or lower the meter vault when the final grade is established. Top of pit lid must be a minimum of two (2) inches above dirt level if no sod or other landscape covering is in place at the time of final inspection.

6. Galvanized piping is not allowed.

7. The service line through and on both sides of the meter pit/vault must be of the same material.

8. No branch connections shall be made in the meter pit. Connections must be made more than five (5) feet from the meter pit on the downstream side.

9. Valves four (4) inch diameter and larger shall be supported by adjustable steel supports, and one and one half (1½) inch diameter and larger meters shall be supported by concrete blocks with steel shims if needed.

10. Manhole rings and covers shall be in conformance with the wastewater section of these Standards, except "WATER" shall be cast in the cover.

11. See APPROVED MATERIALS LIST for meter pits and covers.

12. Settings of meters other than shown and detailed herein shall be considered as non-standard and shall require prior approval of proposed piping layout, meter setting and structural design of vault for each separate installation.

13. Backflow prevention devices will be required in accordance with the Municipal Code.

14. Customer/users and contractors shall be responsible for obtaining all locations for underground utilities and services prior to excavation.

15. The following apply to two (2) feet in diameter water meter pit installation.

    a. The pit shall rest upon brick supports or concrete block.

    b. The installed pit shall have its top locking lid at the same elevations as the grade of the adjacent landscaping. Care shall be taken that drainage of surface waters be directed away from the pit lid and do not puddle over the pit.

    c. Both the inner frost lid and the top locking lid shall be installed on the pit. The locking mechanism shall be fully functional.

    d. When installed, the water meter shall not be touching or resting against the pit barrel or pit cone assembly. The water meter shall lie horizontal and be essentially level.

    e. Water meter pits shall not contain any plumbing fixture, fitting, valve, or pipe not directly a part of the pit assembly, the water meter set, or the water meter itself. Lawn irrigation tees, valves, and winterizing fittings shall not be allowed inside a water meter pit.

    f. The meter must be within eighteen (18) to twenty (20) inches below the top lid.

16. The following apply to four (4) feet and larger water meter vault installation.

    a. Water meter vaults proposed for water meters larger than two (2) inches, manifold water meter sets, fire line rated water meters, or specifically constructed

water meter sets shall have site and design plans approved by the engineer prior to the start of construction.

b. Vaults are to be of water tight construction. Vaults larger than sixty (60) inches shall have a sump pit.

c. To the extent possible, the top of the water meter register head shall be visible from the opened access lid. The water meter shall be equipped with off-site reading equipment as specified by the City Water/Wastewater Operations and Maintenance Division.

d. All vaults shall have a one inch polypipe installed from the vault to the building with 18-4 bellwire inside. The conduit shall be water tight buried to a depth of at least twenty four (24) inches.

e. Where the conduit enters the building, there must be a Plain Old Telephone System (POTS) or analog line within twenty (20) feet of the conduit's end for use by the off-site reading equipment.

f. Bypasses for one and one-half (1½) inches and larger meters are required for commercial, industrial and multi-family users (see details). Bypass sizes are to be determined by owner.

g. Water meter setters for one and one half (1½) inches and two (2) inches will be comparable to the Ford 70 Series Coppersetters (horizontal inlet and outlet) key valve inlet and outlet. Setters will be a minimum of twelve (12) inches in height and will have an inlet valve, outlet valve and a bypass with valve. Setters will be plumbed with compression fittings like the Ford 70 Series Coppersetters (CTS in and out). See APPROVED MATERIALS LIST. Setters will be installed perpendicular to the vault floor with one (1) inch diameter support rods or pipe with a minimum length of eighteen (18) inches installed for support. Setters for dedicated irrigation systems do not have to have a bypass.

17. The following apply to inside installations.

a. Bypasses for one and one half (1½) inches and larger meters are required for commercial, industrial and multi-family users. Bypass sizes are to be determined by the City.

b. Inside installations of meter three (3) inches and larger shall have accessible within twenty (20) feet and in the same room as meter a POTS telephone line for use by off site reading equipment.

18. The box for collecting off site readings shall be installed on a wall approximately forty eight (48) inches off the floor and shall be immediately accessible to service workers.

19. The property owner is required to bear the costs of relocating a meter and/or remote when his actions limit existing free and easy access for the meter readers or introduces a safety hazard. This would include remodeling, additions, fences, new landscaping, pets, etc...

20. When installing one and one half (1½) inches and larger water meters/backflow devices inside commercial buildings and inside of a locked room, a lock box, locked with an approved lock with a key to the room, must be provided for access by the City and installed just outside of the locked door. The lock box must be purchased from the City warehouse.

530.05 ACCESS - WATER METERS

1. Free, easy, and ready access for the purposes of testing, certification, repair, maintenance, or replacement shall be provided to water meters at any reasonable hour.

2. All water meters have to be periodically tested and certified. The customer/user shall take whatever measures are necessary for providing this periodic access.

3. There shall be a clear line of access to the water meter. This access line shall be free of any impediment, including safety hazards, to the movement of personnel and necessary tools, equipment, or material.

4. Lines of access and openings governing access to the water meter set shall be large enough to accommodate the passage of the water meter without the water meter having to be dismantled in any way. It is the responsibility of the customer/user to move belongings, material, or property to insure reasonable conditions of access.

5. There shall be no obstruction of any sort which would necessitate the reaching around, through, behind, under, or over in order to perform usual and necessary work. Nor shall there be any obstruction which would impair the clear vision of the water meter. The area around the water meter shall be fully sufficient for a person to place his body squarely before and in close proximity to the water meter, have a clear view of the meter, and have room to operate customary tools without hindrance.

6. Whenever security considerations necessitate that access to a water meter be controlled through the use of a lock, alarm, or other such device, the customer/user shall make known to the Superintendent the procedures to be followed for ready access through such locks, alarms, or other security arrangements.

531.00 BACKFLOW CONTROL

531.01 GENERAL

1. All work and materials must be acceptable to the engineer.

2. All work and materials are subject to inspection by the City of Longmont at all times.

3. Property owners shall ensure all privately owned backflow devices be tested on a schedule determined by the City, by a Certified Cross Connection Control Technician.

4. Modification, alteration or relocation in backflow device equipment must be approved by the City.

5. All work necessary to achieve installation of a backflow prevention device or assembly shall be inspected. Inspections will be required as follows:

a. Any work on a water service line, including all piping valving work, and underground vaults shall be approved by a Water Department Inspector prior to any backfilling.

b. Backflow prevention device sets, device installation, and discharge piping where appropriate, shall be approved by City Water/Wastewater Operations and Maintenance personnel prior to device installation.

c. For commercial and multi-family, no Certificate of Occupancy will be issued without an approved inspection and device test result submitted to the Water/Wastewater Operations and Maintenance Division.

6. Backflow prevention devices shall be required on the domestic line for commercial, industrial, and multi-family units where four (4) or more units are connected by a common meter and tap.

7. The specific make, model, and manufacturer shall be found in the most recent listing published by The Foundation for Cross-Connection Control and Hydraulic Research of the University of Southern California's (FCCC&HR) "List of Approved Backflow Prevention Assemblies." In the cases of single family residences, the assemblies shall bear the approval of the American Society of Sanitary Engineers (ASSE).

8. Backflow prevention devices that are to be owned by the City shall be of a make and model as shown on the Approved Materials List.

531.02 BACKFLOW PREVENTION DEVICES REQUIRED

1. An approved backflow prevention device or assembly used for protection by containment is required on any water service line whenever there is an actual or potential situation when backflow due to backpressure and/or backsiphonage can occur.

2. The City Water/Wastewater Operations and Maintenance staff shall make an inventory of water use in any facility or location which is supplied potable water from the City's water distribution system to determine the degree of hazard which might exist.

3. On remodels or retrofit situations, subsequent to the hazard inspection, the City Water/Wastewater Operations and Maintenance staff will notify the customer of the type of backflow prevention device required.

4. Where hazards are largely unknown or hazard inspections cannot be conducted for whatever reason the highest degree of protection may be required.

531.03 OWNERSHIP

1. Backflow prevention devices shall be privately owned and maintained by the property owner.

2. Backflow prevention devices used for protection by containment remain with a premise and are not transferable to another premise, property, area, or street address.

3. Only properly trained and certified cross-connection control personnel are permitted to install, repair, replace, relocate, maintain, test, certify, modify, or otherwise affect the internal workings of a backflow prevention device.

531.04 DESIGN REQUIREMENTS

1. Definitions

AIR GAP: The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture, pool, or other device and the flood level rim of said vessel or container. An approved air-gap shall be at least double the diameter of the supply pipe, measured vertically, above the flood level rim of the vessel or container; and, in no case less than one (1) inch.

BACKFLOW: Refer to Ordinance 14.06.010 Definitions.

BACKPRESSURE: Refer to Ordinance 14.06.010 Definitions.

BACK SIPHONAGE: Refer to Ordinance 14.06.010 Definitions.

CONTAINMENT: Refer to Ordinance 14.06.010 Definitions.

CERTIFIED CROSS-CONNECTION CONTROL TECHNICIAN: Refer to Ordinance 14.06.010 Definitions.

APPROVED TESTING LABORATORY: The Foundation for Cross-Connection Control and Hydraulic Research of the University of Southern California (FCCC&HR) and the American Society of Sanitary Engineers (ASSE).

2. Location requirements

a. Backflow prevention devices or assemblies used for protection by containment shall be located on the building side of City owned water meters.

b. Backflow prevention devices or assemblies used for protection by containment shall be located such that all water entering the premise or property through the water service line shall pass through the device or assembly prior to any use by the customer/user. There shall be no fitting, fixture, or other means capable of diverting water form the service line before the device. The exceptions are as follows:

1. There may be closed loop bypass around the backflow prevention device or assembly, provided the bypass itself has in it a similar type approved backflow prevention device or assembly. The purpose shall only be to insure continuous water delivery while one device or assembly is undergoing testing, maintenance, repair, or replacement.

2. Landscape irrigation systems may be teed before the backflow prevention device used for containment, provided such systems are themselves properly equipped with an approved backflow prevention device or assembly.

3. The City may authorize more than one approved backflow prevention device or assembly when physical conditions in a retro-fit situation pose unusual problems to the installation of a single device or assembly.

3. Underground vaults

a. The user/customer has the sole responsibility to determine the potential loads an underground vault will require and shall provide the structural strength required.

b. Site plans and construction details for proposed installation of underground vaults which will be subjected to the loads of motor vehicles shall be submitted to and receive the approval of the engineer prior to the commencement of construction. Whenever possible, the siting of underground vaults in streets, roadways, driveways, alleys, or parking lots will not be allowed. The location of underground vaults on any premise where there is any routine handling of petroleum products, chemicals, hazardous, or toxic materials shall be such that spillage, flow, or runoff of those materials will be away from the underground vault. Care shall be taken that ground slope, landscaping, and other provisions for runoff will not cause any accumulation of such materials inside, over, or adjacent to the vault.

4. Pressure Increases

a. Most backflow prevention devices and assemblies, by the very nature of their design, do not allow any release of pressure which may build up on the customer/user's side of the piping or plumbing system to escape back to the City's water distribution system. Customer/users must insure that there is adequate protection from increases in water pressure on the downstream or user's side of a backflow prevention device or assembly.

THE CITY DOES NOT ACCEPT NOR TAKE ANY RESPONSIBILITY NOR LIABILITY FOR DAMAGES OF WHATEVER KIND WHICH MAY BE OCCASIONED BY OR RELATED TO AN INCREASE OR DECREASE IN PRESSURE IN THE PIPING OR PLUMBING SYSTEM DUE TO THE INSTALLATION OR OPERATION OF AN APPROVED BACKFLOW PREVENTION DEVICE OR ASSEMBLY.

b. The customer/user shall maintain in good working order pressure relief valves on his hot water tanks, boilers, and hot water heating systems. Further, the customer/user shall install and maintain whatever additional pressure relief valves, water hammer arrests, pressure expansion tanks, or other means deemed prudent and wise.

5. Shutoff valves

a. The customer/user shall cause to be installed and shall maintain in good operating order a curb stop and at least one (1) other valve in the service line before the backflow prevention device or assembly used for protection by containment. Both the curb stop and additional valve shall be capable of fully stopping all water flows into the device or assembly. The isolating valves on the

backflow prevention devices or assemblies are not to be considered in lieu of these valves. The isolating valves are to be used only for testing and certifying the device, not for the control of water flow through any piping or plumbing system.

6. Drainage

   a. Certain types of approved backflow prevention devices and assemblies are specifically designed to dump or vent water to the atmosphere as an expected part of their operation. The customer/user shall be responsible for providing whatever drainage work may be needed to control and carry away water which may be dumped or vented by such devices or assemblies.

   b. The City accepts no responsibility nor liability for damages or injury caused or related to the dumping or venting of water, or water mixed with other materials.

   c. Reduced pressure principle devices (RP devices) may dump or vent large quantities of water under pressure. These devices or assemblies are equipped with an air gap funnel to catch the dumped or vented water. The customer/user shall provide whatever piping is necessary from the outlet side of the air gap funnel to effectively and safely carry away and dispose of any dumped or vented water or water mixed with other substances.

7. Stop and Waste Valves

   a. Stop and waste valves on the upstream side of a backflow control device will be allowed only if the valves can vent to daylight. No upstream stop and waste valve may be buried nor be situated such that it is, or potential can be, submerged by the water it vents or dumps, any other water, or any other liquids.

531.05 MATERIALS

1. Materials shall be in accordance with the APPROVED MATERIALS LIST.

2. No solder containing lead shall be used. All soldering fluxes, plumbing pastes, pipe dopes, sealants, coatings, gaskets, and similar materials which may come into contact with potable water must be non-toxic and approved for general plumbing use.

531.06 ACCESS - BACKFLOW PREVENTION

1. Free, easy, and ready access for the purposes of testing, certification, repair, maintenance, or replacement shall be provided to backflow prevention devices or assemblies used for protection by containment at any reasonable hour.

2. All backflow prevention devices have to be periodically tested and certified, most of them annually. The customer/user shall take whatever measures are necessary for providing this periodic access to the device or assembly for the purposes of testing and certification.

3. There shall be a clear line of access to the backflow prevention device or assembly. This access line shall be free of any impediment, including safety hazards, to the movement of personnel and necessary tools, equipment, or material.

4. Lines of access and openings governing access to the device set shall be large enough to accommodate the passage of the backflow prevention device or assembly without the device or assembly having to be dismantled in any way. It is the responsibility of the customer/ user to move belongings, material, or property to insure reasonable conditions of access.

5. There shall be no obstruction of any sort which would necessitate the reaching around, through, behind, under, or over in order to perform usual and necessary work. Nor shall there be any obstruction which would impair the clear vision of the device set. The area around the device set shall be fully sufficient for a person to place his body squarely before and in close proximity to the device set, have a clear view of the set, and have room to operate customary tools without hindrance.

6. Whenever security considerations necessitate that access to a backflow prevention device or assembly be controlled through the use of a lock, alarm, or other such device, the customer/user shall make known to the superintendent the procedures to be followed for ready access through such locks, alarms, or other security arrangements.

531.07 SPACE AND LOCATION REQUIREMENTS

1. The following requirements shall apply to backflow prevention device or assembly sets in all newly constructed structures or facilities and, where reasonable, in all retro-fit situations:

    a. A minimum vertical distance of twelve (12) inches shall exist between the ground or floor and the lowest point on the device or assembly, including the air gap funnel on reduced pressure principle (RP) devices.

    b. The lowest point on the device or assembly shall not exceed thirty (30) inches above the floor, ground, or a firm, permanent footing surface.

    c. The closest side of the device or assembly sized two (2) inch and smaller shall not be less than two (2) inches from any wall or obstruction and shall be at least four (4) inches from any surface which is subjected to freezing temperatures on its other side. Larger devices or assemblies which require companion flanges for installation shall have a minimum clearance of twelve (12) inches from the closest wall or obstruction.

    d. At least one side of the device or assembly shall be open to ready and easy access.

    e. The piping side of all unions and companion flanges shall allow sufficient room to introduce bolts, nuts, and use usual tools. In no case shall the piping side of a union or companion flange be closer than four (4) inches to a wall, floor, or other obstruction.

    f. There shall be at least twelve (12) inches of clearance between the test cocks and any adjacent wall, fixture, or ceiling.

    g. No device or assembly set shall be installed in or above a ceiling.

h. No device or assembly shall be located such that any vented or dumped water cannot be safely carried away without damaging property.

i. No device or assembly, including any air gap funnel, shall be located such that it is likely to be submerged in the water it vents or dumps, in ground water, or in other water or liquids which may be present.

j. No device or assembly shall be located either above or below a hazardous location, such as a chemical mixing tank, electrical apparatus, electronic equipment, or a storage site for chemicals or other hazardous materials.

k. All devices or assemblies shall be located such that they are protected against vandalism, mischief, and deterioration due to atmospheric conditions. Customers/users who are retro-fitting the backflow prevention device set may request a variance to the above requirements when they deem them to be unduly burdensome. Such request should be directed to the City Water/Wastewater Operations and Maintenance Division which will make an investigation and render a decision.

531.08 INSTALLATION REQUIREMENTS FOR AIR GAPS

1. Properly constructed and located air gaps are approved for protection by containment for all degrees of hazard. Air gaps used for protection by containment are most commonly used for applications on tank loading stations, pools used for swimming, wading, or therapy, chemical processing tanks, and sumps or tanks which provide water for pumping. Air gaps shall conform to the following:

   a. They shall be located downstream of the City water meter.

   b. They shall be constructed such that no hose, piping arrangement, or other fixture may be attached to defeat the air gap separation. This includes any solid funnel arrangement installed to prevent splashing.

   c. They shall be constructed such that the potable water supply line is at a vertical distance of not less than two inside pipe diameters (of the potable supply line) above the flood level of the receiving vessel, and in no case shall the air gap between the potable line and the receiving vessel be less than one (1) inch.

   d. When the potable supply line discharge is within two (2) inside pipe diameters of any wall or protrusion, the required vertical air gap between the potable supply discharge and receiving vessel shall be extended to a minimum of three (3) inside pipe diameters of the potable supply line, or two (2) inches, whichever is greater.

   e. There shall be adequate drainage arrangements to handle full volume overflows of the receiving vessel.

   f. The water supply or service line shall be protected from freezing.

g. Air gaps used for protection by containment shall be considered approved backflow prevention devices and shall be inspected at least annually.

531.09 INSTALLATION REQUIREMENTS - REDUCE PRESSURE PRINCIPLE (RP) OR REDUCED PRESSURE DETECTOR CHECK (RPDC) DEVICES OR ASSEMBLIES

1. A reduced pressure principle (RP/RPDC) device or assembly shall be installed for protection by containment whenever the degree of hazard is high and there is a potential risk of contamination to the City's water distribution system. RP/RPDC devices or assemblies shall be installed at any premises or location where toxic or hazardous materials are routinely handled or present. RP/RPDC devices or assemblies shall meet the following:

   a. When installed horizontally, they shall be in an upright position, essentially plumb, and with the relief valve pointed down. RP/RPDC devices or assemblies larger than two (2) inches in size must be installed horizontally.

   b. RP devices two (2) inches and smaller may be installed in a vertical position provided the water flow will be in an upward direction through the device or assembly. Such installations require the addition of a vent elbow such that the outlet of the air gap funnel will be pointing down.

   c. RP devices two (2) inches and smaller shall be equipped with full port/quarter turn ball isolating valves.

   d. RP/RPDC devices sized two and one-half (2½) inch and larger are normally provided with resilient seat butterfly type isolating valves. OS & Y type gate valves can be substituted for the butterfly valves when the device or assembly is to be used in a fire suppression water line.

   e. RP/RPDC devices shall be protected against frost and freeze damage.

   f. RP/RPDC devices shall not be installed in underground vaults unless such vaults have a drain to daylight which is capable of carrying the maximum possible discharge from the device. The drain shall be provided with a twenty-four (24) mesh non-corrodible screen at the discharge to prevent any material from entering the waste line and creating a plug. A sump pump shall not be utilized in lieu of a drain to daylight.

   g. Installation of an RP/RPDC device above ground in a small enclosure is acceptable provided that the enclosure has non-corrodible screened opening(s) which will provide the necessary drainage without the air gap funnel being submerged in the vented or dumped water.

   h. RP/RPDC devices installed inside structures may have a drainage line through an exterior wall to daylight provided any dumped or vented water exiting the drain line will not pose a hazard to the public. Such drain line shall be equipped with a non-corrodible screen at the discharge opening.

i. RP/RPDC devices may have drain lines connected to a sewer system, provided a building permit is obtained and a City plumbing inspector approves the sewer system connection.

j. The City may elect to remove the operators or handles from the isolating valves or to chain them together to prevent unauthorized operation of the isolating valves.

531.10 INSTALLATION REQUIREMENTS FOR DOUBLE CHECK VALVE (DCV) DEVICES OR ASSEMBLIES

1. A double check valve (DCV) device or assembly shall be installed if the degree of hazard is low, with little or no risk of bodily harm should the device or assembly fail. Customers/users or contractors have the option of substituting a reduced pressure principle device or air gap for a DCV. DCV devices shall conform to the following:

   a. When installed horizontally, DCV devices or assemblies shall be in an upright position and essentially plumb.

   b. DCV devices may be installed vertically, provided, the water flow is in an upward direction through the device.

   c. DCV devices two (2) inches and smaller shall be equipped with full port/quarter turn ball isolating valves.

   d. DCV devices sized two and one-half (2½) inches and larger are normally provided with resilient seat butterfly type isolating valves. OS & Y type gate valves can be substituted for the butterfly valves when the device or assembly is to be used in a fire suppression water line.

   e. DCV devices shall be protected against frost and freeze damage.

   f. DCV devices may be installed in underground vaults, either alone or in conjunction with water meters. The following provisions shall be met:

      1. Vaults must be a minimum of four (4) feet in diameter for DCV devices sized two (2) inches and smaller. Vaults for larger DCV devices shall conform to the minimum space requirements on the appropriate Engineer's approved detail drawing.

      2. Standard water meter pits cannot be used for DCV installations.

      3. Vaults containing both water meters and DCV devices must provide sufficient working room to perform usual maintenance, repair, or replacement of both the water meter and the DCV device.

      4. Vaults must satisfy all access and siting requirements.

      5. Vaults must provide that the DCV not be submerged due to high water tables, infiltration of ground waters, or infiltration by surface runoff. Properly screened drains to daylight, sump pumps, or water proof

construction may be required to ensure the DCV is not subjected to submersion.

g. Installation of a DCV device above ground in a small enclosure is acceptable, provided that the enclosure provides the necessary frost protection and conditions of access.

h. The City may elect to remove the operators or handles from the isolating valves or to chain them together to prevent unauthorized operation of the isolating valve

531.11 INSTALLATION REQUIREMENTS FOR PRESSURE VACUUM BREAKER (PVB) DEVICES OR ASSEMBLIES

1. Pressure vacuum breaker (PVB) devices or assemblies shall only be used for protection by containment for water service lines supplying landscaping irrigation systems. PVB devices cannot be used in lieu of reduced pressure principle or double check valve devices or assemblies. PVB devices shall conform to the following:

a. PVB devices shall be installed in an upright position and essentially plumb.

b. PVB devices shall be installed with the critical level mark, or bottom of the device if it has no critical level mark, a minimum of twelve (12) inches above the highest point of downstream usage.

c. PVB devices shall not be installed where they are, or where they will be subjected to backpressure. However, they can be subjected to continuous line pressure, provided it is not greater than the water pressure on the supply side of the device.

d. PVB devices used for protection by containment of a landscaping irrigation system shall be equipped with full port/quarter turn isolating ball valves.

e. PVB devices can have valves, including "stop and waste" type, on their downstream side.

f. PVB devices shall be protected against frost and freeze damage. Air ports for winterizing the device by means of blowing out water are acceptable upstream of the PVB device provided the air port is not, nor is likely to be, submerged.

g. Installation of a PVB device above ground in a small enclosure is acceptable provided that the enclosure provides the necessary conditions of access and adequate drainage.

531.12 INSTALLATION REQUIREMENTS-ATMOSPHERIC VACUUM BREAKER (AVB) DEVICES OR ASSEMBLIES

1. Atmospheric vacuum breaker (AVB) devices or assemblies shall only be used for protection by containment for water service lines supplying landscaping irrigation systems. AVB devices cannot be used in lieu of pressure vacuum breaker, reduced pressure principle, or double check valve devices or assemblies. AVB devices shall conform to the following:

a. AVB devices shall be installed in an upright position and essentially plumb.

b. AVB devices shall be installed with the critical level mark, or the bottom of the device if it has no critical level mark, a minimum of six (6) inches above the highest point of downstream usage.

c. AVB devices shall not be installed where they are, or where they will be, subjected to backpressure from any cause. There cannot be any valves of any type downstream of the AVB device, nor can AVB devices be used in situations where the floating check disk or poppit will be in a closed position for more than twelve (12) continuous hours.

d. AVB devices used for protection by containment of a landscaping irrigation system shall be installed in each zone of the irrigation system, downstream of all solenoid or zone control valves, such than when the water supply to each zone is shut-off, the float check disk, or poppit, will immediately drop.

e. AVB devices shall be protected against frost and freeze damage. Air ports for winterizing the device by means of blowing out water are acceptable upstream of the AVB device provided the air port is not, nor is likely to be, submerged.

531.13 INSTALLATION REQUIREMENTS FOR IN-LINE DUAL CHECK (IDC) DEVICES OR ASSEMBLIES

1. In-line dual check (IDC) devices or assemblies are approved for residential and commercial locations where potable water use is limited to drinking, family cooking, bathing, and washing. The IDC device or assembly can only be installed when the lowest degree of backflow hazard exists. The IDC device or assembly shall not be subjected to any backpressure condition. IDC devices or assemblies shall conform to the following:

   a. IDC devices or assemblies shall be considered for protection by containment only when they are configured with a water meter setter or resetter. By themselves, dual in-line checks are not approved for containment unless the application has been specifically authorized by the Superintendent.

   b. IDC devices or assemblies offer the least amount of protection against backflow. The City reserves the right to require all IDC devices or assemblies to be upgraded to devices or assemblies offering higher degrees of protection at any time it is considered wise or prudent. Customers/users are strongly urged to treat IDC devices or assemblies as a temporary compliance of having a backflow prevention device installed.

   c. IDC devices or assemblies shall not be considered in lieu of any other required backflow prevention device or assembly.

   d. The City reserves the right to require that previously installed IDC devices or assemblies not so equipped to be retro-fitted with venting or pressure relief ports, testing ports, and/or other means which would increase their effectiveness as a backflow preventor.

e. All IDC devices shall meet the appropriate standard of the ASSE.

531.14 BACKFLOW PREVENTION DEVICE SETS

1. The backflow prevention device set and connected piping or plumbing shall be firmly supported so that there is no centerline misalignment in the device set when the device or assembly is not in place. The backflow prevention device or assembly is not to be used to support nor bear the weight of other components in plumbing or piping system.

2. No part or component of the device set is to be used for any purpose other than holding and securing the backflow prevention device or assembly in place.

3. In no case shall the backflow prevention device set allow the device or assembly to rest directly upon a lower weight bearing surface. Removable blocking or approved jacks shall be used between the device or assembly and the bearing surface to provide needed support to the device or its set. Such blocking shall be of cement block, brick, or similar non-biodegradable materials.

4. Only bottom support as provided by movable blocking or approved jacks shall be in contact with the backflow prevention device or assembly. No strapping, pipe hangers, or similar supporting devices shall be attached or connected to the device or assembly itself.

5. All backflow prevention device sets shall be thoroughly flushed to remove all Construction debris and foreign matter from them and the service line or plumbing system piping prior to device installation.

531.15 TESTING AND CERTIFICATION OF BACKFLOW CONTROL DEVICES OR ASSEMBLIES

1. Testing of Backflow Control Devices is the responsibility of the property owner. Devices must be tested by a Certified Cross-Connection Control Technician prior to the issuance of a Certificate of Occupancy. The successful test results must be provided to the City before a Certificate of Occupancy will be issued.

2. Each year after the first test, the property owner will be notified in writing by the City of the need to recertify the Backflow Control Devices at each property. The property owner will have sixty (60) days to have all Backflow Control Devices on the referenced property tested by a Certified Cross-Connection Control Technician. If the testing is not completed in the sixty (60) days, the City may terminate water service to the property.

3. The inspections, tests, and replacement of Backflow Control Devices shall be the expense of the property owner.

4. Testable backflow assemblies for lawn sprinkler system of single family residences where there is no injection or mixing of fertilizer or any other foreign substances shall be tested on a schedule determined by the City.

5. Repair Parts

a. Only replacement parts produced by or specifically recommended by the Backflow Control Device manufacturer shall be used in the repair of the Backflow Control Devices.

b. The reuse of parts from check valves by reversing the part will not be allowed.

6. All testing gauges used by Certified Cross-Connection Control Technicians shall be check for accuracy at least yearly, and proof of testing shall be provided to the City upon request.

531.16 RECORDS AND REPORTS

1. All testers will use test forms approved by the City. All inspections, tests, and maintenance will be recorded on said forms.

2. Within ten (10) days of the completion of inspections, tests, or maintenance, a completed form must be submitted to the City and to the property owner.

3. A Certified Cross-Connection Control Technician shall attach a tag to the

531.17 CERTIFIED CROSS-CONNECTION CONTROL TECHNICIAN CRITERIA

1. Certified Cross-Connection Control Technicians shall provide the following information to the City. The information will be included in a backflow prevention tester's list of certified testers in the area. The information can be mailed or faxed to:

City of Longmont Water/Wastewater Department
1100 S Sherman St - Building 4
Longmont, CO 80501
FAX (303) 651-8812

a. Copy of current Cross Connection Control and Backflow Tester Certificate.

b. Test kit calibration certificate from an authorized manufacturer's calibration/repair laboratory or an ISO 9002 certified calibration/repair laboratory for instrument repairs or measurements. Document calibration must be National Institute of Standards and Technology (NIST) traceable and meet the current ASME/ANSI B40.04 standards.

c. The certified calibration report shall include the following:

1. Indicate minimally the descending reading at 10, 7, 5, 2, 1, and 0 PSID with a minimum required tolerance range of +/- 0.1 PSID.

2. Data as found (data prior to any adjustment of the test kit).

3. After calibration data or returned information documented (data after adjustment, if required)

d. Must be licensed by the City

531.18 BACKFLOW PREVENTION DEVICES ON IRRIGATION SYSTEMS

1. Per the requirements of the International Plumbing Code, all landscaping irrigation systems which use potable water shall be equipped with a proper backflow prevention device. The City Building Inspection Department will inspect all residential irrigation systems. Inspections of multi-family, commercial, and commercial irrigation systems will be inspected by the City Water/Wastewater Department. Testing of all devices will be by a Certified Cross-Connection Control Technician or properly trained personnel.

2. Water service lines which are dedicated solely to supplying irrigation water shall conform to all appropriate procedures and conditions based upon a hazard inspection and a determination of the necessary type of device and its installation as required for protection by containment.

3. Landscaping irrigation systems which are supplied with potable water by means of a tee in a water service line which also supplies water for other uses shall conform to the following:

    a. Air gap separations and reduced pressure principle (RP) devices or assemblies shall be acceptable in all situations.

    b. All irrigation systems which have pumps, or other means of producing backpressure, chemical injection of any kind or type, or are capable of using water from another source, shall be equipped with air gap separation or reduced pressure principle (RP) devices or assemblies.

    c. All irrigation systems which do not produce any backpressure and utilize only potable water from the City's distribution system may be equipped with a reduced pressure principle valve (RP), pressure vacuum breaker (PVB), or atmospheric vacuum breaker (AVB) devices or assemblies, provided, each type of device is installed in conformance with its appropriate installation requirements.

    d. Each and every pipe, water line, or other means used to provide potable water to an irrigation system shall have an approved backflow prevention device or assembly installed in it.

531.19 BACKFLOW PREVENTION DEVICES ON FIRE SUPPRESSION LINES

1. Unless otherwise required by ordinance, all newly constructed or modified fire suppression systems using potable water from the City's water distribution system shall be required to have an approved backflow prevention device or assembly installed. Modified shall mean any expansion, piping alteration or realignment, rebuilding, or piping replacement in an existing system. Such fire suppression systems shall conform to the following:

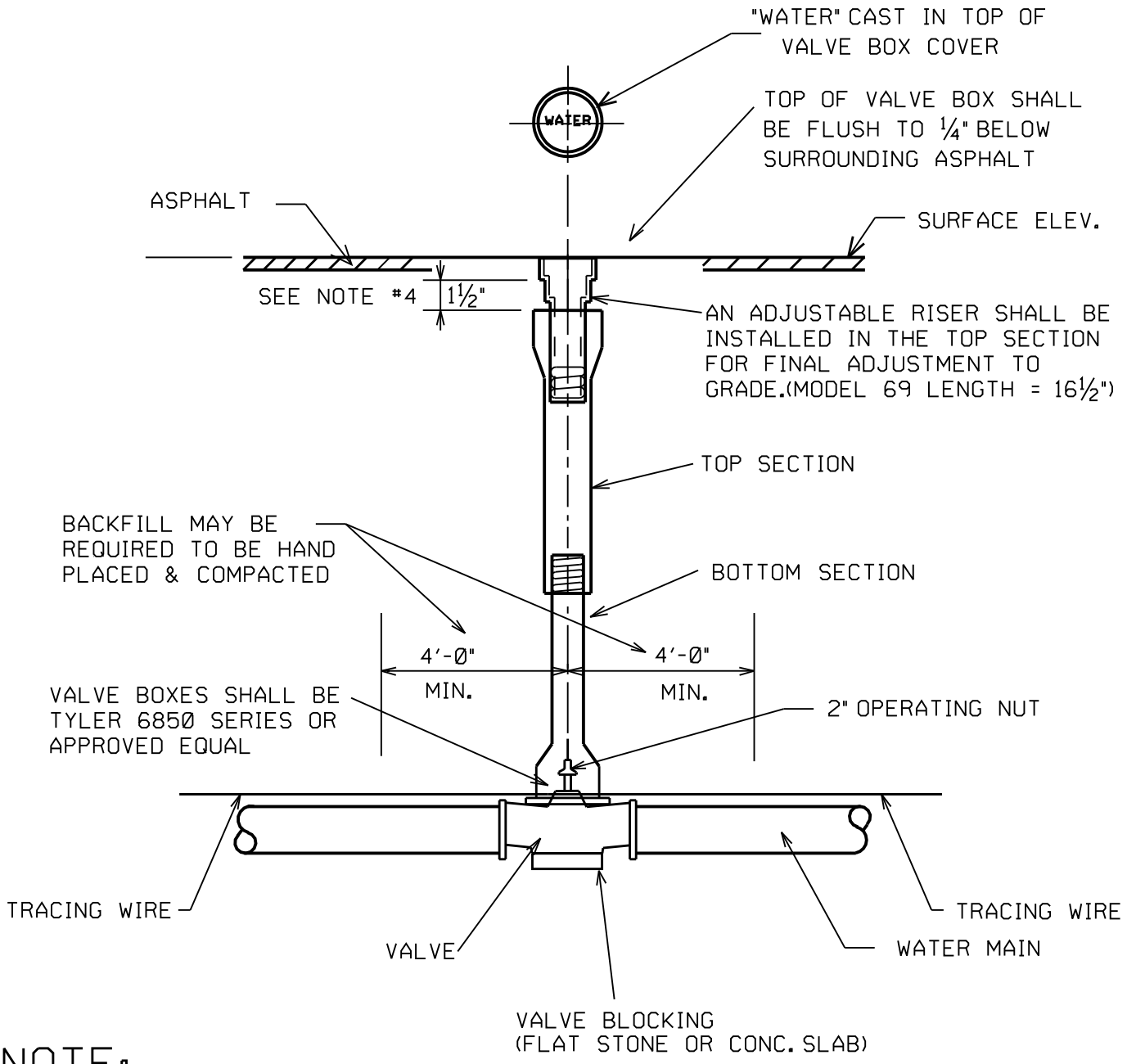
    a. Reduced pressure principle (RP) devices or assembles shall be installed whenever any chemical additive, pump, injection, or other means of producing backpressure, except for a “siamese” type connection, is present. RP devices or assemblies shall also be installed in any situation where a second source of water is utilized, or may be utilized. All other fire suppression lines shall be protected with a double check backflow prevention device.

b. All backflow prevention devices or assemblies shall conform to their appropriate installation requirements.

c. Where a single water service line is used for supplying domestic water and fire suppression water, both the portion of the piping system supplying the domestic water and the portion supplying fire suppression water shall have installed the appropriate backflow prevention devices or assemblies.

532.00 TEMPORARY WATER USE-PERMIT REQUIRED

1. Temporary use of potable water from the City's water distribution system by means of a temporary water tap, a temporary service line, a fire hydrant, or other devices shall require a permit from the City, subject to availability. Said permit shall include provisions for payment of water used, installation of a meter, installation of an appropriate backflow prevention device, deposit and daily rental charge. For temporary hydrant water, only City designated ("blue top") fire hydrants may be used unless otherwise approved on the permit. The City will require a minimum of two working days advance notice prior to the issuance of any temporary water use permit. At its sole discretion, the City may suspend temporary water use permits with one (1) week’s notice.



NOTE:

1) VALVE BOX SHALL NOT BE SUPPORTED BY THE WATER LINE.
2) VALVE BOX TO BE PLUMB AND CENTERED OVER NUT.
3) VALVE BOX DETAIL SHALL APPLY TO BOTH NEW INSTALLATION & ADJUSTMENT OF EXISTING VALVES.
4) THE MAXIMUM DISTANCE THAT THE SCREW-IN RISER MAY EXTEND ABOVE THE TOP SECTION, WHEN INITIALLY INSTALLED, SHALL BE 1½ INCHES.
5) WHEN ADJUSTING EXISTING VALVE BOXES, RECONNECT EXISTING TRACING WIRE IF PRESENT.

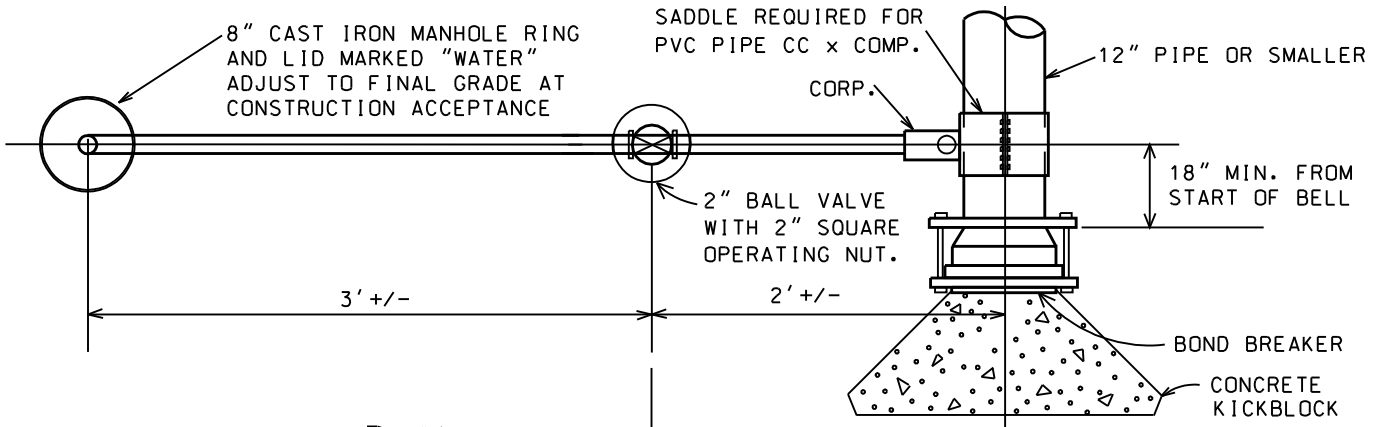
VALVE BOX DETAIL

NTS

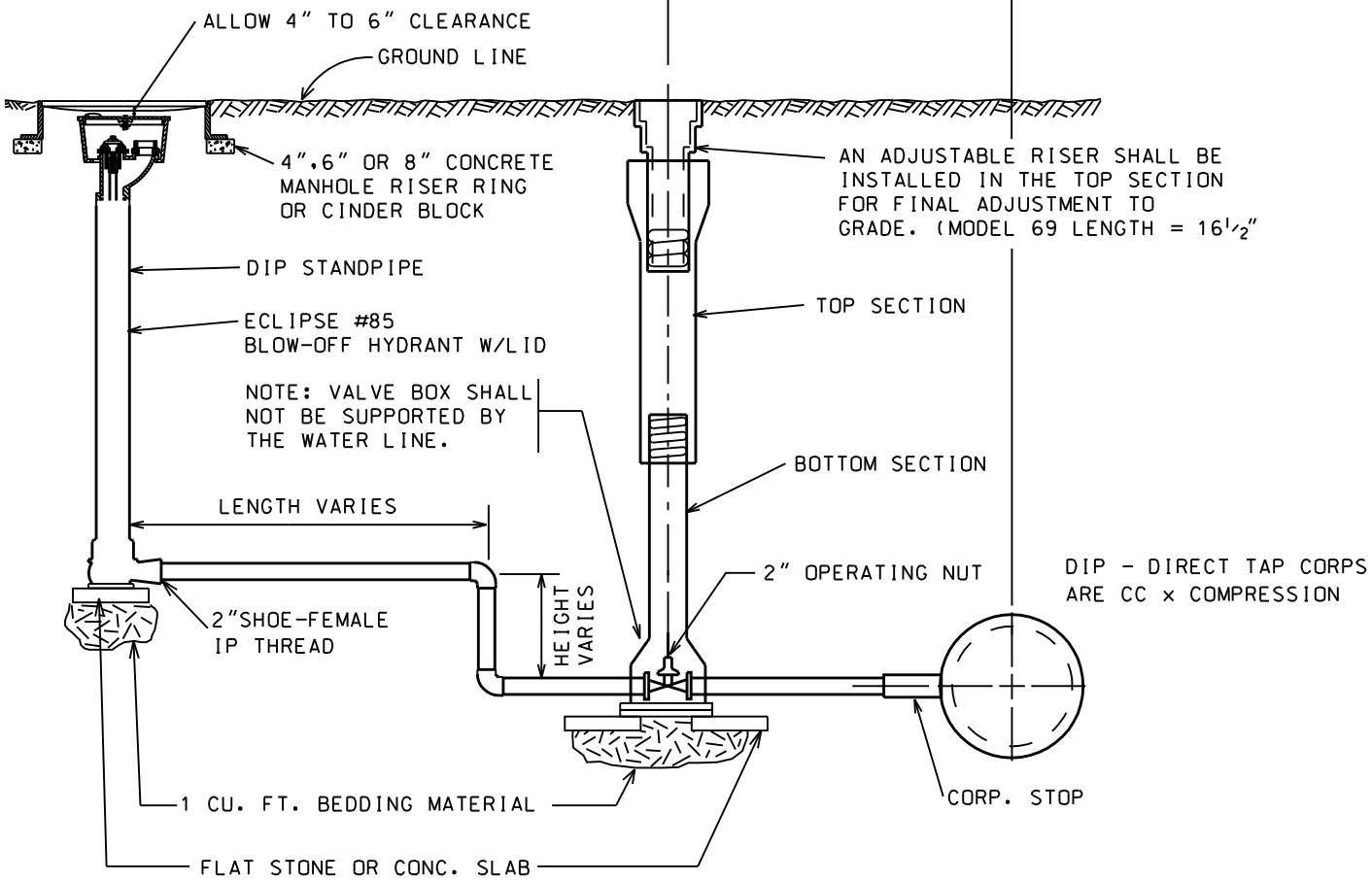
4-99 JR

NOTES:

1) PLUG SHALL BE MECHANICALLY RESTRAINED:
2) 2" BLOW OFF PIPING MAY BE BRASS WITH THREADED BRASS FITTINGS OR TYPE K SOFT COPPER WITH BRONZE THREADED x COMPRESSION FITTINGS.



PLAN



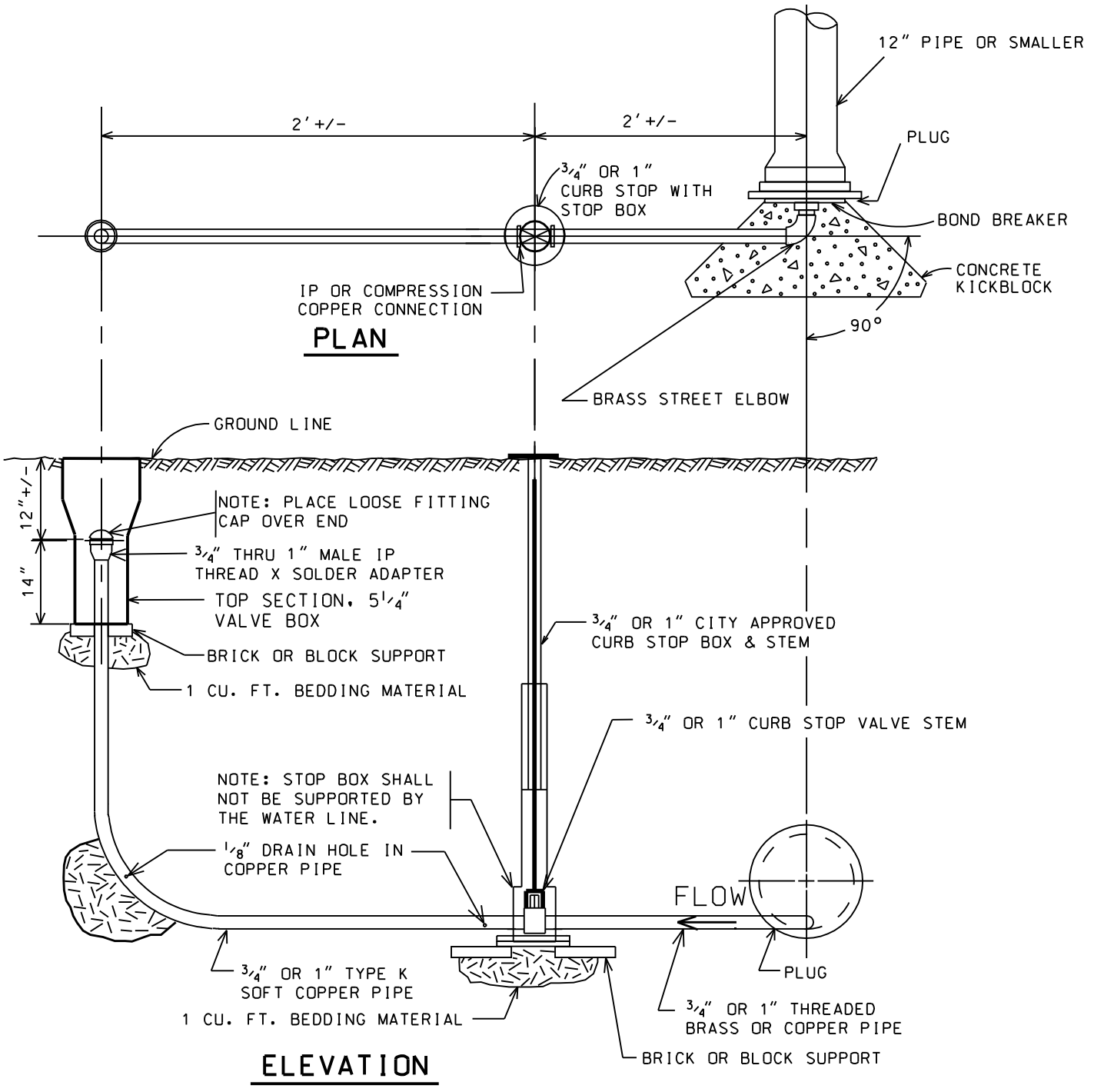
ELEVATION

STD. BLOW-OFF INSTALLATION FOR 12" & SMALLER PIPE

NTS

REV 3-19-93 BM
REV 3-12-99 JR

500-02A



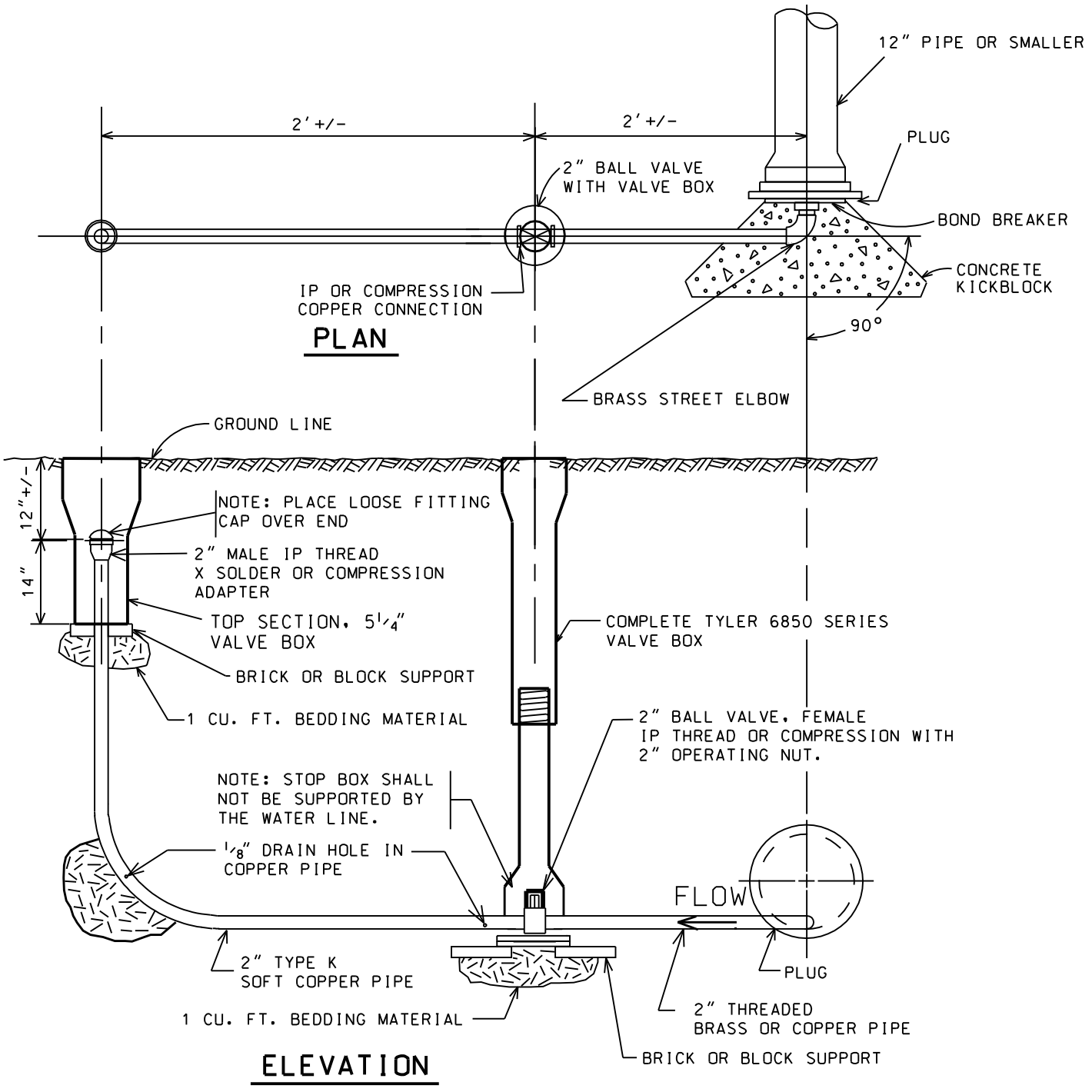
TEMPORARY 3/4" & 1" BLOW-OFF INSTALLATION FOR 12" & SMALLER PIPE

NTS

REV.DATE	BY	APPROVED
7-18-02	JR/AM	
10-10-02	JR	

CITY OF LONGMONT COLORADO

500-02B

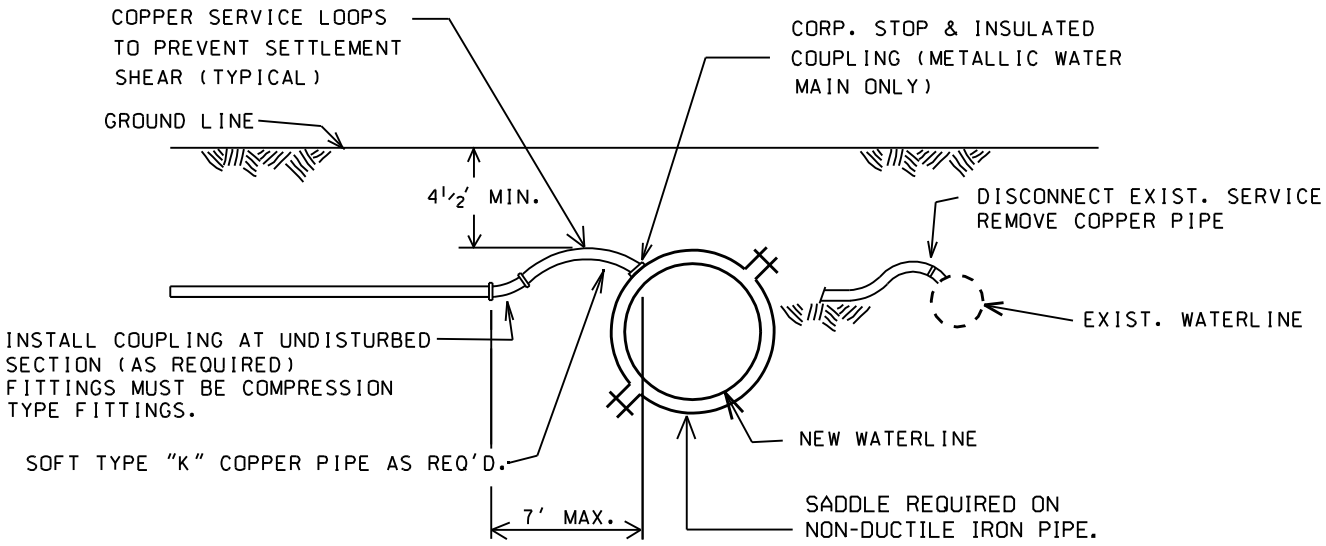


TEMPORARY 2" BLOW-OFF INSTALLATION FOR 12" & SMALLER PIPE

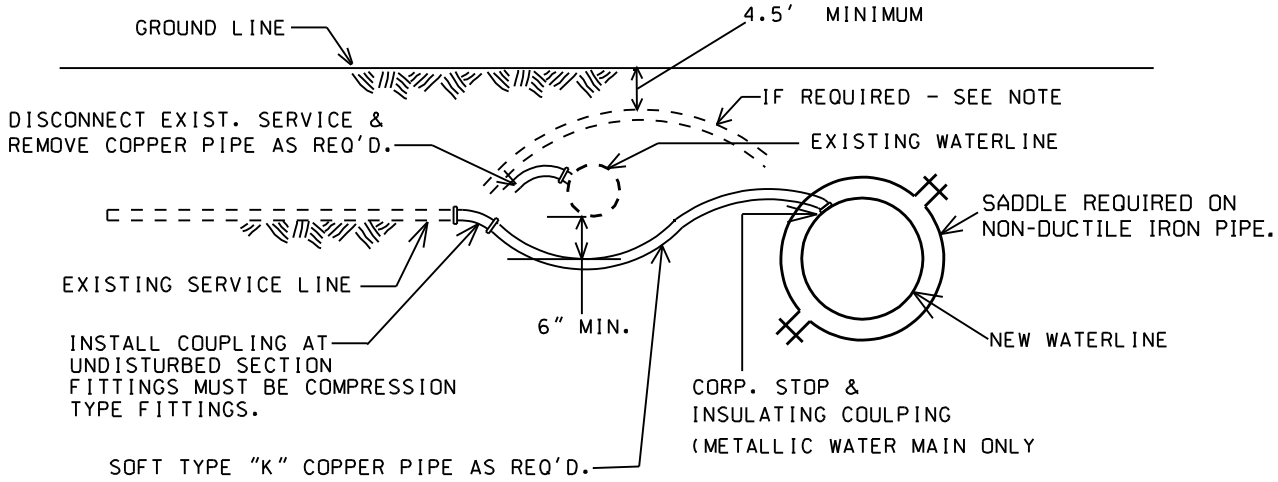
NTS

REV.DATE	BY	APPROVED
7-18-02	JR/AM	
10-10-02	JR	

CITY OF LONGMONT COLORADO



SERVICE RECONNECT (SHORT)



SERVICE RECONNECT (LONG)

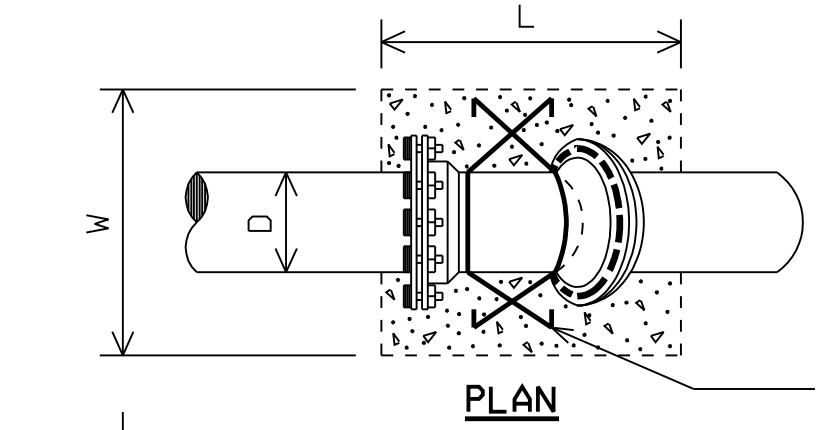
NOTE:

IF THE EXISTING WATERLINE IS AT SUCH A DEPTH THAT THE NEW LONG SERVICE CAN BE INSTALLED OVER THE EXISTING WATERLINE AND STILL MAINTAIN 4' - 6" MINIMUM GROUND COVER. THE SERVICE MAY BE CONNECTED AS SHOWN IN THE ABOVE DETAIL. THE CONTRACTOR SHALL OBTAIN APPROVAL FROM THE ENGINEER PRIOR TO CONSTRUCTING THE SERVICE CONNECTION IN THIS MANNER.

WATER SERVICE LINE RECONNECTS

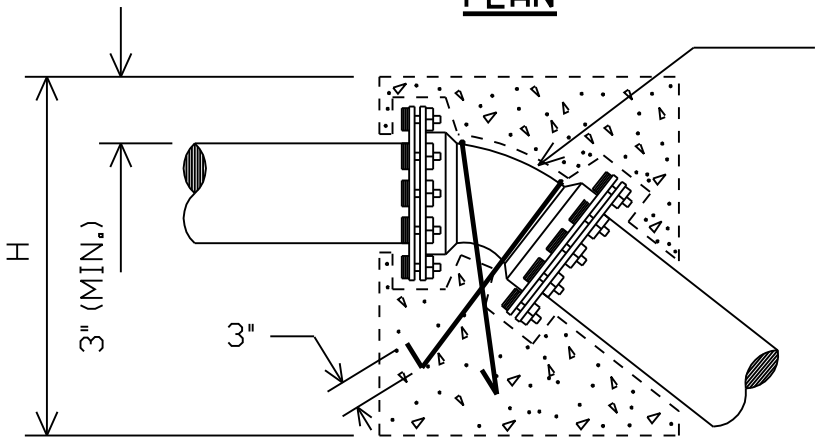
NTS

REV 3-19-93 BM
REV 7-18-02 JR



PLAN

#5 REBARS LOOPED OVER BEND. EMBEDMENT LENGTH IN CONCRETE IS EQUAL TO (E) IN TABLE BELOW.



BONDBREAKER (TYPICAL)

REBARS EXPOSED TO EARTH SHALL BE COATED WITH BITUMINOUS PAINT.

PROFILE

SIZE OF PIPE (D)	11 1/4 DEG.					22 1/2 DEG.					45 DEG.				
	L"	W"	H"	E"	VOL	L"	W"	H"	E"	VOL	L"	W"	H"	E"	VOL
4"	12	24	24	12	4	12	34	34	12	8	22	37	32	22	15
6"	18	32	27	18	9	15	52	40	15	18	28	64	32	28	33
8"	21	40	33	21	16	22	61	40	22	31	35	64	45	35	58
10"	24	50	36	24	25	30	59	48	30	49	42	72	52	42	90
12"	31	56	36	31	36	36	70	48	36	70	45	80	62	45	129

NOTES:
1) VOLUME IS IN CUBIC FEET.

2) ALL CONCRETE TO BE 2,500 P.S.I. MIN.

3) BLOCKS TO BE CENTERED HORIZONTALLY ON THE BEND.

4) DESIGN BASED ON A TEST PRESSURE OF 150 P.S.I. AND SAFETY FACTOR (S_f) OF 1.5

5) $V_g = \frac{S_f \ PA \ SIN \ \theta}{W_m}$

6) $W_m = 140 \ \# \ / \ FT^3$

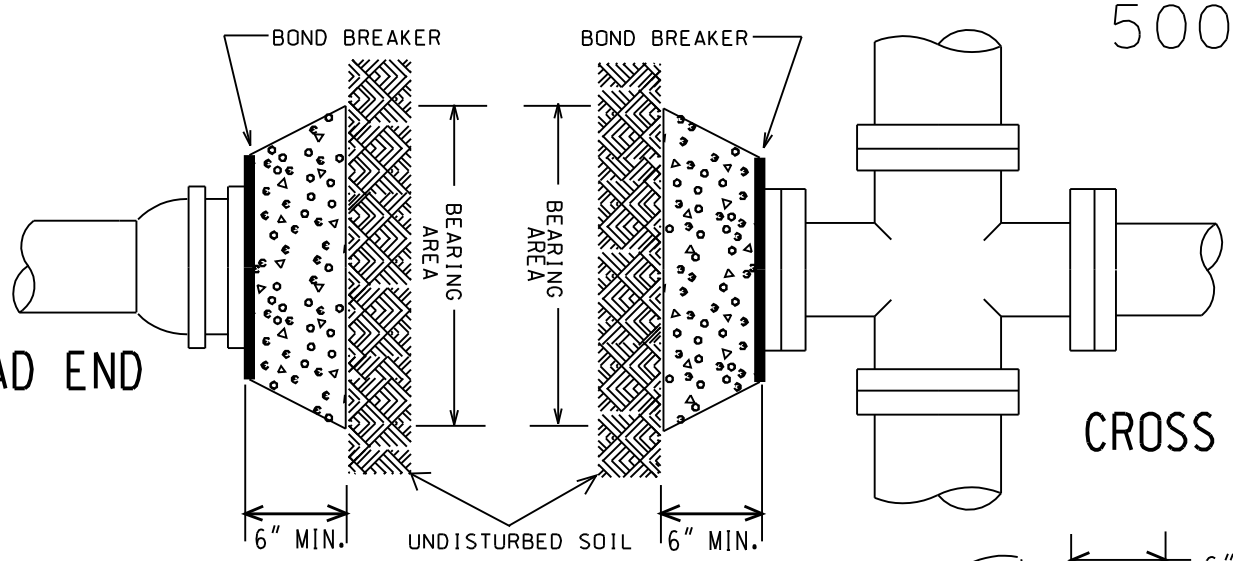
THE DESIGN ENGINEER IS RESPOSIBLE FOR VERIFYING THE ACTUAL SITE CONDITIONS WITH RESPECT TO THE ASSUMPTIONS LISTED ABOVE.

UPPER VERTICAL THRUST BLOCK DETAIL

REV 3-19-93 BM

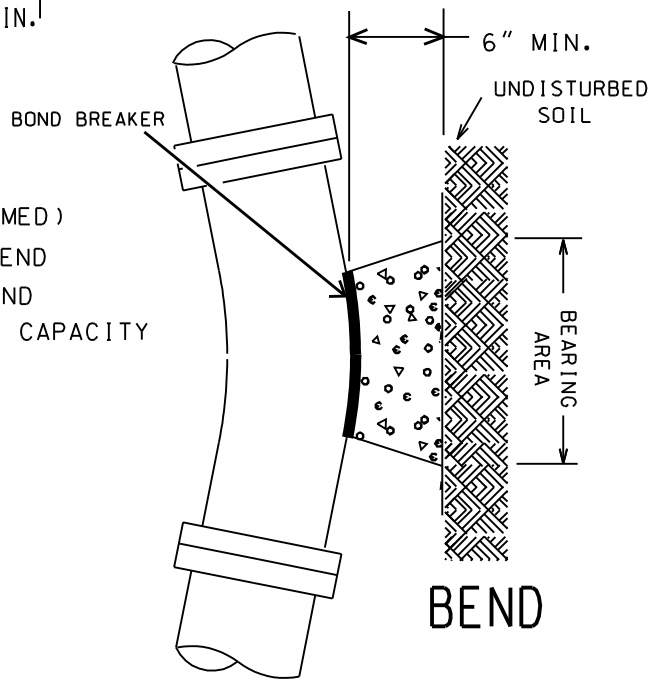
NTS

CITY OF LONGMONT COLORADO



NOTES:

1. BEARING SURFACES SHOWN IN CHART ARE MINIMUM
2. THE CHART IS BASED ON 150 PSI POTENTIAL PIPE PRESSURE PLUS A 1.5 SAFETY FACTOR
3. SOIL BEARING CAPACITY = 1,500 LB/SQ. FT. (ASSUMED)
4. THRUST IS EQUAL TO [S_f (2)PA SIN $\theta/2$] FOR A BEND
5. THRUST IS EQUAL TO [PA S_f] FOR A TEE OR DEAD END
6. BEARING AREA IS THRUST DIVIDED BY SOIL BEARING CAPACITY
7. THE DESIGN ENGINEER IS RESPONSIBLE FOR VERIFYING THE ACTUAL SITE CONDITIONS WITH RESPECT TO THE ASSUMPTIONS LISTED ABOVE.



MINIMUM BEARING SURFACE AREA

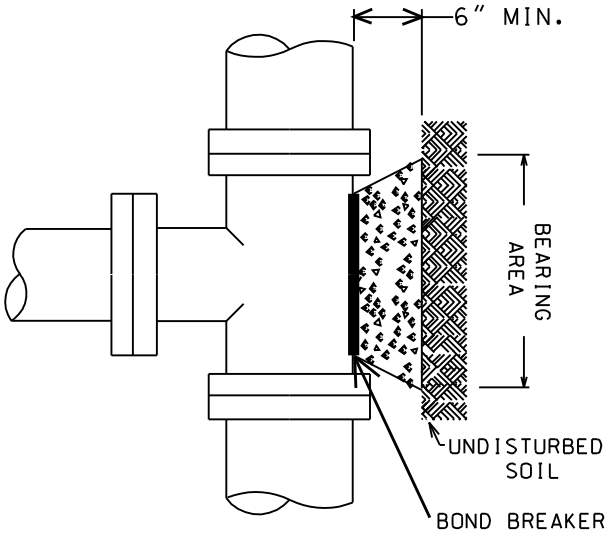
(IN SQUARE FEET)

SIZE OF PIPE	BENDS				TEE OR DEAD END
	11¼ DEG	22½ DEG	45 DEG	90 DEG	
4"	1	1	2	3	2
6"	1	2	4	6	5
8"	2	3	6	11	8
10"	3	5	10	17	12
12"	4	7	13	24	17

NOTE: THESE NUMBERS ARE ROUNDED UP TO THE NEXT WHOLE NUMBER.

THESE NUMBERS WILL VARY DEPENDING ON THE BEARING CAPACITY OF THE SOIL.

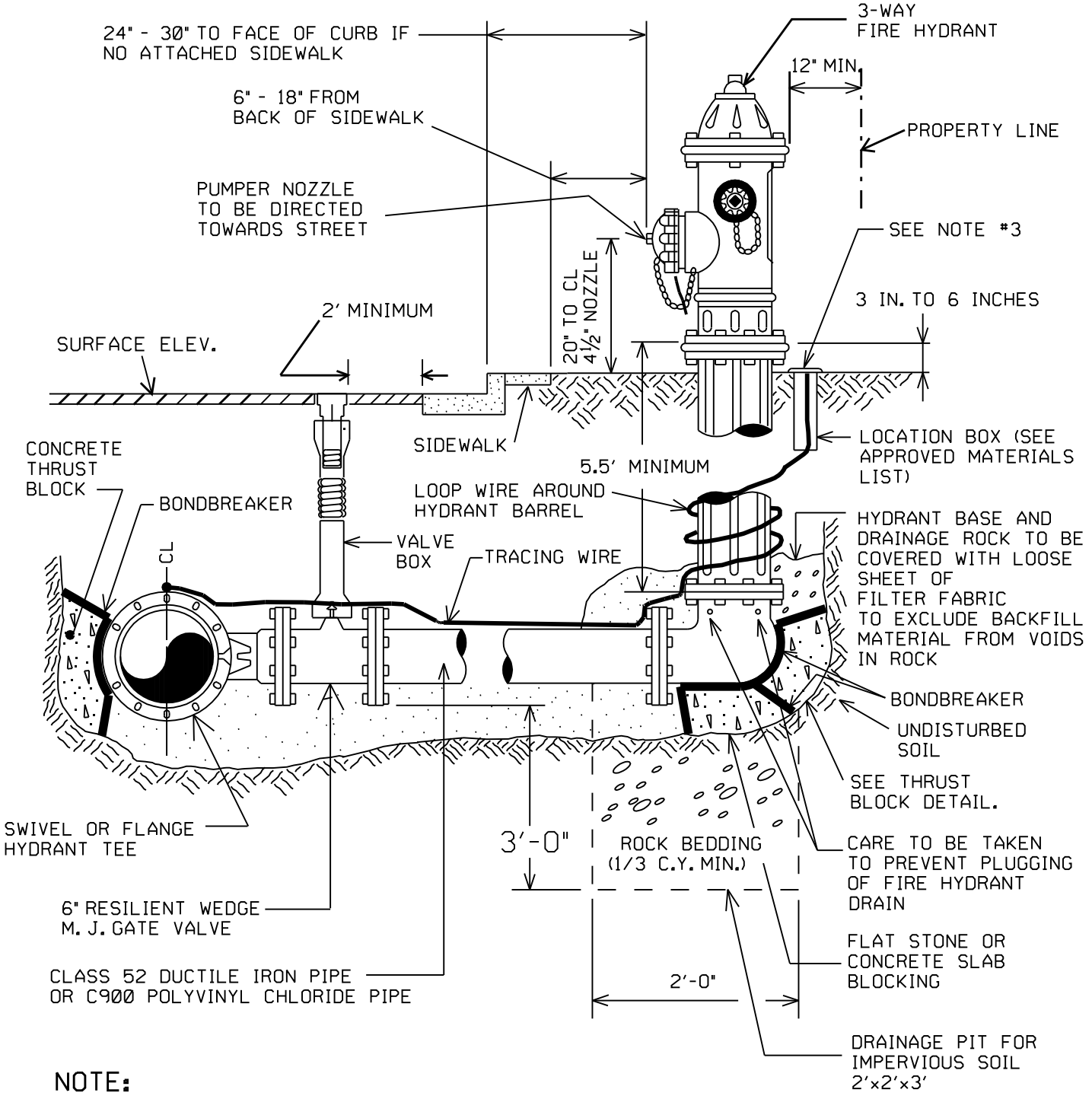
BLOCK HEIGHT SHOULD BE EQUAL TO OR LESS THAN ½ THE TOTAL DEPTH TO THE BOTTOM OF THE BLOCKS, BUT NO LESS THAN THE PIPE DIAMETER. ALSO THE WIDTH MUST BE BETWEEN ONE AND TWO TIMES THE HEIGHT.



HORIZONTAL THRUST BLOCK DETAIL

NTS

REV 3-19-93 BM



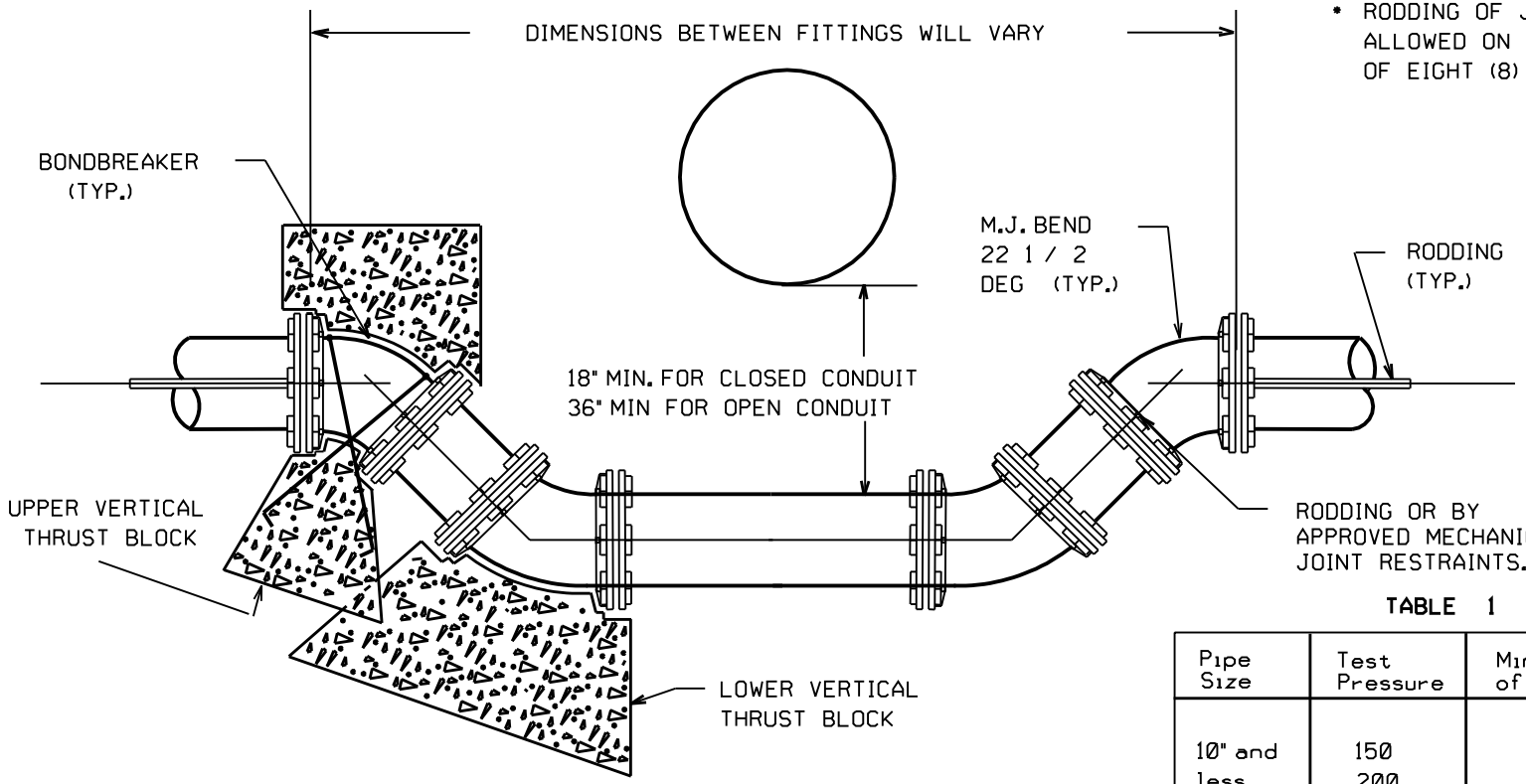
NOTE:

1) IF MORE THAN ONE BARREL EXTENSION IS USED TO RAISE A FIRE HYDRANT TO GRADE, ONLY ONE STEM EXTENSION OF THE PROPER LENGTH WILL BE ALLOWED. MULTIPLE STEM EXTENSIONS ARE NOT ACCEPTABLE.
2) ALL METALIC PIPE MUST BE WRAPPED IN POLYETHYLENE INCLUDING HYDRANT BARREL.
3) A MINIMUM OF 12 INCHES OF SLACK SHALL BE INSTALLED FOR EACH WIRE IN THE LOCATION BOX
4) ADDITIONAL TRACING WIRE STATIONS MAY BE NECESSARY IF FIRE HYDRANT SPACING IS TO GREAT TO ADEQUATELY TRACE THE PIPELINE.

STANDARD FIRE HYDRANT INSTALLATION PROFILE

NTS

REV 9-19-02 JR



* RODDING OF JOINTS IS NOT ALLOWED ON PIPE SECTIONS OF EIGHT (8) FEET OR LONGER.

TABLE 1

Pipe Size	Test Pressure	Minimum number of Tie Rods
10" and less	150	2
	200	2
12"	150	2
	200	4

NOTES:

1) LOWERING OF THIS TYPE MAY BE RESTRAINED BY MEANS OF THRUST BLOCKING OR BY RODDING OF THE JOINTS OR BY APPROVED MECHANICAL JOINT RESTRAINTS.

2) FOR SIZING INFORMATION OF THRUST BLOCKS REFER TO THRUST BLOCK DETAILS.

3) WHEN RESTRAINING PIPE BY MEANS OF RODDING JOINTS, $^{3}/_{4}$" TIE RODS, NUTS, AND WASHERS WILL BE USED AND ARE TO BE MADE OF "COR-TEN" STEEL GRADE #2 AS PER A.S.T.M. A242.

4) FOR FURTHER INFORMATION ON RODDING OF JOINTS REFER TO TABLE 1.

5) ALL METALIC PIPE, FITTINGS, AND APPURTENANCES WILL BE WRAPPED IN POLYETYLENE.

6) REQUIREMENTS FOR LARGER THAN 12" DIAMETER PIPE WILL BE DETERMINED ON A CASE BY CASE BASIS.

7) IF CONTINOUS LINE PRESSURE IS GREATER THAN 100 PSI, A COMBINATION OF RODDING / RESTRAINING GLANDS AND THRUST BLOCKS WILL BE REQUIRED.

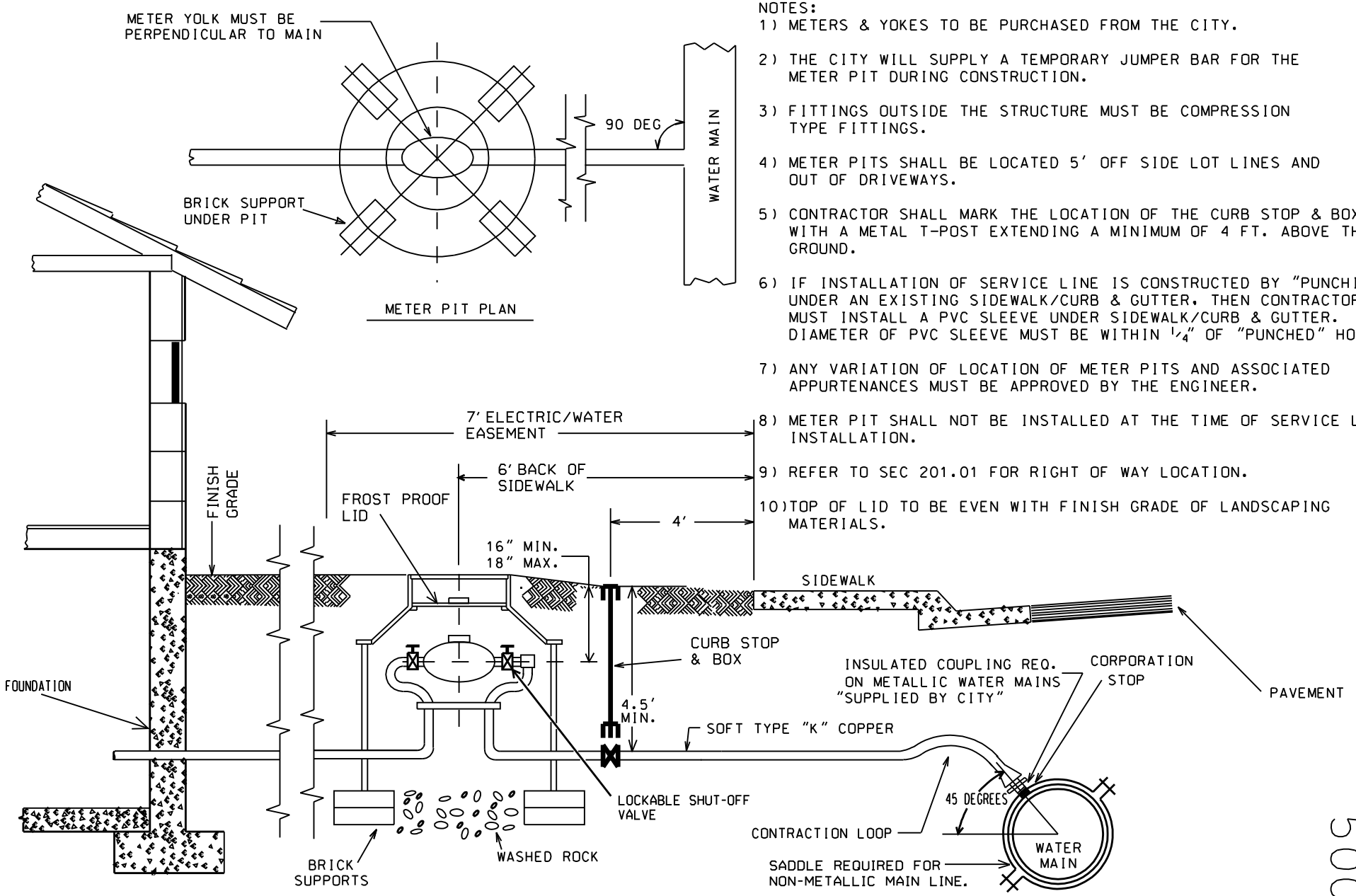
12" OR SMALLER WATERLINE, LOWERING DETAIL FOR UTILITY CROSSINGS

NTS

REV 3-19-93 BM
REV 4-11-96 JR

CITY OF LONGMONT COLORADO

500-07



NOTES:

1) METERS & YOKES TO BE PURCHASED FROM THE CITY.
2) THE CITY WILL SUPPLY A TEMPORARY JUMPER BAR FOR THE METER PIT DURING CONSTRUCTION.
3) FITTINGS OUTSIDE THE STRUCTURE MUST BE COMPRESSION TYPE FITTINGS.
4) METER PITS SHALL BE LOCATED 5' OFF SIDE LOT LINES AND OUT OF DRIVEWAYS.
5) CONTRACTOR SHALL MARK THE LOCATION OF THE CURB STOP & BOX WITH A METAL T-POST EXTENDING A MINIMUM OF 4 FT. ABOVE THE GROUND.
6) IF INSTALLATION OF SERVICE LINE IS CONSTRUCTED BY "PUNCHING" UNDER AN EXISTING SIDEWALK/CURB & GUTTER. THEN CONTRACTOR MUST INSTALL A PVC SLEEVE UNDER SIDEWALK/CURB & GUTTER. DIAMETER OF PVC SLEEVE MUST BE WITHIN 1/4" OF "PUNCHED" HOLE.
7) ANY VARIATION OF LOCATION OF METER PITS AND ASSOCIATED APPURTENANCES MUST BE APPROVED BY THE ENGINEER.
8) METER PIT SHALL NOT BE INSTALLED AT THE TIME OF SERVICE LINE INSTALLATION.
9) REFER TO SEC 201.01 FOR RIGHT OF WAY LOCATION.
10) TOP OF LID TO BE EVEN WITH FINISH GRADE OF LANDSCAPING MATERIALS.

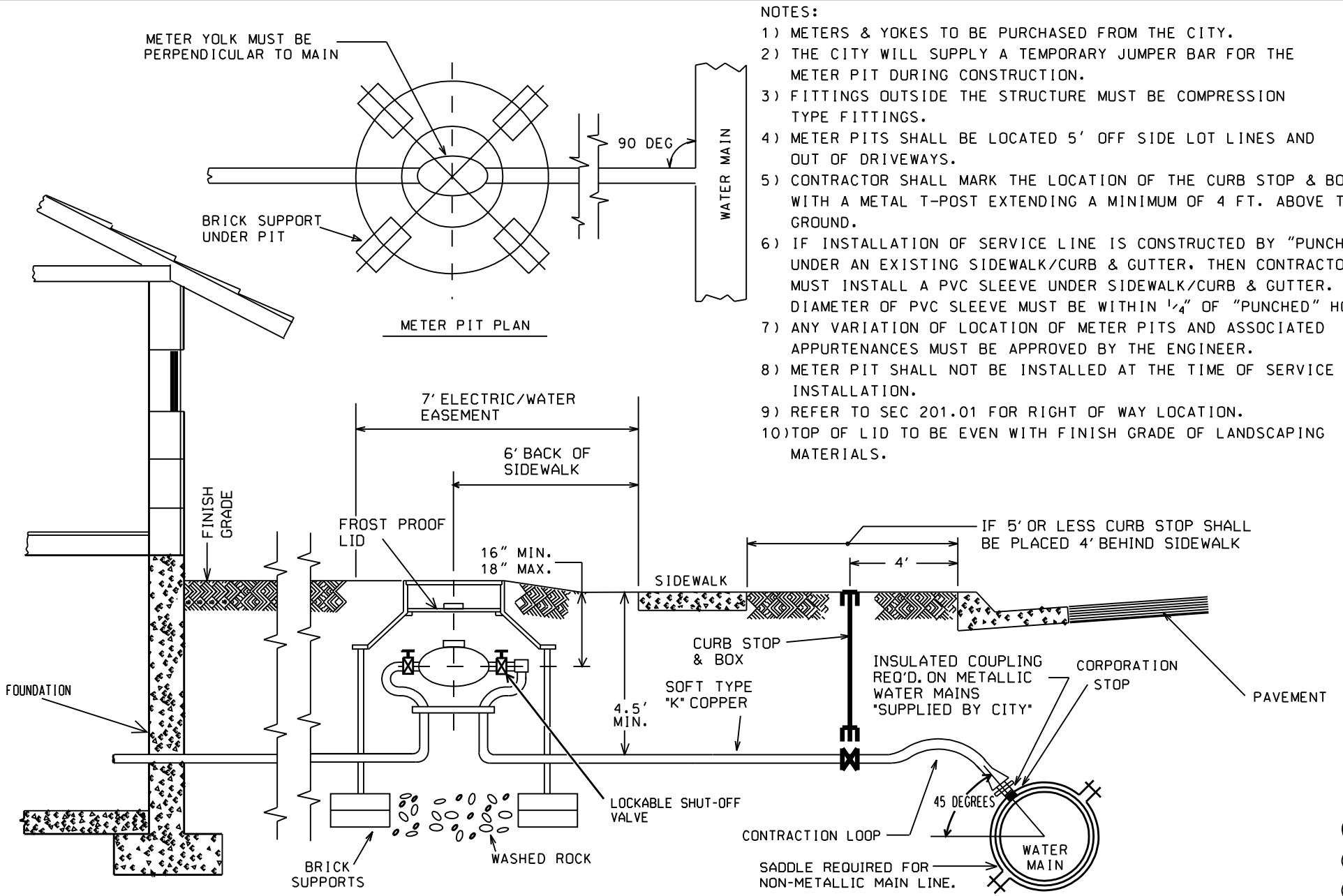
WATER SERVICE AND OUTSIDE METER INSTALLATION

NTS (ATTACHED SIDEWALK SHOWN)

REV 9-28-94 SC
REV 4-11-96 JR

CITY OF LONGMONT COLORADO

500-08



NOTES:

1) METERS & YOKES TO BE PURCHASED FROM THE CITY.
2) THE CITY WILL SUPPLY A TEMPORARY JUMPER BAR FOR THE METER PIT DURING CONSTRUCTION.
3) FITTINGS OUTSIDE THE STRUCTURE MUST BE COMPRESSION TYPE FITTINGS.
4) METER PITS SHALL BE LOCATED 5' OFF SIDE LOT LINES AND OUT OF DRIVEWAYS.
5) CONTRACTOR SHALL MARK THE LOCATION OF THE CURB STOP & BOX WITH A METAL T-POST EXTENDING A MINIMUM OF 4 FT. ABOVE THE GROUND.
6) IF INSTALLATION OF SERVICE LINE IS CONSTRUCTED BY "PUNCHING" UNDER AN EXISTING SIDEWALK/CURB & GUTTER. THEN CONTRACTOR MUST INSTALL A PVC SLEEVE UNDER SIDEWALK/CURB & GUTTER. DIAMETER OF PVC SLEEVE MUST BE WITHIN 1/4" OF "PUNCHED" HOLE.
7) ANY VARIATION OF LOCATION OF METER PITS AND ASSOCIATED APPURTENANCES MUST BE APPROVED BY THE ENGINEER.
8) METER PIT SHALL NOT BE INSTALLED AT THE TIME OF SERVICE LINE INSTALLATION.
9) REFER TO SEC 201.01 FOR RIGHT OF WAY LOCATION.
10) TOP OF LID TO BE EVEN WITH FINISH GRADE OF LANDSCAPING MATERIALS.

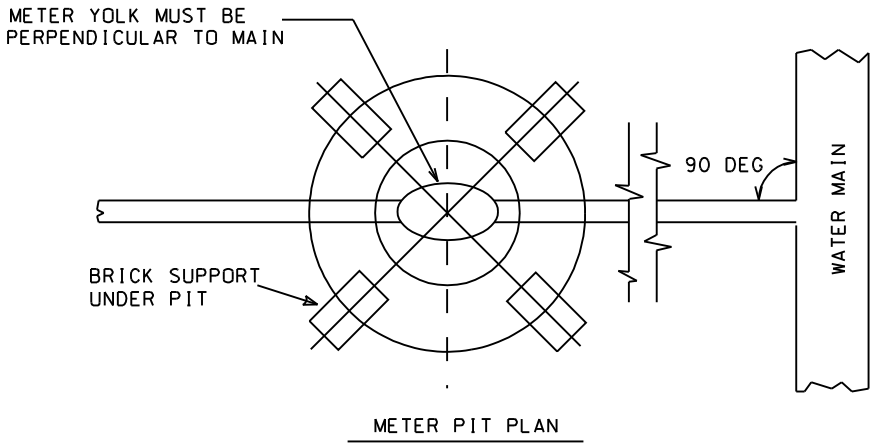
WATER SERVICE AND OUTSIDE METER INSTALLATION

NTS (DETACHED SIDEWALK SHOWN)

REV 4-11-96 JR

CITY OF LONGMONT COLORADO

500-08A



METER PIT PLAN

NOTES:

1) CONTRACTOR SHALL PLACE A TEMPORARY STEEL PLATE OVER THE PIT 12"-18" BELOW FINAL GRADE AND MARK THE LOCATION WITH A 2"X4" EXTENDING A MINIMUM OF 2 FT. ABOVE THE GROUND. (APPLIES ONLY WHEN PITS ARE INSTALLED DURING MAIN LINE CONSTRUCTION.) CONTRACTOR SHALL SET LID TO FINAL GRADE AFTER ELECTRICAL SYSTEM INSTALLATION.

2) METERS & YOKES TO BE PURCHASED FROM THE CITY.

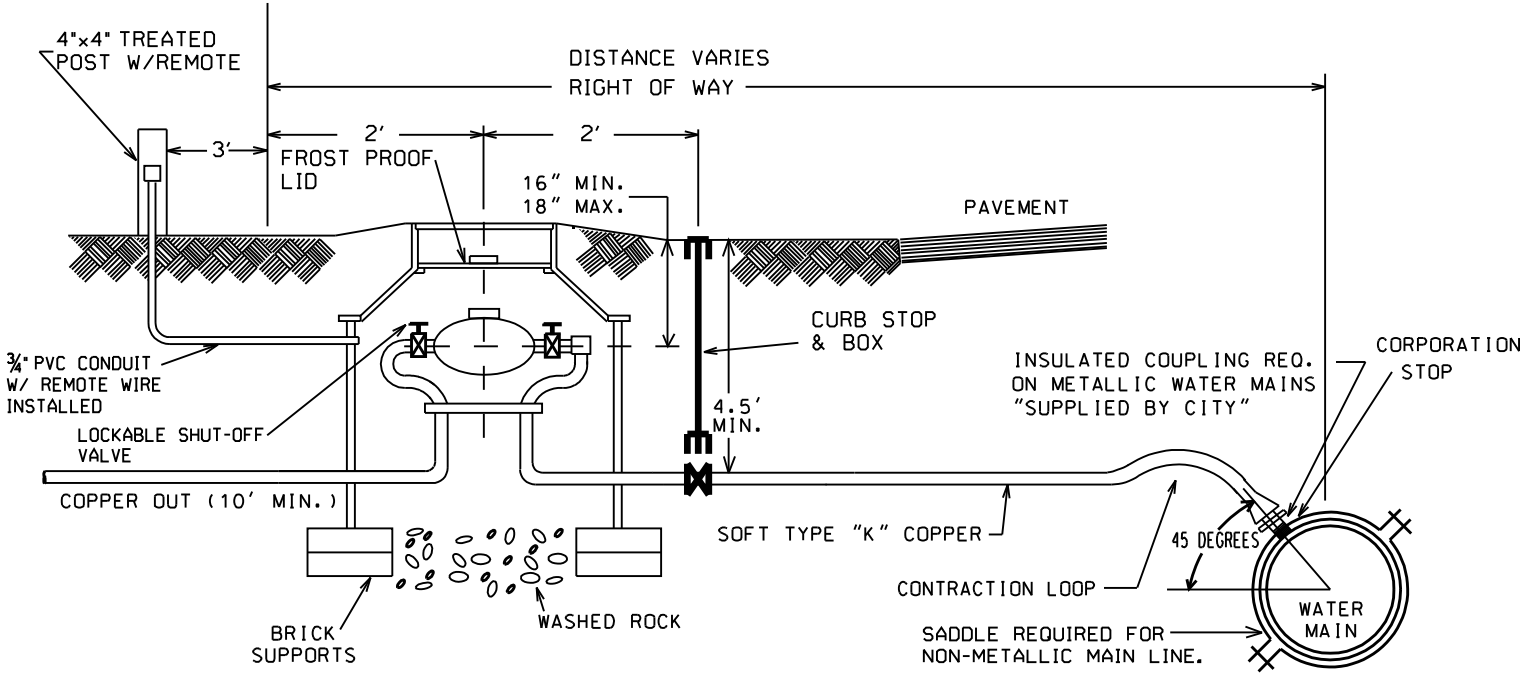
3) THE CITY WILL SUPPLY A TEMPORARY JUMPER BAR FOR THE METER PIT DURING CONSTRUCTION.

4) FITTINGS OUTSIDE THE STRUCTURE MUST BE COMPRESSION TYPE FITTINGS.

5) CONTRACTOR SHALL MARK THE LOCATION OF THE CURB STOP & BOX WITH A METAL T-POST EXTENDING A MINIMUM OF 4 FT. ABOVE THE GROUND.

6) ANY VARIATION OF LOCATION OF METER PITS AND ASSOCIATED APPURTENANCES MUST BE APPROVED BY THE ENGINEER.

7) TOP OF LID TO BE EVEN WITH FINISH GRADE OF LANDSCAPING MATERIALS.



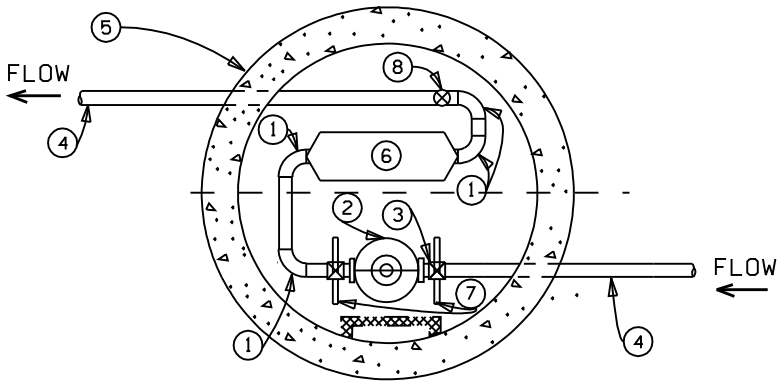
RURAL WATER SERVICE AND OUTSIDE METER INSTALLATION

NTS

5-1-96 JR

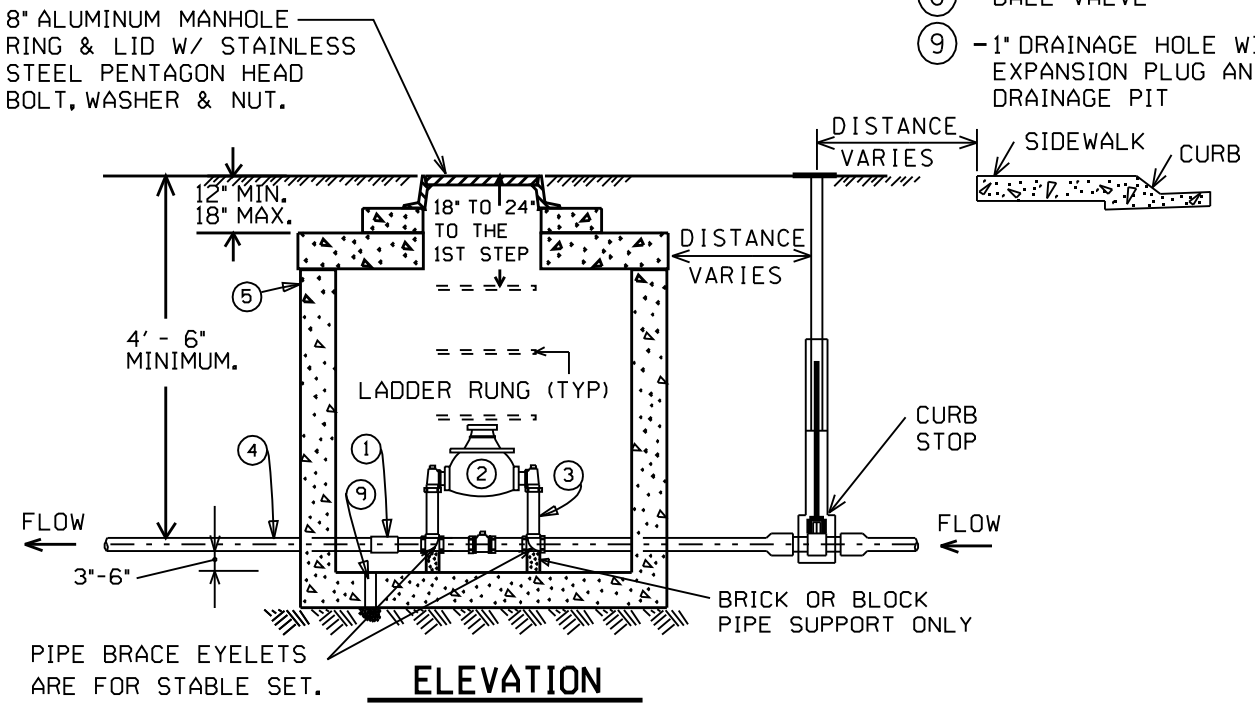
CITY OF LONGMONT COLORADO

500-08B



PLAN

1 - 90 DEG. ELBOW
2 - METER UNIT
3 - APPROVED COPPERSETTER WITH BYPASS.
4 - TYPE K 'SOFT' COPPER TUBING
5 - 60" DIA. CONCRETE VAULT
6 - DOUBLE CHECK VALVE
7 - PIPE BRACE
8 - BALL VALVE
9 - 1" DRAINAGE HOLE WITH EXPANSION PLUG AND DRAINAGE PIT



ELEVATION

NOTES:

1-BASE AND BOTTOM BARREL SECTION SHALL BE PRECAST AS A SINGLE UNIT. THE VAULT SHALL BE WATERTIGHT. USE APPROVED GASKET MATERIALS TO SEAL PIPE PENETRATIONS.

2-A 60" DIA. VAULT WILL ACCOMMODATE A 2" METER. LARGER METERS WILL REQUIRE A SPECIAL DESIGN.

3-JOINTS INSIDE METER VAULT SHALL BE EITHER THREAD, COMPRESSION, SILVER SOLDERED OR 95-5 TIN ANTIMONY SOLDER.

4-THE WATER METER SHALL BE PURCHASED FROM CITY OF LONGMONT WATER/ WASTEWATER DEPT. COORDINATE WITH THE DEPT. FOR TYPES OF METERS AT (303) 651-8469.

5-METER SETTER SHALL BE AS INDICATED IN CITY STANDARDS.

6-NO CONNECTIONS OR CHANGES IN PIPE DIAMETER SHALL BE MADE IN THE METER OR IN THE DISTANCE OF FIVE FEET ON EITHER SIDE OF METER VAULT.

7-HALF INCH OR LARGER CONDUIT MUST BE RUN FROM THE PIT TO THE CLOSET BLDG AND UP THE EXTERIOR OF THE BUILDING WALL A MIN. OF 4 FEET.

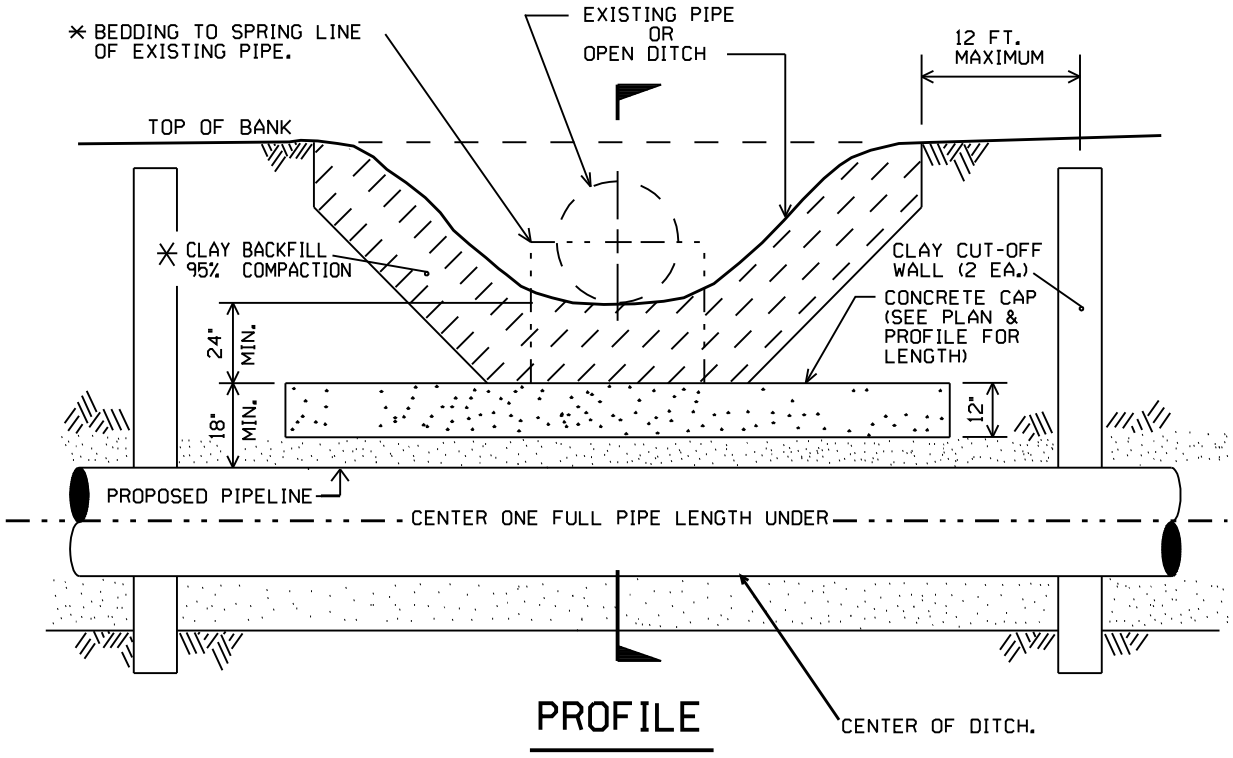
8-WHEN THE BACKFLOW DEVICE IS INSTALLED INSIDE THE BUILDING, THE PLUMBING WITHIN THE VAULT WILL BE MODIFIED TO ACCOMMODATE THE METER ONLY.

9-THE INSTALLATION OF WATER METER VAULTS IN STREETS, ROADWAYS, DRIVEWAYS, ALLEYS OR PARKING LOTS WILL NOT BE ALLOWED UNLESS APPROVED BY THE WATER ENGINEER.

1 1/2" - 2" DOMESTIC METER IN VAULT

NTS

REV 11-28-01 JR
REV 8-03-05 JR



PROFILE

* USE CLAY BACKFILL ONLY WHEN CROSSING OPEN DITCH. USE BEDDING MATERIAL TO SPRING LINE OF EXISTING PIPE WHEN CROSSING PIPE.

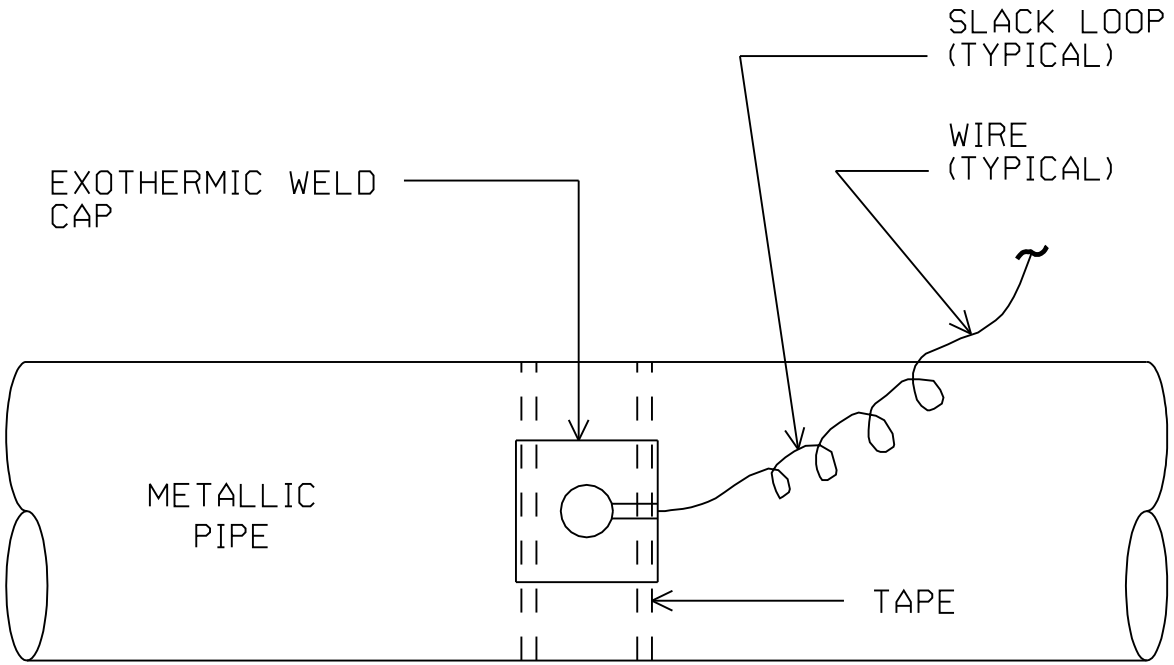
DITCH CROSSING

(ALSO SEE DETAIL 100-05) NTS

REV 3-19-93 BM
REV 3-12-99 JR

CITY OF LONGMONT COLORADO

500-10



NOTES:
THE EXOTHERMIC WELD CAP SHALL COMPLETELY COVER THE WIRE CONNECTION.

TAPE SHALL BE USED TO SECURE THE WELD CAP TO THE PIPE.

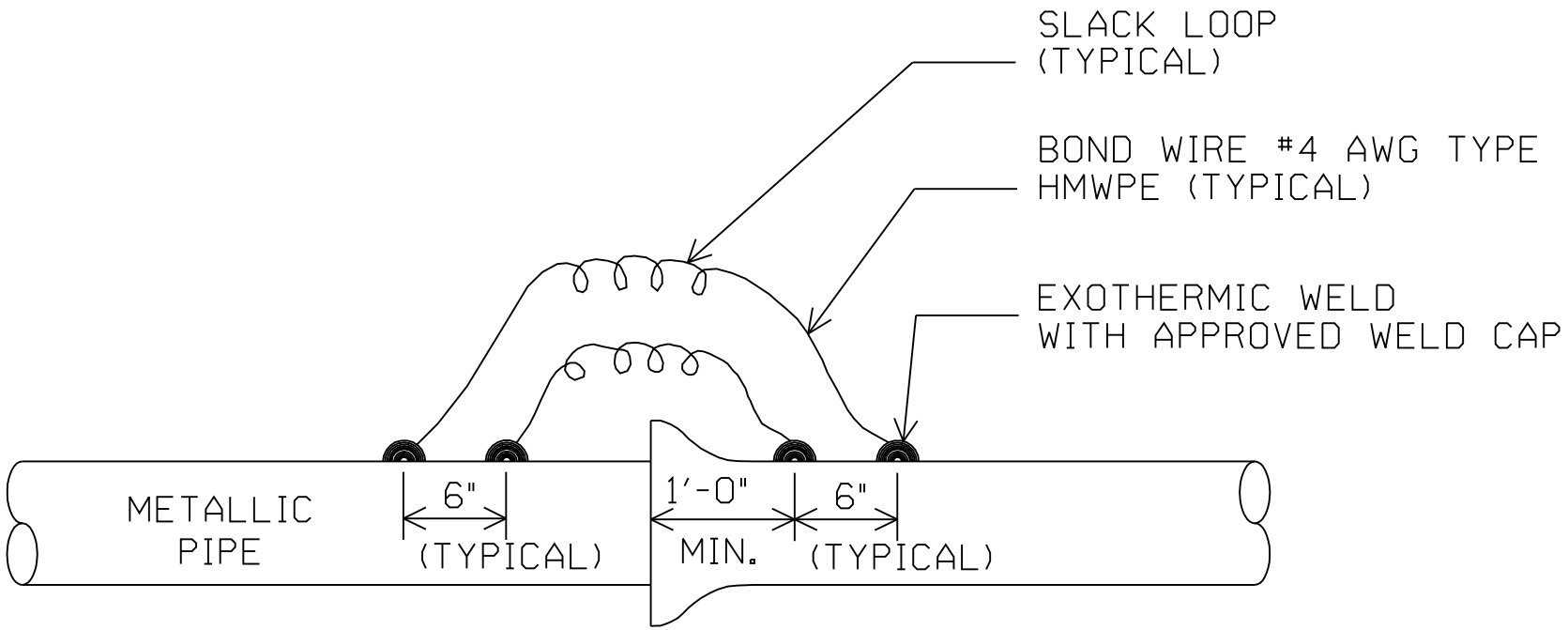
THE WELD CAP SHALL BE ORIENTED SO THAT THE WIRE SHALL BE RUN IN THE LONGITUDINAL DIRECTION OF THE PIPE.

EXOTHERMIC WELD CAP INSTALLATION

NTS

REV 3-19-93 BM
REV 4-02-01 JR

500-11



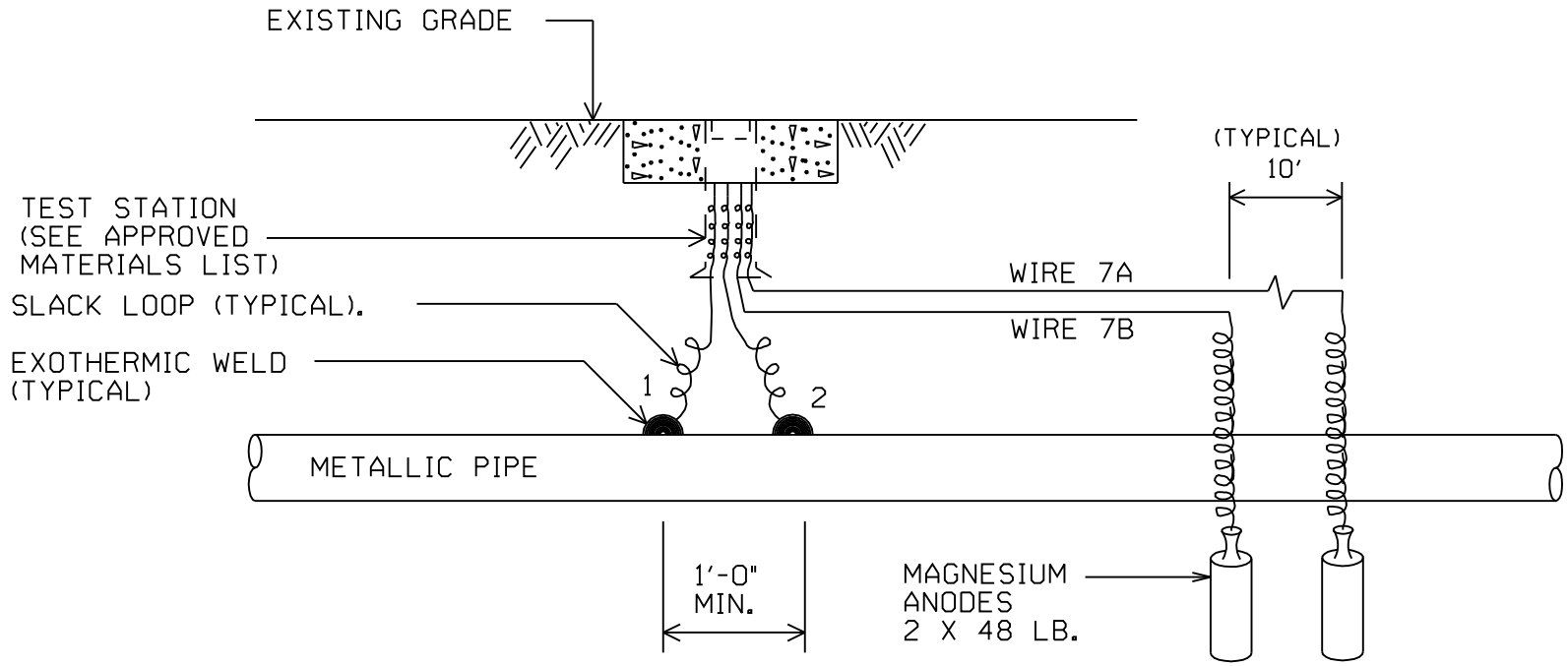
NOTE:
BOND WIRES SHALL BE ATTACHED TO THE PIPE, VALVE OR FITTING TOP CENTERLINE.

JOINT BOND INSTALLATION

NTS

REV 1-02-02 JR

500-12



NOTES

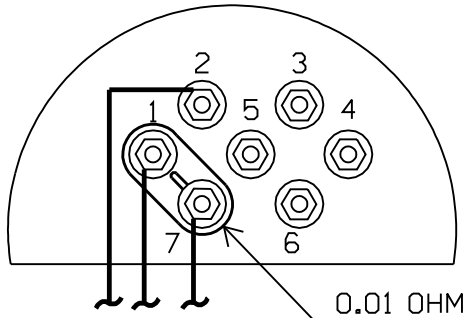
1: ALL WIRES SHALL BE STRANDED COPPER TYPE RHW-2/RHH/USE-2.

2: A MINIMUM OF 24 INCHES OF SLACK SHALL BE INSTALLED IN EACH WIRE IN THE TEST STATION BOX.

3: ALL WIRES SHALL BE ATTACHED TO TOP OF PIPE.

4: ANODES ARE TO BE PLACED AT PIPE DEPTH OR BELOW AND 5 FEET AWAY FROM THE PIPE. INSTALL ON ALTERNATE SIDES OF THE PIPE.

TEST STATION
TERMINAL BOARD
WIRING DETAIL.



TERMINAL AND WIRE #	SIZE	COLOR
1	12 AWG	RED
2	12 AWG	RED
7(A&B)	12 AWG	BLACK

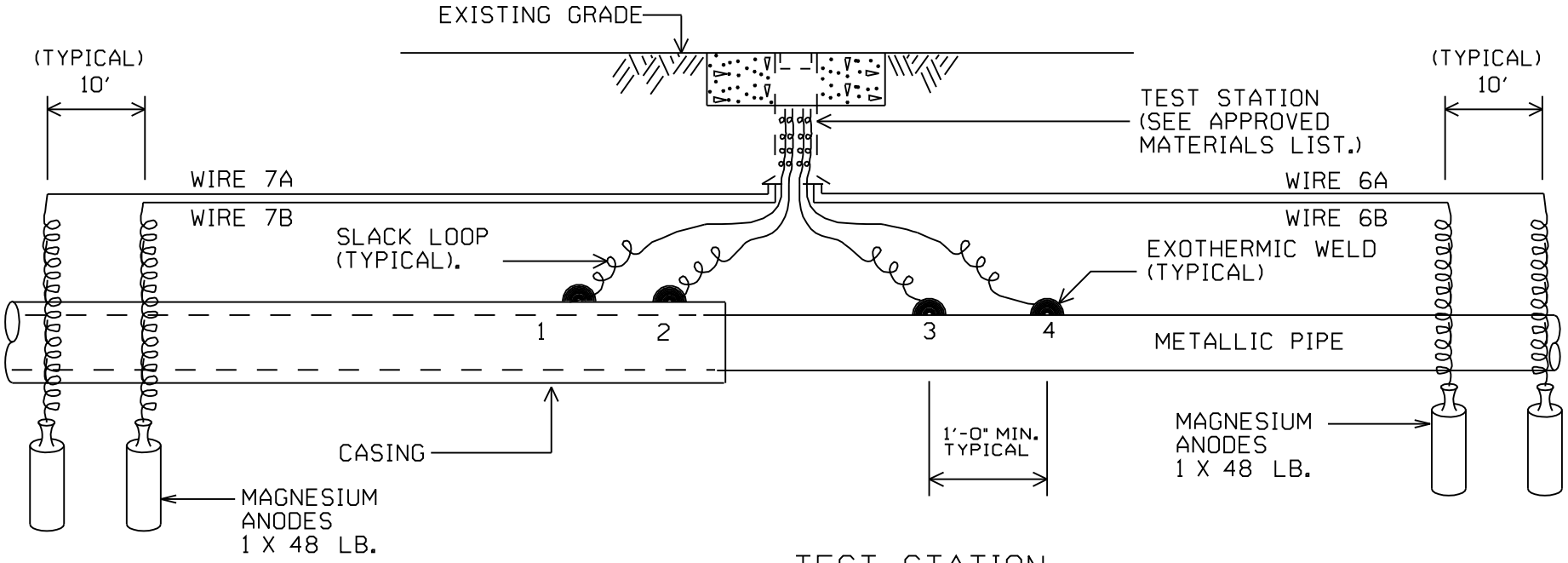
CATHODIC TEST STATION – TYPE 1

NTS

REV 1-02-02 JR
REV 11-25-02 JR
REV 03-04-03 JR

CITY OF LONGMONT COLORADO

500-13



NOTES

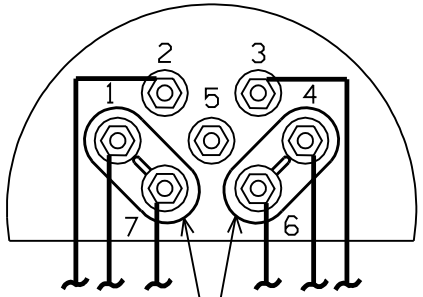
1: A MINIMUM OF 24 INCHES OF SLACK WIRE SHALL BE INSTALLED FOR EACH WIRE IN THE TEST STATION BOX.

2: ALL WIRES SHALL BE STRANDED COPPER TYPE RHW-2/RHH/USE-2.

3: ALL WIRES SHALL BE ATTACHED TO THE PIPE TOP CENTERLINE.

4: ANODES ARE TO BE PLACED AT PIPE DEPTH OR BELOW AND 5 FEET AWAY FROM THE PIPE.

TEST STATION
TERMINAL BOARD
WIRING DETAIL.



0.01 OHM-8 AMPERE
SHUNT COLOR CODE-
YELLOW COTT MANUF.

TERMINAL AND WIRE #	SIZE	COLOR
1	12 AWG	GREEN
2	12 AWG	GREEN
3	12 AWG	RED
4	12 AWG	RED
5	—	—
6 (A&B)	12 AWG	BLACK/RED
7 (A&B)	12 AWG	BLACK/GREEN

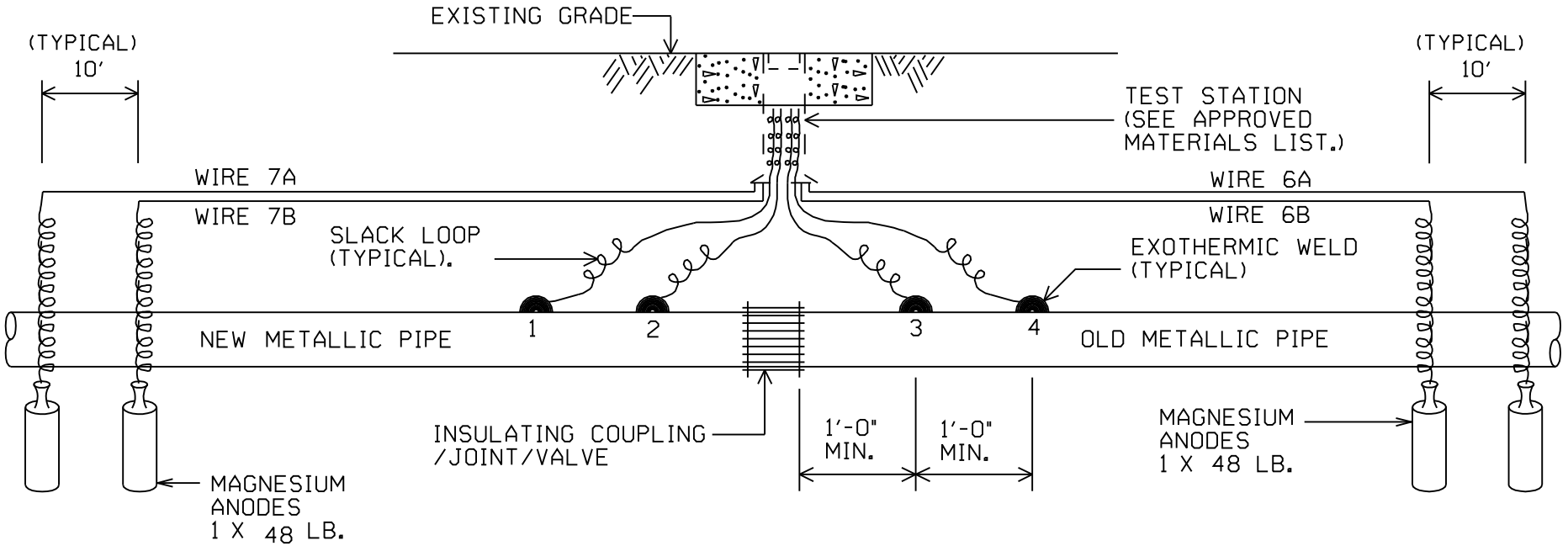
CATHODIC TEST STATION - TYPE 2

NTS

REV 1-03-02 JR
REV 11-25-02 JR
REV 03-04-03 JR

CITY OF LONGMONT COLORADO

500-14



NOTES

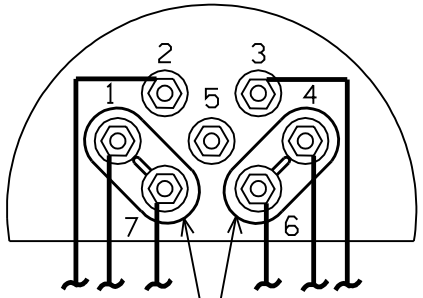
1: A MINIMUM OF 24 INCHES OF SLACK WIRE SHALL BE INSTALLED FOR EACH WIRE IN THE TEST STATION BOX.

2: ALL WIRES SHALL BE STRANDED COPPER TYPE RHW-2/RHH/USE-2.

3: ALL WIRES SHALL BE ATTACHED TO THE PIPE TOP CENTERLINE.

4: ANODES ARE TO BE PLACED AT PIPE DEPTH OR BELOW AND 5 FEET AWAY FROM THE PIPE.

TEST STATION TERMINAL BOARD WIRING DETAIL.



0.01 OHM-8 AMPERE SHUNT COLOR CODE- YELLOW COTT MANUF.

TERMINAL AND WIRE #	AWG 12 SIZE	COLOR
1	12 AWG	RED
2	12 AWG	RED
3	12 AWG	BLUE
4	12 AWG	BLUE
5	———	——
6 (A&B)	12 AWG	BLACK/BLUE
7 (A&B)	12 AWG	BLACK/RED

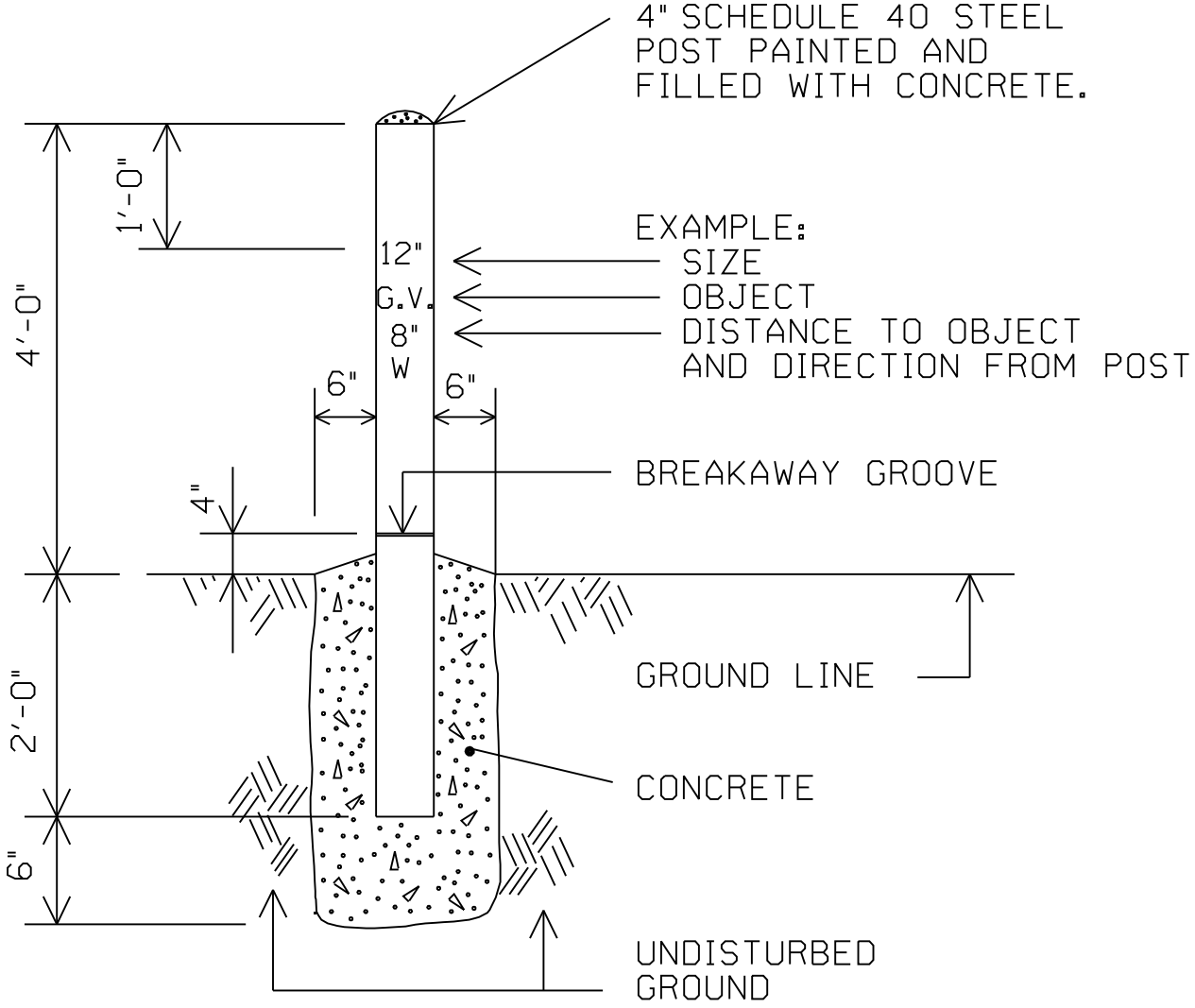
CATHODIC TEST STATION – TYPE 3

NTS

REV 1-03-02 JR
REV 11-25-02 JR
REV 03-04-03 JR

CITY OF LONGMONT COLORADO

500-15



PAINT SCHEDULE

SAFETY YELLOW - CATHODIC PROTECTION

WHITE - POTABLE WATER PIPE, FITTINGS, VALVES

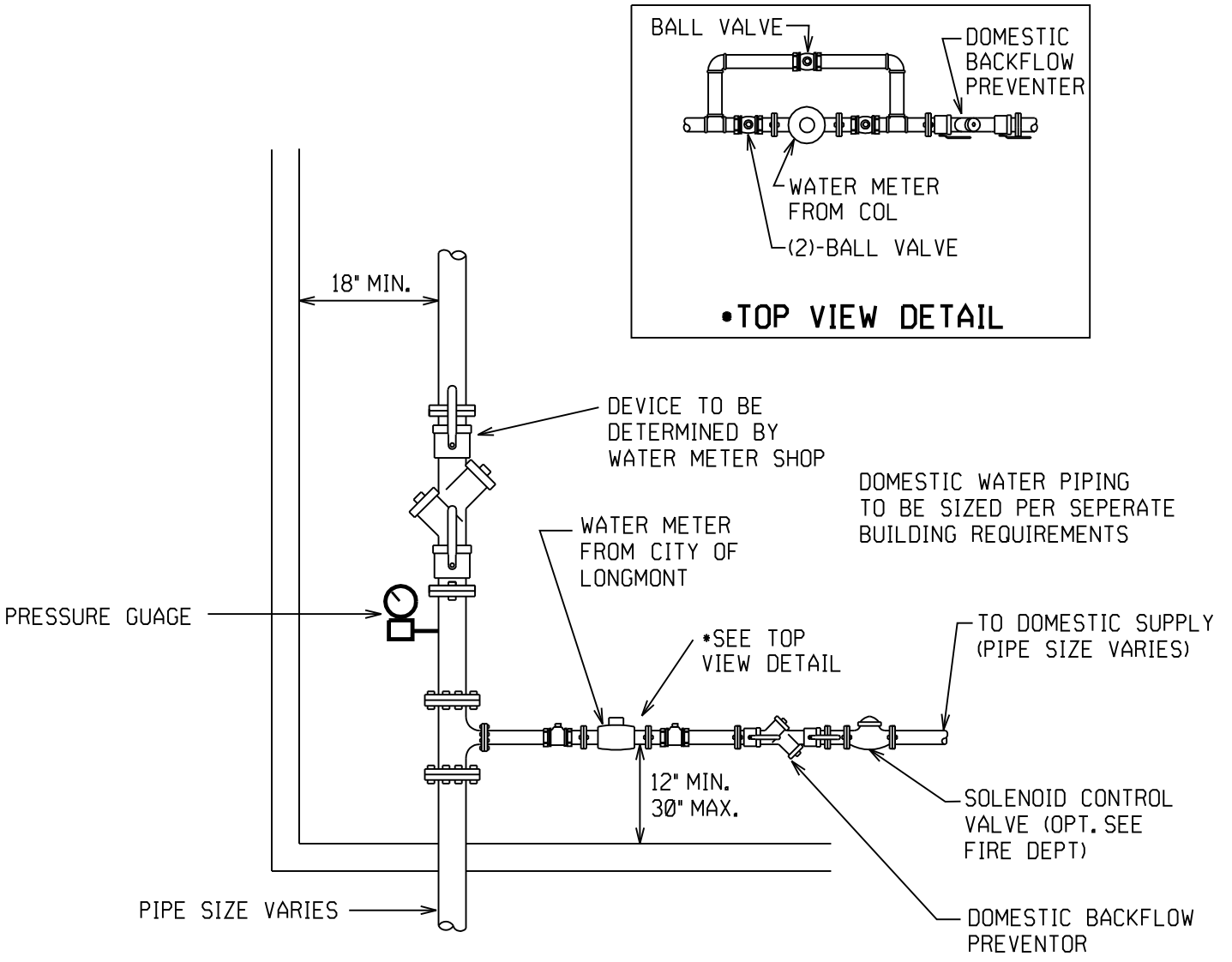
GREEN - SANITARY SEWER

NOTE: MARKER POSTS SHALL BE INSTALLED AT ALL FITTINGS, VALVES AND MANHOLES AS SHOWN ON THE PLAN.

MARKER POST

NTS

REV 3-19-93 BM



NOTES:

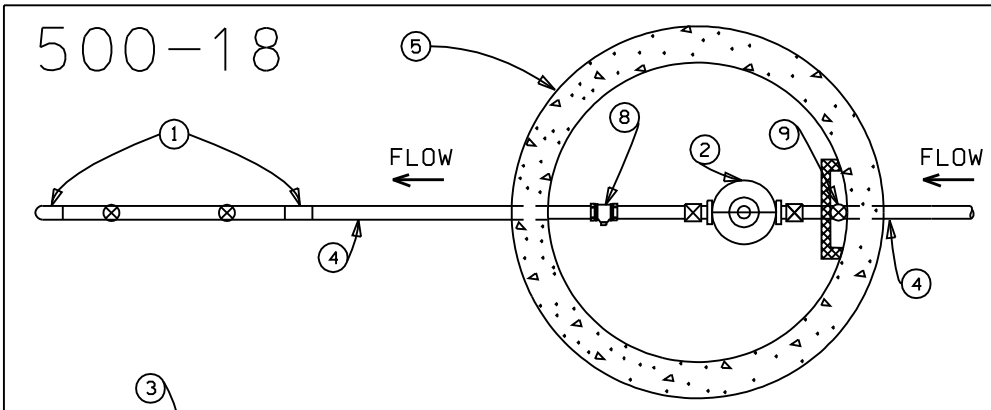
1-NO GALVANIZED FITTINGS ALLOWED
2-WATER METER AND BACKFLOW DEVICES PURCHASEED FROM COL
3-ALL PIPE AND FITTINGS TO BE BRASS OR COPPER
4-1" METER WILL HAVE A REMOTE ON OUTSIDE OF BUILDING
5-1½" - 2" AMR 530.04 INSTALLATION SECTION 17, 18.

FIRE/DOMESTIC WATER SUPPLY COMBINATION DETAIL ¾"-2"/MULTI FAMILY

NTS

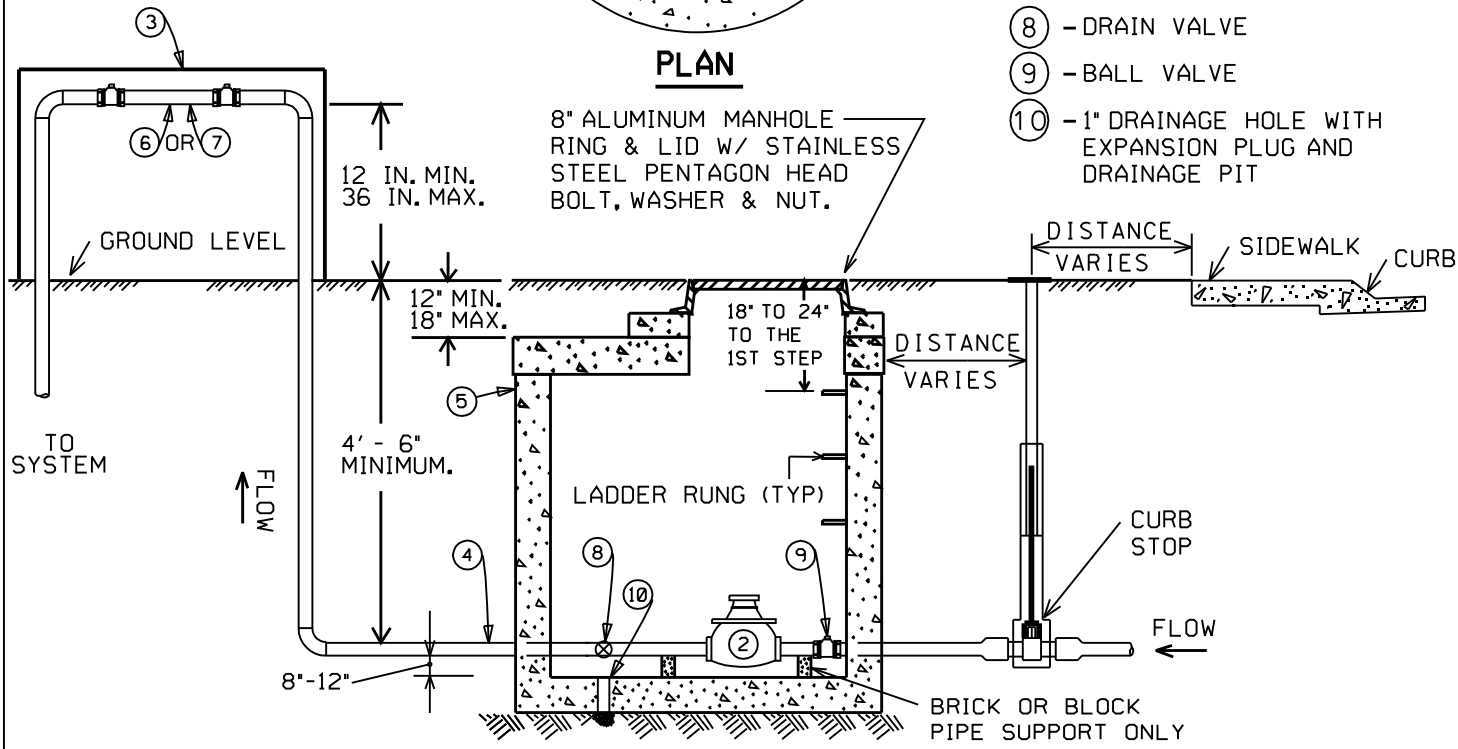
3-12-01 JR

500-18



PLAN

1 - 90 DEG. ELBOW
2 - METER UNIT
3 - ENCLOSURE
4 - TYPE K 'SOFT' COPPER TUBING
5 - 48" DIA. CONCRETE VAULT (MIN.)
6 - REDUCED PRESSURE BACKFLOW
7 - PRESSURE VACUUM BREAKER SEE STANDARDS AND SPECS
8 - DRAIN VALVE
9 - BALL VALVE
10 - 1" DRAINAGE HOLE WITH EXPANSION PLUG AND DRAINAGE PIT



ELEVATION

NOTES:

1-BASE AND BOTTOM BARREL SECTION SHALL BE PRECAST AS A SINGLE UNIT. THE VAULT SHALL BE WATERTIGHT EXCEPT FOR 1" DRAIN HOLE. USE APPROVED GASKET MATERIALS TO SEAL PIPE PENETRATIONS.

2-A 48" DIA. VAULT WILL ACCOMMODATE A 2" METER. LARGER METERS WILL REQUIRE A SPECIAL DESIGN.

3-JOINTS INSIDE METER VAULT SHALL BE EITHER THREAD, COMPRESSION, SILVER SOLDERED OR 95-5 TIN ANTIMONY SOLDER.

4-THE WATER METER SHALL BE PURCHASED FROM CITY OF LONGMONT WATER/ WASTEWATERDEPT. COORDINATE WITH THE DEPT. FOR TYPES OF METERS AT (303) 651-8467.

5-NO CONNECTIONS OR CHANGES IN PIPE DIAMETER SHALL BE MADE IN THE METER OR IN THE DISTANCE OF FIVE FEET ON EITHER SIDE OF METER VAULT.

6-PLACE 24" LID ABOVE METER FOR READING PURPOSES.

7-THE INSTALLATION OF WATER METER VAULTS IN STREETS, ROADWAYS, DRIVEWAYS, ALLEYS OR PARKING LOTS WILL NOT BE ALLOWED UNLESS APPROVED BY THE WATER ENGINEER.

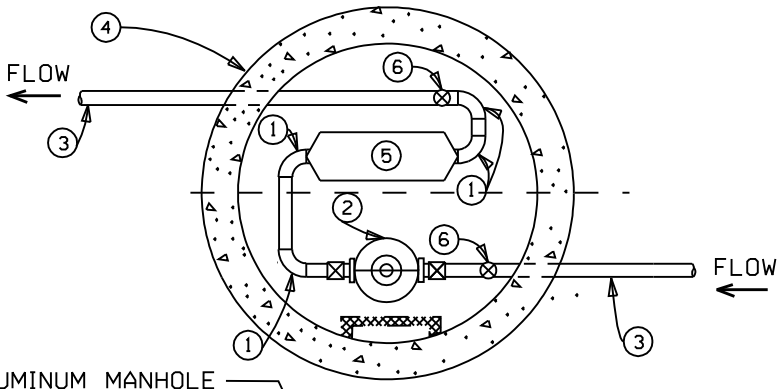
9-BACKFLOW SHALL HAVE ENCLOSURE TO PROTECT DEVICE.

3/4" - 2" IRRIGATION METER IN VAULT

NTS

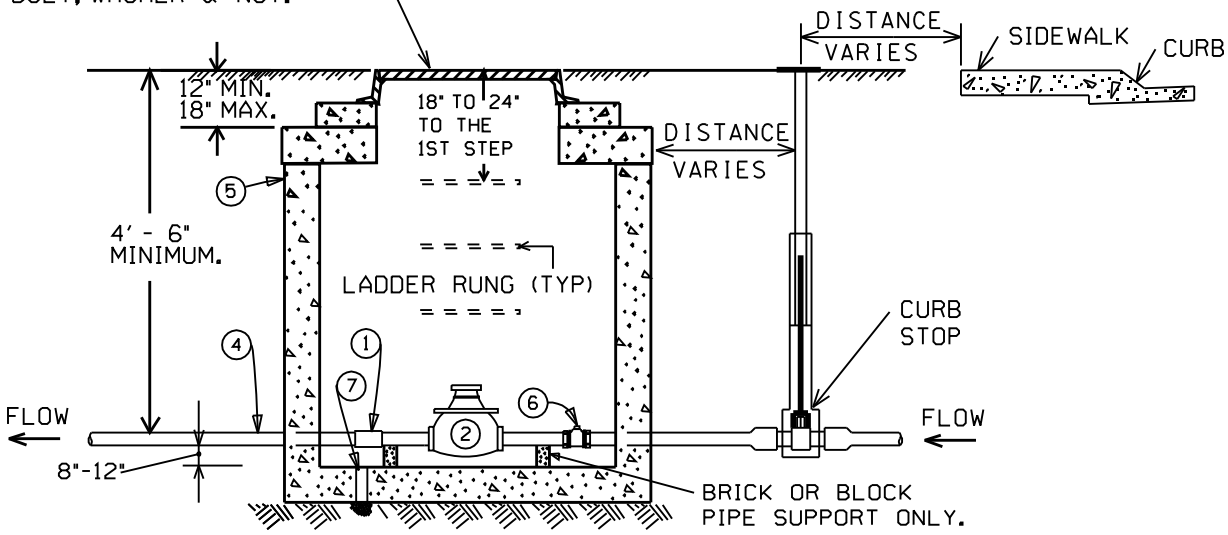
7-21-04 SC
2-03-05 JR
8-03-05 JR

CITY OF LONGMONT COLORADO



PLAN

1 - 90 DEG. ELBOW
2 - METER UNIT
3 - TYPE K 'SOFT' COPPER TUBING
4 - 48" DIA. CONCRETE VAULT
5 - DOUBLE CHECK VALVE
6 - BALL VALVE
7 - 1" DRAINAGE HOLE WITH EXPANSION PLUG AND DRAINAGE PIT



ELEVATION

NOTES:

1-BASE AND BOTTOM BARREL SECTION SHALL BE PRECAST AS A SINGLE UNIT. THE VAULT SHALL BE WATERTIGHT. USE APPROVED GASKET MATERIALS TO SEAL PIPE PENETRATIONS.
2-JOINTS INSIDE METER VAULT SHALL BE EITHER THREAD, COMPRESSION, SILVER SOLDERED OR 95-5 TIN ANTIMONY SOLDER.
3-THE WATER METER SHALL BE PURCHASED FROM CITY OF LONGMONT WATER/ WASTEWATER DEPT. COORDINATE WITH THE DEPT. FOR TYPES OF METERS AT (303) 651-8469.
4-METER SETTER SHALL BE AS INDICATED IN CITY STANDARDS.
5-NO CONNECTIONS OR CHANGES IN PIPE DIAMETER SHALL BE MADE IN THE METER OR IN THE DISTANCE OF FIVE FEET ON EITHER SIDE OF METER VAULT.
6-HALF INCH OR LARGER CONDUIT MUST BE RUN FROM THE PIT TO THE CLOSET BLDG AND UP THE EXTERIOR OF THE BUILDING WALL A MIN. OF 4 FEET.
7-WHEN THE BACKFLOW DEVICE IS INSTALLED INSIDE THE BUILDING, THE PLUMBING WITHIN THE VAULT WILL BE MODIFIED TO ACCOMMODATE THE METER ONLY.
8-THE INSTALLATION OF WATER METER VAULTS IN STREETS, ROADWAYS, DRIVEWAYS, ALLEYS OR PARKING LOTS WILL NOT BE ALLOWED UNLESS APPROVED BY THE WATER ENGINEER.

3/4" - 1" DOMESTIC METER IN VAULT

NTS

REV 11-28-01 JR
REV 8-03-05 JR

CITY OF LONGMONT COLORADO

CITY OF LONGMONT
SECTION 600 - PARKS AND FORESTRY
TABLE OF CONTENTS

600.00 REGULATED AREAS AND DEVELOPMENT PROCESS 1
600.01 GENERAL 1
600.02 PLAN REQUIREMENTS 2
600.03 ACCEPTANCE PROCESS 9
601.00 CONCRETE PATHS, BRIDGES AND UNDERPASSES 11
601.01 GENERAL CRITERIA 11
601.02 MINIMUM DESIGN CRITERIA 12
601.03 MINIMUM PLAN INFORMATION 15
601.04 MATERIALS 16
601.05 EXECUTION 18
601.06 COMPLETION SERVICES 19
601.07 GUARANTEE/WARRANTY 19
602.00 GRADING AND FINE GRADING 20
602.01 GENERAL CRITERIA 20
602.02 MINIMUM DESIGN CRITERIA 20
602.03 MINIMUM PLAN INFORMATION 22
602.04 MATERIALS 23
602.05 EXECUTION 23
603.00 IRRIGATION 25
603.01 GENERAL CRITERIA 25
603.02 MINIMUM DESIGN CRITERIA 26
603.03 MINIMUM PLAN INFORMATION 28
603.04 MATERIALS 29
603.05 EXECUTION 33
603.06 TESTING 40
603.07 COMPLETION SERVICES 41
603.08 GUARANTEE/WARRANTY 43
604.00 SEEDING 43
604.01 GENERAL CRITERIA 43
604.02 MINIMUM DESIGN CRITERIA 44
604.03 SUBMITTALS 44
604.04 MATERIALS 45
604.05 INSPECTION 45
604.06 EXECUTION 46
604.07 COMPLETION SERVICES 47
604.08 MAINTENANCE 47
604.09 GUARANTEE/WARRANTY 47
605.00 SODDING 48
605.01 GENERAL CRITERIA 48
605.02 MINIMUM DESIGN CRITERIA 48
605.03 SUBMITTALS 48
605.04 MATERIALS 49
605.05 INSPECTION 49
605.06 EXECUTION 49
605.07 MAINTENANCE 50
605.08 GUARANTEE/WARRANTY 50
606.00 TREES, PLANTS AND GROUNDCOVER 51

606.01 GENERAL CRITERIA 51
606.02 MINIMUM DESIGN CRITERIA 51
606.03 SUBMITTALS 55
606.04 MATERIALS 55
606.05 INSPECTION 56
606.06 EXECUTION 57
606.07 COMPLETION SERVICES 60
606.08 GUARANTEE/WARRANTY 60

SECTION 600 - PARKS AND FORESTRY
INDEX OF DETAILS

601.01	Concrete Path Detail
601.02	Flood Gate
603.01	Backflow Preventer, Meter Pit and Downstream Assemblies
603.02	Winterization Assembly
603.03	Flow Meter Assembly
603.04	Master Valve Assembly
603.05	Controller, Satellite and Enclosure
603.06	Remote Control Valve Assembly
603.07	Quick Coupler Assembly
603.08	Drip Remote Control Valve Assembly
603.09	Manual Drain Valve Assembly
603.10	Gate Valve Assembly
603.11	Concrete Thrust Block Detail
603.12	Pop-Up Rotor Sprinkler Assembly
603.13	Pop-Up Spray Sprinkler Assembly
603.14	Flush Cap Assembly
603.15	Drip Detail in Shrub Beds
603.16	Drip in Open Turf Areas
606.01	Tree Planting Detail
606.02	Shrub Planting Detail

LANDSCAPE AND IRRIGATION

600.00 REGULATED AREAS AND DEVELOPMENT PROCESS

600.01 GENERAL

1. All arterial right-of-way, primary greenway or other areas owned and/or maintained by the City Parks and Forestry Services, including detention pond areas, shall comply with these specifications, the approved plans and the terms and provisions of the public improvements agreement.

    a. Development adjacent to Ken Pratt Boulevard (Highway 119) east of Main Street (Highway 287) shall follow the Ken Pratt Boulevard Landscaping Guidelines for the design of the arterial right-of-way improvements. Plant quantity requirements will be per the Longmont Development Code current at the time of development.

    b. Areas owned and not maintained by the City shall conform to these Standards and Specifications, however, certain exceptions may be made on a case by case basis through approval by the Parks and Open Space Division.

    c. Common open space and other areas not owned or maintained by the City, but maintained by a property owner, property owner's association, homeowner's association or other maintenance organization, shall conform to applicable general criteria and the minimum design criteria (Paragraphs xxx.01 and xxx.02 of each technical section) of these Standards and Specifications.

    d. Trees designated for saving or protection in a preliminary or final development plan or a tree preservation plan approved by the City, regardless of their location in publicly dedicated land or private property, shall be protected per the applicable criteria of Sections 602.00 and 606.00.

2. Arterial rights-of-way, primary greenways, park sites, and other areas owned or maintained by City Parks and Forestry, and private common open space and other privately maintained development areas shall also conform to the City Municipal Code and the Longmont Area Comprehensive Plan.

3. Consideration is to be given to provide for uniformity and proper alignment of concrete paths and associated landscaping within the regulated areas. Intersections, concrete path alignment and landscaping shall provide for safety and maintenance considerations.

4. Any deviation in layout of the irrigation system, concrete path, or landscaping from the approved construction plans shall be reviewed and approved by the City staff prior to installation. If modifications are extensive, plan re-submittal and approval will be required. For minor modifications, per City determination, correction on as-built drawings may be sufficient. Determination on modification type shall be determined by City staff.

5. Landscape plans shall be included as part of the overall construction plans for the phase of construction associated per the public improvement agreement.

6. Additional plan design criteria and plan information as relevant shall be included per each sub-section of 600 in these Standards and Specifications.

7. The City will consider variances to City Standards in an effort to reduce water consumption in arterial rights-of-way. The Public Works and Water Utilities Department recommends reducing turf area by increasing the size of shrub beds or using sub-surface irrigation in turf areas. Subsurface irrigation is only advised in areas without extensive buried utilities. Financial assistance with increased costs may be available. Contact Public Works and Water Utilities (303-651-8348) for details on the availability of funds.

    a. Untreated (raw) water sources for irrigation systems will be used when available per the Water Conservation Master plan. Contact Water Resources for availability.

600.02 PLAN REQUIREMENTS

1. Concept Plans. A concept plan shall be submitted for all annexations into the City. Plans shall include the following information as a minimum:

    a. Plan delineation showing parks, primary greenways and arterial rights-of-way as adopted per the most recent update of the Longmont Area Comprehensive Plan. City Landscape Regulations shall define requirements of each designated area. Plan shall be consistent with requirements outlined in Landscape Regulations.

        1. Plan to be at a scale no smaller than 1"=200'.

        2. Existing trees with general species and size defined.

        3. Delineation of wetlands or other sensitive habitats with areas defined by a qualified ecological report. Wetlands shall be noted as to whether they are considered jurisdictional waters of the United States by US Corps of Engineers regulations.

        4. Existing topography showing two (2) foot contour intervals.

        5. All existing water bodies including ditches, streams, ponds, or other significant occurrences.

        6. Notation as to areas that will be dedicated to the City and their proposed widths, lengths and areas.

    b. Typical cross-sections for relevant primary greenways and arterial streets expressing intended conceptual improvements.

        1. Cross-sections to be at a scale no smaller than 1"=20'.

        2. Width of area as proposed, shown with right-of-way line, curbing or ditch centerline and 100-year floodplain boundary line. Location of concrete path with distance from right-of-way line to be defined.

3. Typical landscape design concepts, including plant clustering, buffers and other features described.

c. Notes to be placed on the plan that read as follows as relevant to the development:

1. Primary greenways shall be dedicated to the City at the time of final platting and shall be constructed by the Developer according to City Landscape Regulations requirements in effect at the time of construction. Once Final Acceptance is obtained, the City shall assume maintenance obligations for the primary greenway.

2. Arterial rights-of-way shall be dedicated to the City at the time of final platting and shall be constructed by the Developer according to City Landscape Regulations requirements in effect at the time of construction. Maintenance shall be the responsibility of the homeowners association or City (as applicable) after Final Acceptance of public improvements is obtained per of the Municipal Code.

2. Preliminary Development Plans - A preliminary plan shall be submitted as required by the City Development Code. Plans shall include all of the information from the Concept Plan and the following general information as a minimum (also see requirements under each sub-section of this chapter):

a. Scale of drawings at 1"=50' or larger. North arrows, scale, street names and other standard plan notations to be shown.

b. Existing plant materials identified on the plans showing their location as surveyed, tree size measured at four and one half (4 ½) feet above adjacent grade, species and condition or health. Also it should be indicated if the trees/shrubs are to remain or be removed as part of the site development.

1. A site visit with the City Forester is encouraged at this time to determine tree removal or saving status.

c. Preliminary grading concept showing berming or land forms. Contours should be shown at two-foot intervals.

d. Preliminary landscape plan showing plant groupings, general plant type (deciduous, ornamental or coniferous trees); shrub beds; flower beds; water features; concrete paths or walkways, fences, live ground covers or mulch areas, and other unique features.

e. List of suggested plant species for each type of plant material shown on the plan.

f. Delineation of regulated areas per Landscape Regulations including primary greenways, park sites, arterial rights-of-way, buffer areas, common open space and scenic entry corridors. Each area to be identified in terms of total length (excluding road crossings), width (minimum, maximum and typical), and square footage of each type area (primary greenway, arterial ROW, etc.).

g. Details or cross sections of each regulated area with a typical landscape treatment described. Scale of detail or section to be 1"=20' scale or larger.

For primary greenways, a plan cross-sectional sheet with ditch cross-sections along the centerline of the ditch at fifty (50) foot intervals are to be included. Existing grade and proposed edge of right-of-way are to be clearly indicated. Scale to be 1"=20' horizontal and 1"=10' vertical.

Or instead of these cross-sections, provide:

Photographic survey of ditch sections along centerline of ditch at fifty (50) foot intervals where photographs are keyed to a plan that notes where photograph is taken from. The photograph is to clearly show a physical demarcation of the proposed edge of the right-of-way (e.g. a pole held by an assistant). Entire length of primary greenway to be photo-surveyed.

h. Plan notes that include the following (also see specific notes per each sub-section of this chapter):

1. A design intent statement that clarifies in general terms the proposed landscape treatment.

2. A maintenance obligation statement that clarifies for each individual area, the responsible entity for on-going maintenance. Include clarification for arterial rights-of-way, primary greenways, on-site improvements (common open space), detention ponds and/or scenic entry corridors.

3. A development obligation statement that clarifies the responsibility of the Developer to install landscaping and irrigation according to the most current Landscape Regulations and Standards and Specifications in effect at the time of construction.

4. A statement, as relevant, that clarifies the obligation of the Developer to prune any existing trees within the project limits, if they are to remain, according to City Forestry Standards and under the direction of the City Forester. A current list of licensed contractors is available by calling 303-651-8446.

5. A statement describing landscape and irrigation tap sizes and locations and if they will be eligible for a tap fee waiver.

3. Final Development Plans and/or Final Site Plans - A final plan shall be submitted as required by the City Development Code. Plans shall include all of the information required for Preliminary plans and the following information as a minimum (also see requirements under each sub-section of this chapter):

a. Scale of drawings at 1"=20' or larger. North arrows, scale, street names and other standard plan notations to be shown.

1. Only areas owned or maintained by the City need have plans at this scale. Common open space or other non-regulated areas can vary from

this scale requirement provided sufficient detail and clarity can be illustrated at the different scale.

b. Final grading concept showing berming or land forms. Existing and proposed contours are to be shown at a one (1) foot contour interval. Illustrate floodplain boundary definition showing 100-year floodplain boundary and a line representing 10% of 100-year floodplain for relevant areas.

c. Final landscape plan showing individual plant layout at 2/3 mature size, specific plant species for each plant as identified by a key that relates to a full landscape schedule showing key, quantity per species, botanical name, common name, size and condition purchased (e.g., balled & burlapped/B&B, and mature height and spread etc.). Separate landscape schedule to be provided for each regulated area: common open space areas, arterial right-of-way, primary greenway, etc. Also show and include general dimensions for all water features with specific notation as to type; concrete paths or walkways, fences, and other unique features.

d. All existing and proposed utilities and their associated easements, graphically shown in their correct alignment and labeled as existing or proposed; underground or overhead, and with dimensions describing the width of the easements.

1. See Section 500 for Public Works and Water Utilities requirements and Section 700 for Power & Communications regulations.

e. A chart showing the following for each separate regulated area:

1. Total length, width (minimum, maximum and typical), square footage, and acreage of each area (Primary Greenway, arterial right of way, common open space, etc).

2. Total number of required trees and shrubs for each area, per current Landscape Regulations.

3. Proposed number of trees and shrubs for each area.

4. Square footage of shrub beds for each area.

5. Square footage of each different turf type for each area.

6. Length of concrete path for each area.

7. Square footage of any buildings located in each area (as applicable).

f. Plan notes, in addition to those required for Preliminary Plans, that include the following (also see specific note under each sub-section of this chapter):

1. A statement that indicates if potable City water is to be used as a source for irrigation systems and, if so, the tap and backflow prevention device size and location. Also note whether the tap is eligible for fee waiver (for

those taps irrigating City owned areas only – primary greenways and arterial rights-of-way).

2. Location of landscape material shall be altered to provide adequate clearance from the final location of the electric distribution facilities to the satisfaction of Longmont Power & Communications.

4. Public Improvement Plans - Shall be submitted as required by the City Development Code in the same plan set as other public improvements, however, landscaping and irrigation designs for common open space areas are to be shown on separate sheets and with separate calculations from city owned and/or maintained areas. Generally, construction plans shall be required for all public improvement plan submittals. Plans shall include all information required for Final Plans and include the following information as a minimum:

a. Scale of drawings at 1"=20' or larger. North arrows, scale, street names and other standard plan notations to be shown. As these plans will be used for construction as-built drawings, clear drafting notations and professional quality mapping will be required. All plans including multi-sheet sets shall include original key clarifying where each sheet lies in overall development.

b. Final irrigation plan for both public and private improvements showing all equipment, layout, pipe sizing, sleeves, equipment legend and notes to clearly indicate components and construction. Tap location, meter pit assembly, controller, electrical service, valves and other locations as relevant shall be clearly indicated.

1. Irrigation plans shall be required at a scale of 1”=20’ or larger. Variances to this requirement may be made for long linear areas that will be irrigated with large rotor zones. Specific approval by staff is required before plans are submitted

2. A chart listing the number of zones and the number of heads per each zone shall be included on all irrigation plans. Chart to be included for publicly owned and/or maintained areas and a separate chart for common open space areas.

3. Areas with temporary irrigation systems should be noted on the plans, as necessary. Sufficient information should be provided on the plans in order for the City to determine that temporary irrigation is appropriate, including proposed methods and frequency of watering.

4. The following plan notes are required on the irrigation plans for all common open space:

i. All mainline and lateral piping shall be Class 200 PVC.

ii. The number of stations on the controllers shall include two extra stations for possible future use. Controller box shall be weather tight and vandal resistant with locking exterior disconnect.

iii. Check valves are required in all heads.

iv. Polyethylene Drip Pipe shall be weather and UV resistant, NSF approved and SDR pressure rated. Blue stripe or White stripe drip pipe is preferred. Soaker hose is not permitted.

v. All irrigation taps and electric services are to have an address and building permit before installation.

vi. All piping shall be buried a minimum of eighteen (18) inches.

vii. All piping shall be sleeved where located under paved surfaces. Electric wiring shall be sleeved separately from piping. Pipe sleeve sizes shall be two (2) sizes larger than the diameter of the pipe being sleeved and wire sleeves shall be a minimum of two (2) inches in diameter. All sleeves shall be marked with a "V" chiseled into the concrete curb or other paved surface it crosses under.

viii. Three (3) spare electrical wires shall be extended to each end of the mainline. The wires shall be looped in each valve box (eighteen (18) inch minimum loop) for possible future use.

ix. Head-to-head coverage is to be provided to all seeded and sodded areas.

x. Drip irrigation shall be provided for all trees and shrubs located in shrub beds and in all native seeded areas (even those areas approved for temporary irrigation for native seed). Trees located in irrigated turf areas shall not receive drip. Drain valves shall be included at the end of each drip lateral pipe.

c. Plan notes, in addition to those required for Preliminary & Final Plans that include the following (see specific sub-sections of this chapter for additional note requirements):

1. It is the responsibility of the Developer and their Contractors to build the project according to approved plans and City details and in accordance with current City Standards and Specifications. Field changes to these plans are to be approved by the City staff prior to any work. Field conditions that conflict with or jeopardize the longevity of the proposed improvements shall be brought to the attention of the City staff for resolution. Failure to bring such matters to the City's attention or to obtain approval of remedial measures will in no way relieve the Contractor of their obligation to resolve the matter to the satisfaction of the City staff.

2. It shall be the Contractor's responsibility to schedule a Pre-Construction meeting with the City Project Managers and inspectors prior to any work

commencement for publicly owned and / or maintained landscaped areas. Clarification will be given at this meeting on inspector contacts. Failure to schedule this meeting or perform necessary field inspections during the course of construction shall in no way relieve the Contractor of any obligations, performance standards or construction specifications as outlined in the Longmont Standards and Construction Specifications. Any work that proceeds without the approved City inspections shall be corrected at no cost to the City.

3. It shall be the responsibility of the Developer/Contractor to build the project in a time frame necessary to obtain Construction Acceptance and Final Acceptance during the growing season.

4. It is the responsibility of the Contractor to have a copy of the most current City Standards and Specifications on site at all times. All improvements within the publicly owned and/ or maintained areas and commonly-owned areas shall be installed per these standards and details. The standards shall be available to the Contractor at all site meetings/inspections. Any work that proceeds within the greenway or right-of-way that does not adhere to current Standards and Specifications and/or without the approved City inspections shall be corrected at no cost to the City.

5. Landscape and irrigation improvements shall not be installed prior to all utility construction.

6. A statement that clarifies mulch type, depth and type of permeable weed barrier underlayment.

7. A statement that clarifies fence type, height, and materials. If applicable, include a note that clearly states that the fence and/ or signage is to be maintained by the homeowner's association, property owner or individual homeowner, as relevant to the project.

8. For common open space areas, the following designer certification:

I certify this irrigation plan to be designed per current City of Longmont Design Standards and Specifications including the approved materials list, and that it was made under my supervision in accordance with Uniform Plumbing Code and Electric Code.

_____
Design Company Name / Phone number
Designer Signature /Title

_____
Date

_____
Notary

9. An itemized cost estimate and an estimated completion date per phase for City public improvements and common open space areas for landscaping, irrigation and associated concrete path. The estimate shall be itemized by area with the specific sizes for each area or quantity for each type of work provided.

600.03 ACCEPTANCE PROCESS

1. Construction Acceptance of Public Improvements - Request a Construction Acceptance inspection by calling either: a) Parks and Forestry Services at 303-774-4532 for City owned and maintained areas; or b) Planning at 303-651-8330 for privately maintained area. Also request Construction Acceptance from Public Works and Water Utilities by calling 303-651-8304. All construction must be 100% complete prior to this inspection. Schedule walk through during the growing season. Submission of equipment and public improvement as-built drawings per Section 603.07 is required as part of this acceptance process.

   a. Generally, between the months of November and April, City inspectors will not be available to inspect the landscape portions of Development projects. If all other City Divisions and Departments are able to approve Construction Acceptance for other areas during the dormant season, a Partial Construction Acceptance may be granted for weather dependent improvements. If the Developer and Contractor can finalize all work and obtain a Landscape and Irrigation Construction Acceptance prior to June 1 of the next growing season, then the City will allow for less than one year warranty period for landscape and irrigation improvements and sign for Final Acceptance at the same time as the other City Divisions and Departments. This shortened warranty period may not be available in seeded areas where establishment is unsatisfactory. In the event that the Developer and Contractor is not able to obtain a full Construction Acceptance from the City for outstanding items prior to June 1, then a delay of the Final Acceptance for all public improvements may be required.

   b. Upon obtaining Construction Acceptance, warranty and maintenance period by Developer continues. (This section does not apply to City capital improvement projects unless specifically stated in their bid documents.)

      1. Maintain area in optimal condition for duration of period between Construction Acceptance and Final Acceptance (one-year minimum).

      2. Make periodic adjustments to irrigation system to achieve most desirable application of water. Reduce watering as appropriate. Provide all necessary maintenance including mowing and fertilizing turf areas, wrapping/unwrapping trees (at beginning and end of dormant season), securing stakes and guys, restoring mulch areas, removing trash and debris, sweeping and removing snow or ice from walks, pruning broken limbs and replacing dead plant materials, weed control, erosion control, and repairing other damage as needed.

      3. Maintenance shall insure optimal health and vigor of plant materials as needed to maintain specifications. Developer is responsible for all winterization or activation of irrigation system and other adjustments until

Final Acceptance. Icing of walks due to irrigation water and/or seasonal conditions shall be immediately addressed by Developer. Maximum allowable snow removal response time is twenty four (24) hours.

2. Final Acceptance for Public and Private Improvements - Request inspection at least 30 days before the end of one-year maintenance period from City inspectors and during the growing season, per Section 600.03 of these standards. It is the developer's responsibility to schedule inspections when plants are not in dormancy. Failure to do so may result in the delay of Final Acceptance until the following growing season. In addition, request Final Acceptance from Public Works and Water Utilities by calling 303-651-8304 and for landscape and irrigation improvements not to be maintained by the City, by calling Planning staff at 303-651-8330. A 15-day project work-through will take place where Parks and Forestry personnel, Homeowners Association, or the Developer will be on-site to operate and inspect the irrigation system and landscaped areas. Schedule an irrigation operator's training session with City personnel at the beginning of this project work-through period.

   a. The City's Land Development Code (Title 15), and development plans define responsibility of on-going maintenance. If the area is to be maintained by the City, Parks and Forestry Services shall begin maintenance upon Final Acceptance, except for City capital improvement projects where the bid documents will clarify when City maintenance is to begin. If it is to be maintained by the property owner, Developer, Contractor or homeowner's association, the appropriate entity shall continue maintenance upon Final Acceptance.

      i. The City shall assist the property or homeowner's association (when such entities exist) by turning over a hard copy of irrigation as-built drawings after inspection and will retain a digital copy.

   b. Appropriate securities shall be released at Final Acceptance per the Municipal Code.

   c. At the City's discretion, an extended warranty may be accepted for portions of a project that do not fully meet City Standards and Specifications at the time of inspection, in order to facilitate Final Acceptance. Securities for extended warranty periods will be required.

   d. Common Open Space Final Acceptance. Landscape and irrigation improvements must be completed in order to grant Final Acceptance for a project, unless otherwise approved. At this time, the developer must provide digital (.pdf) and hard copy of landscape and irrigation as-built drawings with the following certification statements (inspection to follow receipt of as-built drawings):

   Designer Certification:

   I certify this irrigation system has been inspected and constructed per current City of Longmont Design Standards and Specifications including approved materials list.

   _____

   Design Company Name/Phone number

_____
Designer Signature/Title

_____
Date

_____
Notary

Contractor Certification:

I certify this irrigation system was installed per current City of Longmont Design Standards and Specifications including approved materials list, and that it was done under my supervision in accordance with Uniform Plumbing Code and Electric Code.

_____
Construction Company Name/Phone Number

_____
Contractor Signature/Title

_____
Date

_____
Notary

3. Outlots to be Dedicated to the City - Provide City Parks and Forestry with tax payment certification for areas dedicated to the City prior to Final Acceptance.

601.00 CONCRETE PATHS, BRIDGES AND UNDERPASSES

601.01 GENERAL CRITERIA

1. Concrete paths in arterial rights-of-way, primary greenways, parks and other areas owned or maintained by City Parks and Forestry Services, shall comply with all standards in 216.00 and 601.00 of the City Standards and Specifications manual. Where those standards or specifications may conflict, section 601.00 shall be followed.

2. Bridges or street underpasses may be required where crossings of a primary greenway waterway and arterial street are necessary to allow logical concrete path alignment. Bridges are to comply with this section of these Standards and Specifications. Street underpasses shall follow section 301.03 and section 601 of these Standards and Specifications.

3. Concrete flatwork in private development areas shall conform to current industry standards.

4. All Sections as applicable shall also apply to all City capital design and construction projects that reference these Standards. References to the "Developer" in these Standards shall be considered references to the Consultant or Contractor. In the event of any conflict between these Standards and the project specifications, the more stringent of the two shall apply.

601.02 MINIMUM DESIGN CRITERIA

1. A minimum eight (8) foot wide, minimum six (6) inch thick concrete path is to be provided along all arterial rights-of-way, primary greenways, and other areas as determined in cooperation with City staff. There is to be a two (2) foot minimum clear zone adjacent to all concrete paths from any vertical object except where water or sanitary sewer maintenance access is needed. Variances from this minimum clear zone requirement may be given in those cases. A tool jointed concrete rumble strip may be used between the path and the vertical object where minimal 'nuisance' strips may result.

2. A minimum eight (8) foot wide, minimum six (6) inch thick concrete path is to be provided along all secondary greenways. There is to be a two (2) foot minimum clear zone adjacent to all concrete paths from any vertical object except where water or sanitary sewer maintenance access is needed. Variances from this minimum clear zone requirement may be given in those cases. . A tool jointed concrete rumble strip may be used between the path and the vertical object where minimal 'nuisance' strips may result.

3. A ten (10) foot wide inside clear dimension is to be provided for all bridges in City-owned areas and for all arterial street underpasses.

4. Americans with Disabilities Act (ADA) and AASHTO standards are to be followed in the design of all concrete paths. A grade of not more than 1:20 shall be provided for all concrete paths and sidewalks connecting to public paths.

    a. ADA guidelines allow for the following design grades for outdoor recreation trails. These requirements could apply to Primary Greenway concrete trails in some situations. Please note that it is the responsibility of the Developer to verify current ADA requirements and coordinate with the City of Longmont to clarify where 'outdoor recreation trail' standards may be applied.

        i. 1:12 slope for no longer than two hundred (200) feet with no landings required.

        ii. 1:10 slope for no longer than thirty (30) feet with a five (5) foot landing at each end that does not exceed a 1:20 slope.

        iii. 1:8 for no longer than ten (10) feet with a five (5) foot landing at each end that does not exceed a 1:20 slope.

5. Concrete paths adjacent to slopes steeper than 4:1 shall have a six (6) foot minimum shoulder at +/- 2% slope on the downhill side of the path before the steeper slopes begin.

6. Horizontal curves with fifty (50) foot minimum radius (fifty (50) foot minimum tangent sections between curves) is the desired guideline for all concrete paths. One hundred (100) foot radius is encouraged. An overly curvilinear concrete path is not encouraged.

    a. Curvilinear concrete paths may not be closer than six (6) feet from the back of curb.

7. Vertical curves shall take into consideration the topography, drainage and ADA requirements and shall provide for safety of pedestrians and recreationalists. An overly "roller-coaster" treatment of concrete path alignment shall not be allowed.

8. The concrete path shall be offset from the property line in such a manner as to provide the following:

    I. A detached concrete path, except at street intersections where the path is to be curb attached for a minimum of fifty (50) lineal feet from the intersection.

Width of tree lawns between concrete paths and curbs or other hard surfaces to be a minimum of eight (8) feet where canopy deciduous trees are used for ease of maintenance operations and long-term tree health. Canopy trees will not be allowed where tree lawns are less than eight (8) foot in width. Where available right-of-way width is insufficient for the required offset, variances may be allowed if landscape provisions are met, but will be restricted to ornamental or small tree canopy trees. In areas narrower than five (5) feet, depending on tree type, a root barrier may be required to prevent concrete path and/or curb heaving. See Approved Materials List – Tree Recommendations for suggested plantings.

    II. Optimally sized landscape areas on both sides of the concrete path within the right-of-way to allow for efficient irrigation and to eliminate nuisance strips – optimal shrub areas four (4) feet minimum and eight (8) feet preferred; optimal turf areas twelve (12) feet.

    III. Concrete path placement at the edge of the right-of-way where additional common open space is provided behind the right-of-way line. This layout will provide maximum separation between curbline and concrete path and also provide a visual definition of the boundary between private and public areas.

9. Additional concrete flatwork is required where a detached concrete path becomes curb attached and where the detachment is two (2) feet or less in separation. This area may be placed in decorative concrete flatwork (colored/ textured).

10. Where shrub beds are adjacent to curbs in arterial rights-of-way, an eighteen (18) inch wide, four (4) inch thick bomanite (or approved equal) strip along the curb edge, per Section 606.02. Pre-approved stamp is the brick pattern. Color to be submitted to and approved by the City.

11. Where greenway concrete paths intersect with local, collector or arterial streets (where an underpass is not required), a stop sign shall be located at the intersection of the two traffic routes (facing the greenway route) and an intersection warning sign shall be placed one hundred (100) feet from the intersection along the greenway.

12. Concrete path to be located out of the low flow channel and associated areas that contain 10% of the 100-year flow rate in large drainage basins, and low flow channel and associated areas that contain 5% of the 100-year flow rate in small drainage basins, as determined by the City Public Works and Water Utilities Storm Drainage Division.

    a. Exceptions to this provision to be specifically requested with reason for non - compliance given.

13. Bridge width ten (10) foot inside clear dimension between railings minimum), railing height to be 42”-54” above deck height, length and orientation if applicable. Riprap or other engineered abutment protection is required. Railings to be designed to meet AASHTO requirements. Bridge to carry minimum uniform live load of sixty (60) pounds per square foot or one 10,000 pound vehicle load with 80% of load on rear wheels, unless City maintenance vehicles exceeding this weight require access to this area. If jet trucks and other large vehicles require this bridge access, the specific weight of those larger vehicles will be the minimum live load requirements. Assume wind load of 0/25 psf on full height of bridge, as if enclosed. . Shop drawings to be submitted for approval thirty (30) days prior to manufacture schedule.

    a. Bridges to include railing to eliminate drop off areas at abutment or along approach pathways where needed. Railing to match bridge rails and accommodate turning movement of maintenance/emergency vehicles turning onto bridge.

    b. Bridges in City owned areas shall be located above 10% of the 100-year floodplain elevation unless larger flows are required by City Storm Drainage Engineers.

    c. Each bridge shall have a safety sign attached to both ends of bridge. See Section 601.04.6 for sign requirements. Signs shall not protrude into bridge or concrete path clearance zone.

    d. A steel safety plate is to be mounted on the bridge deck as needed to fill gaps over one half (½) inch at abutment. Plate is to be mounted to bridge only, and will slide over abutment with expansion movement of bridge. Plate is to run entire width of decking and extend onto abutment sufficiently to cover the gap completely. Plate edges to be beveled to lessen trip hazard or bump.

14. Arterial street underpass of primary greenway concrete paths to be sized to accommodate eight (8) foot wide concrete path plus two (2) foot wide concrete warning strip on the water-side of the path, while maintaining an eight and one half (8.5) foot minimum head clearance (unless maintenance vehicles require greater vertical clearance) from finish grade of concrete path. Additional head clearance (up to ten (10) foot) is preferred where possible. Concrete thickened edge or other structural component to be engineered for the concrete path within the low flow channel and associated areas that contain 10% of the 100-year flow rate in large drainage basins, and low flow channel and associated areas that contain 5% of the 100-year flow rate in small drainage basins. Riprap path protection to prevent undercutting path during flood conditions is required. Elevation of concrete path should allow normal flow conditions without flooding. Separator walls and/or sump pumps are not allowed without specific exception granted. Alternate concrete path route during flooding to be provided at

underpasses using a concrete ramp to arterial concrete path (complying with section 601).

a. Flood gates to be provided at both sides of underpass out of normal high water elevation and at intersection of ramp to arterial concrete path.

b. Lighting of underpasses is required. Lighting to be vandal resistant, lexan lens fixtures. Wiring to be enclosed in conduit per UBC and installed per National Electric Code. Number of fixtures to provide consistent pedestrian lighting level. A building permit is required for this work. See Section 700 for Power & Communications electrical requirements.

c. Striping shall be required in all underpasses. Stripes shall be four (4) inches wide and yellow and shall be painted in a dashed pattern in the center of the trail. The striping shall extend through the underpass and for a minimum of fifty (50) feet outside of each end of the underpass, or as needed for safety.

d. Signage: Graphics for signs are to be provided by the City if available.

   i. Low clearance sign mounted directly above concrete path as it enters underpass indicating specific clearance in feet and inches to lowest clearance point.

   ii. Street sign mounted above underpass concrete path as it enters underpass indicating street name above the concrete path.

   iii. Primary Greenway ID sign – at street intersections or as deemed appropriate by City staff, mounted on 6x6 wooden post.

   iv. Dog pick up sign/ station – at street intersections and/or other locations deemed appropriate by City staff. Mounted on 4x4 wood post with PVC bag dispenser mounted beneath sign.

   v. Trail Courtesy signs – at locations deemed appropriate by City staff. Mounted on wooden 4x4 post.

e. Site Furnishings: Site furnishings including trash containers on concrete pads and benches on concrete pads may be required for inclusion along Primary Greenways. Furnishings are required on a ½ mile interval and may include other specific locations per City staff.

f. Underpasses with limited sight distance may be required to include a warning light and sign to indicate presence of maintenance vehicles. Light system includes card reader on post at sufficient distance from underpass to effectively warn path users of vehicle presence – typically at intersection of ramp. Light to be mounted on Underpass face.

601.03 MINIMUM PLAN INFORMATION

1. Location of concrete path within right-of-way, showing connections to other walkways and floodplain boundary lines delineated per Section 600.02.3 of these standards.

2. Concrete path curve radii to be indicated on plans.

3. On all plans, provide a Design Intent Statement that describes the location, width (eight (8) foot minimum), thickness (six (6) inch minimum) of the concrete path. In addition, a note should indicate compliance with the most current City Standards and Specifications at the time of construction.

4. On Public Improvement Plans, a note that relevant floodgates, lighting and signage to be provided per Section 601 of the City Standards and Specifications.

5. On Public Improvement Plans, a note that relevant bridges and street underpasses are to be constructed per Section 601.04 and other relevant sections, as applicable, of the City Standards and Specifications.

601.04 MATERIALS

1. For a specific list of materials accepted by the City please see Parks and Open Space Divisions Approved Materials List.

2. Concrete mix design: see Section 216 of these Standards.

   a. Control joints: zip strips or saw cut (soft cut) to one quarter (¼) the total slab thickness.

   b. Curing compound: for all exposed concrete surfaces - white pigmented sealant.

3. Bridge steel to be CorTen self-weathering steel (preferred) or zinc enamel painted structure (color gloss black or as approved by City Parks & Forestry Services). Concrete reinforced bridges are acceptable. Concrete decking is preferred, however, ironwood decking also acceptable (three (3) inch minimum thickness planks). See approved materials list for pre-approved decking. Approach railing to match bridge steel and paint (if applicable). Safety plate at abutment to be one quarter (¼) inch minimum textured, galvanized steel plate.

4. Barrier railings shall be constructed of minimum two (2) inch round tubing with three-eighths (3/8) inch walls. All welds shall be ground sooth and railings shall be painted gloss black (or other color per Parks and Forestry approval) with zinc enamel paint. All railing design is to be per Detail 200-19 of these standards and to meet current AASHTO standards.

5. Flood gates welded from four (4) inch (minimum) galvanized pipe support posts and two and one-half (2-1/2) inch pipe for gate with ample cross members for structural integrity. Posts for locking into open and closed positions are required using heavy-duty chain and steel encased padlock. Gate, reflector tape with sign per Section 601.04.6.a

6. Signage: All signs shall be silk-screened with 3M ink on .080” thick aluminum backing plates. No Electronically Cuttable Film (E.C. Film) shall be permitted unless approved by the City. All signs shall have a border the same color as the sign text. Signs to include Spanish translation if possible (to be provided by Parks and Forestry). Sign faces to be secured using tamper resistant fasteners.

a. Flood gate signs: "Path Closed. Use alternate route. Camino cerrado. Use la ruta alternativa.", to be secured to gate. Color: Yellow with black letters.

b. Low clearance sign (English only) to be secured to the face of the underpass (with field measured height from lowest point within opening): Color: Yellow with black letters.

c. Street identification sign (English only) at underpass – Street name (only) to be secured to the face of the underpass: Color: Royal blue with white letters.

d. Bridge loading sign (English only) (with manufacturer's maximum bridge loading information) to be secured to the bridge by the manufacturer: Color: Bronze plate or approved equal.

e. Stop sign (English only) at concrete path intersections with roads (standard street sign or smaller version allowed) to be mounted on wood post: Sign Color: Red with white letters.

f. Path intersection sign to be mounted on wood post: "Warning: Intersection ahead. Aviso: Intersección a continuación." sign: Color: Yellow with black letters.

g. Bridge caution sign: "Caution: Slippery when wet. Precauciòn: Resbaloso cuando esta mojado." Or, International graphic symbol to be secured to bridge end posts without extending into path or on separate free-standing wood post. Color: Yellow with black letters.

h. Primary Greenway ID sign: Name of primary greenway (English only) to be mounted on wood post, Sign Color: White with green letters. Sign to run vertically up post.

i. Dog waste sign: Copy and color to be provided by Parks and Forestry. Sign face to be mounted on wood post.

j. Dog waste dispenser: Twenty four (24) inches long four (4) inch PVC (Class 200) pipe with two (2) end caps, painted black. Two (2) each four (4) inch diameter holes cut into one side of pipe top and bottom. Dispenser to be mounted on wood post.

k. Trail Courtesy sign – Color – Green. Copy to be provided by Parks and Forestry. Two (2) sign faces are to be provided (English and Spanish). Mount to wood post with one sign face on each side.

l. Sign Posts – four by four (4 x 4) inch or six by six (6x6) inch (size as appropriate for sign face) pressure treated wood posts stained gray (Stain Color – Sherwin Williams Grey Birch). Top edges beveled and posts free of significant checking.

m. Card Reader post – metal two and one half (2½) inch diameter post – galvanized or painted black enamel.

7. Lighting:

   a. Vandal resistant, lexan lens fixtures with metal guard. See approved materials list for pre-approved fixtures.

8. Root Barrier: See approved materials list for pre-approved barriers.

601.05 EXECUTION

1. Locate all utilities prior to grading and trenching and protect from damage, per Section 107.04 of these Standards. Call 303-651-8446 for Parks Division irrigation locates.

2. Submit concrete mix design to Public Works and Water Utilities for approval.

3. Alignment to be per approved plans. Field modifications in alignment must be approved by City staff prior to formwork.

4. Coordinate with irrigation installation so necessary sleeves are placed beneath concrete path as needed. Sleeves to be set at standard trench depth per Section 603.04.

5. Obtain testing of compaction and moisture and re-compact as needed in order to obtain minimum compaction requirements. Compaction testing needed in accordance with Section 211.

6. Timing of concrete placement to allow for proper finish and product. No placement allowed if rain or snow is pending prior to reasonable cure. Excessively hot or cold weather may be reason for placement rescheduling by the City of Longmont. Weather damage due to precipitation may be cause for rejection of paving.

7. Slab thickness to be six (6) inch minimum.

8. No tooled joints are allowed on concrete path construction. Place expansion joints at maximum spacing of four hundred (400) lineal feet or three thousand, two hundred (3,200) square feet, whichever is less. Install expansion material at sufficient depth to allow for sealant and remain flush with finish surface elevation. Expansion joints where flatwork intersects vertical concrete. Dowel per Section 200 between all cold joints and between concrete path and bridge abutment.

9. Install control joints on eight (8) foot centers using zip-strip during placement operation so lines are straight and perpendicular to the edge of the concrete path or saw-cut after placement operation with straight and perpendicular cuts. Control joints also to be placed at intersections, radius points and elsewhere as needed to prevent cracking. Saw-cut joints to be timed properly with the setting of the concrete. Cutting shall be started as soon as the concrete has hardened sufficiently to prevent aggregates from being dislodged by the saw, and shall be completed before shrinkage stresses has developed sufficiently to induce cracking.

10. Testing to be done by an independent testing lab per Section 214 of the City Standards and Specifications.

11. Concrete finish to be consistent light broom finish. Heavy broom finish will not be permitted. Irregularities, poor finish and other deficiencies of workmanship or vandalism will require concrete work to be removed and replaced. Weather damage to finish will also be cause for removal and replacement. Contractor has option to provide sample panel of finish prior to work for City approval.

12. No concrete wash is to be dumped onto landscape areas. Any concrete water or spillage is to be contained and removed from the site prior to any landscaping.

13. Protect concrete with curing compound and other means to prevent premature drying, frost and rain. Provide watchmen as needed to protect from vandalism until reasonable cure is obtained.

14. Remove forms twenty four (24) hours after pour unless otherwise approved. Avoid damage to edges of pavement.

15. Backfill edges of concrete path prior to opening to public use, per Section 602 of these Standards.

16. Install signs at locations field verified by City inspectors. Install posts with 30" minimum bury – backfill excavation with washed rock. Offset post from path edge so that edge of sign face is a minimum of twenty four (24) inches from the path edge. Install sign faces in correct orientation to path for sign message readability. Install sign face using vandal resistant fasteners.

17. Lighting – recess light fixtures between bridge beams or at corner of underpass structures if possible. Mount photocell in concealed location if possible, yet open to natural light conditions.

18. Warning Light – mount light on exterior face of each side of underpass. Mount card reader to metal post at sufficient distance from underpass to engage light prior to vehicle entering area (typically at intersection of the ramp and alternative route).

601.06 COMPLETION SERVICES

1. Provide to City record drawings including horizontal verification of concrete path and all other structures.

601.07 GUARANTEE/WARRANTY

1. Prior to final acceptance, all bridges, street underpasses, concrete paths and other miscellaneous improvements under this section are to be warranted against defects. Cracking, settling, displacement and damage to those improvements are to be repaired or replaced by the Developer at no cost to the City. Repairs and replacements are to be covered by warranty.

602.00 GRADING AND FINE GRADING

602.01 GENERAL CRITERIA

1. For City-owned areas - soil fertility and texture tests conducted by the Colorado State University Soils Lab or other certified lab must be completed and submitted to the City for review; recommendations in the lab reports shall be followed in all cases. Generally this will include soil amendment and fertilizer recommendations; in some cases, all new topsoil will be required.

2. This entire section shall also apply to all City capital design and construction projects that reference these Standards. References to the "Developer" in these Standards shall be considered references to the Consultant or Contractor. In the event of any conflict between these Standards and the project specifications, the more stringent of the two shall apply.

602.02 MINIMUM DESIGN CRITERIA

1. Grades in all areas per Section 600.01.1.b. are to be designed to allow for proper drainage and ease of maintenance operations. Grass swales shall drain at a minimum slope of 2%. Hard surface paths and piping shall drain at a minimum slope of 1%. Berms and other slopes shall not exceed 4:1 for areas scheduled for irrigated and mowed turf. Berms and other slopes shall not exceed 3:1 for native grass areas (unmowed or mowed only during establishment), and for shrub beds. Retaining walls, riprap or other structures will be used to bring grades into conformance with these standards.

2. Ditch embankments shall be graded to 4:1 maximum slope from a distance approximately one (1) foot above channel bottom, or as determined in the field by City inspectors. Retaining walls, riprap or other structures will be used to bring grades into conformance with these standards. A level area should be maintained at the top of slope with a width adequate for landscaping and ditch maintenance access including concrete paths, as determined by Parks & Forestry and the appropriate ditch company.

3. Grading is to be designed to contain right-of-way area nuisance water within the right-of-way. Swales or other means must be used to prevent water from draining from right-of-way areas into private lots.

4. Grading shall take into account all desirable existing vegetation that is and scheduled to remain. No grading will be allowed within the drip line of existing trees scheduled to remain. Cut or fill not exceeding six (6) inch may occur within the drip line, but shall be done by hand methods. Grading will be designed to save as many mature, good quality and desirable species trees as possible, but shall include removal of all invasive or undesirable trees, shrubs, vegetation and noxious weeds (see plant list in appendix). Construction fencing and other standard protection methods shall be utilized to protect existing trees.

5. Grading adjacent to concrete paths shall include a six (6) foot minimum shoulder at +/- 2% slope on the downhill side of the path where slopes are steeper than 4:1.

6. Wetlands and other sensitive areas shall be protected from erosion and damage. Silt fencing shall be utilized to control damage to sensitive areas including waterways, and wetlands.

7. Grading operations shall utilize all existing topsoil on the site.

8. All grading shall adequately allow for a six (6) foot wide mowing deck, especially at tops and sides of berms, along sides and bottoms of swales, etc. Where areas are graded steeper than 4:1 adjacent to the concrete path, a six (6) foot wide shoulder with a 10:1 maximum slope shall be required.

9. Grading shall provide a one (1) foot minimum width flat buffer area with a +/-2% slope at the toe of slopes with shrub beds steeper than 4:1 and where adjacent to a concrete path, sidewalk or curb. Grades in private common areas, including detention ponds, shall not exceed the maximums noted in this section. Walls or other structures may be used where necessary to bring grades into conformance with these standards.

10. Detention ponds shall have corners of ponds at a slope of no greater than 6:1. The pond bottom shall drain at a minimum 2% slope over grass areas and 1% over concrete trickle channels. A concrete slab near the outlet shall be installed and sized appropriately to accommodate siltation. Storm drainage inlets shall be placed in close proximity to the pond outlet to eliminate or minimize the need for a trickle channel. A trickle channel with minimum three (3) foot width, if installed, shall be constructed with a minimum slope of 1% to ensure proper drainage and shall be located to one side of the pond and limited to the extent possible to allow for multi-use functions of the pond area. Adequate maintenance equipment access shall be provided by means of a concrete path or other allowed all-weather traffic-rated surface to access storm drainage inlets/outlets etc.

    a. Ponds designed to retain water at all times and detain only additional storm flows shall be designed per above criteria where applicable.

11. For detention ponds to be owned and maintained by the City Parks and Forestry Services, the following shall also be provided: a perimeter landscaped area, ten (10) feet in width, around the top of the pond to allow for landscaping and other amenities; benches, picnic tables, play equipment, sports courts and/or fields, and other amenities, as determined by City Parks and Forestry Services, that are in scale with the size of the detention facility. All equipment shall be placed on concrete pads, per the direction of City staff. See Approved Materials List for equipment.

12. Where an arterial ROW is being improved prior to the construction of the ultimate curb and gutter, the Developer will be responsible for anticipating the future road construction. Ultimate ROW improvements shall be designed and built to the future curbline (horizontal and vertical elevation), as determined by the Public Works and Water Utilities Department. The space between the existing road edge and the ultimate curbline shall contain any necessary interim drainage improvements and shall be seeded. Road delineators will be required where no curb and gutter is provided, on a fifty (50) lineal foot spacing. Refer to Section 604 for additional information.

602.03 MINIMUM PLAN INFORMATION

1. Preliminary Development Plans: Existing topography at two (2) foot contour interval for entire site including rights of way and primary greenway. Proposed topography in general graphic delineation depicting location of berms or other landforms. Additionally, a detail or section that shows the existing and proposed topography for all right-of-way areas, primary greenway areas and detention ponds within the project area. Detail to show location of concrete path, landscape areas as well as proposed grades with maximum slopes indicated.

2. Final Development Plans and Public Improvement Plans: Existing topography at one (1) foot contour interval for entire site including rights of way and primary greenway. Proposed topography that ties to existing contours so that cut and fill areas are clearly indicated. Slope arrows that indicate minimum and maximum slopes allowable. Ultimate curbline alignment and existing edge of asphalt along arterial ROWs slated for future expansion. All future alignment information is to be determined by the Public Works and Water Utilities Department using the most current information available.

3. Public Improvement Plan notes that read as follows:

    a. All irrigated turf areas shall not exceed 4:1 slopes. Native grass and shrub bed areas shall not exceed 3:1 slopes.

    b. All existing trees scheduled to remain shall be protected by an orange construction fence four (4) feet high secured with steel t-posts at the drip line of each tree. Sufficient posts shall be used to maintain fence in erect condition at all times. No grading shall commence without construction fencing in place. Hand grading only will be allowed within the limits of construction fencing. No more than six (6) inch of cut or fill will be allowed within the drip line of any tree shown to remain on these construction plans.

    c. All topsoil shall be striped from the site for use on this project. No topsoil shall be removed from the site. After clearing and grubbing operations are complete, and prior to other earthwork activities, strip topsoil to maximum depth possible to recover topsoil. No subsoil shall be removed as part of this topsoil striping operation. Stockpile topsoil in an area where grading activities can commence without interference, and protect from wind or other erosion with fabric or by other approved means. Subgrade work to leave an allowance for replacement of topsoil.

        1. In City-owned areas, replace topsoil to the depth available or six (6) inch minimum. Where sufficient topsoil is not available on-site, additional imported topsoil shall be utilized to allow for six (6) inch minimum depth of topsoil in all landscape areas. Imported topsoil shall comply with Section 602.04 of the City Standards and Specifications.

    e. Soil amendments per Section 602.04 of the City Standards and Specifications shall be used in all landscaped areas. Soil amendment shall be applied no more than thirty (30) days before seeding. A minimum of three (3) cubic yards soil amendment per 1000 square feet of landscape area shall be incorporated into

the top six (6) inches of topsoil by tilling. Increase amendment quantities as needed per Soils Test recommendations.

602.04 MATERIALS

1. For specific list of materials accepted by the City please see Parks and Open Space Division Approved Materials List.

2. Topsoil: A friable loam, typical of cultivated local topsoils, containing at least 2% humus. It must be taken from a well drained, arable site and shall be reasonably free of subsoil, stones, clods, sticks, roots and other objectionable extraneous matter or debris. No stones or other materials over two (2) inches in size shall be allowed. It shall contain no toxic materials. Topsoil shall have an acidity in the range of ph 5.5 to ph 8.5.

   a. Submit sample and written confirmation from supplier of material composition including the percent of organic matter, salts, and nutrient composition. Sample is to be representative.

3. Soil Amendment: A high quality composted material containing a minimum of 30% organic matter by dry weight. The mixture shall be free from clay subsoil, stones, lumps, plants or roots, sticks, weed stolons, seeds, high sodium content and other materials harmful to plant life. The compost shall be coarsely ground with an even composition and have an acidity in the range of PH 5.5 to PH 7.0. All material shall be sufficiently composted such that no material used is recognizable. The following nutrient analysis should be provided on a dry basis: Nitrogen: 1% min; Phosphorus: .4%; Potassium: 1.2%; Salts: 6.5% (as received basis).

   a. Submit sample and written confirmation from supplier of material composition including: percent organic matter, sodium, nutrient composition and trademark. Sample is to be representative.

4. Fertilizer: Triple superphosphate with a chemical analysis of (0-46-0).

602.05 EXECUTION

1. Locate all utilities prior to grading or trenching and protect from damage, per Section 107.04 of these Standards. Call 303-651-8446 for Parks Division irrigation locates.

2. Install construction fencing and/or Storm Water Construction Activity BMP’s as needed prior to any grading activities.

3. Apply general herbicide or broadleaf herbicide (2,4-D amine 4% A.I.) as applicable to areas where noxious weed beds have been established or where seed mix is to be planted. Herbicide must be applied by certified contractors at the rate recommended by the manufacturer after proper notification has been done in accordance with chemical applicator's standards. Precautions must be taken to avoid drifting of spray onto other properties and shall not be done in breezy conditions. Plant material not designated for herbicide application that is damaged shall be replaced by the Contractor. Timing of application shall allow complete weed kill prior to grading operations and again prior to final grade if re-growth has occurred.

4. For arterial ROW development adjacent to a road slated for future expansion, survey and stake future horizontal and vertical alignment of the ultimate curb. These stakes are to be maintained throughout the ROW construction process, including irrigation layout, seeding and sodding. Disturbed stakes are to be re-surveyed, as necessary, to maintain the required information during construction. Grades outside the ultimate roadway are to be set to anticipate future road improvements. Grades between the existing road edge and the ultimate curbline are to be graded to provide drainage and a safe shoulder for vehicles.

5. Take precautions to accommodate proper drainage and flow during and after grading and soil preparation.

6. Clear and grub the site by removing unsuitable vegetation, woody and rock material present in the surface grade.

7. Strip topsoil to a maximum depth, as determined by field inspection to recover as much quality topsoil material available and where site is scheduled for cutting or filling. If existing grades are to be maintained, topsoil can remain undisturbed. Stockpile stripped topsoil in location separated from grading activities and cover to protect from wind and other erosion.

8. Proceed with earthwork operation per approved plans. When complete with rough grading, obtain approval from City inspectors by . Rough grade inspection is to allow for six inch (6") minimum depth of topsoil and specified soil amendments as part of the fine grading work.

9. Rip to twelve (12) inch depth with agriculture subsoiler in all areas to receive plantings.

10. Re-spread or import topsoil to achieve six (6) inch minimum depth in all landscaped areas and grade to smooth and even lines. Establish swales and drainage as required per plans.

11. Evenly distribute soil amendment at rate of three (3) cubic yards per 1000 square feet of area, or as recommended by Soil Test, over the entire area to be prepared. Till amendments and topsoil into top twelve (12) inches of soil. Compact to a firm, but not hard (80% of Standard Proctor Density at 2% optimum moisture). Soil amendment shall be applied no more than thirty (30) days before planting operations.

12. Remove all objects greater than one-half (½) inch in diameter in all irrigated turf areas. For native grass seeded areas, two (2) inch diameter objects or greater are to be removed.

13. Trim finish grade elevations adjacent to paved areas to one (1) inch below pavement finish grade.

14. Evenly distribute triple superphosphate fertilizer at the rate of fifteen (15) pounds per thousand square feet; modify type and rate if soils test recommends otherwise.

15. Remove all debris piles and other stockpiles from site. Clean walkways and streets on daily basis to minimize mud tracking and siltation into drainage structures.

603.00 IRRIGATION

603.01 GENERAL CRITERIA

1. This entire Section shall also apply to all City capital design and construction projects that reference these Standards. References to the "Developer" in these Standards shall be considered references to the Consultant or Contractor. In the event of any conflict between these Standards and the project specifications, the more stringent of the two shall apply.

2. This entire section shall also apply to common open space areas.

3. Comply with the International Plumbing Code, City Electrical Code (latest editions) and general industry standards for all areas.

4. All arterial right-of-way, primary greenway and other private required landscaped areas shall have an automatic, clock-activated irrigation system of sufficient coverage to irrigate all plant material.

5. Design and planning criteria shall be in conformance with the 1996 Water Conservation Master Plan, as amended. Xeriscaping is required within all City owned areas and in privately owned common areas.

    a. Xeriscaping within this section shall be defined as reducing water use in landscaped areas through: proper planning and design (zoning plant materials and recognition of micro-climates); good soil improvement (topsoil and soil amendment); limiting turf areas and using water thrifty turf types (see approved materials list); efficient irrigation (zoning irrigation to separate turf areas from shrubs, minimize overspray onto hard surfaces, use of water saving equipment (see approved materials list), and recognition of micro-climates); use of mulches (and avoidance of impermeable weed barriers); use of water thrifty plant materials (natives are encouraged); and through appropriate maintenance practices. For more information contact Xeriscape Colorado.

6. Installation of an irrigation system within Common open space and City owned areas shall include a separate tap (private areas separate from public areas), backflow preventer, meter, meter pit and power source for the irrigation controller which will not be subject to disconnection should the fronting property be vacated. Where raw water irrigation is available, it shall be used for irrigation with potable back-up also provided.

    a. All potable irrigation systems shall be equipped with backflow prevention devices meeting the specifications of the Public Works and Water Utilities Department.

    b. Where the City will maintain the system, devices will be installed below ground and a cage whose design will be approved by Parks & Forestry will protect all above ground mounts. The irrigation controller will be of the pedestal-mounted variety or be wall mounted with lockable, weatherproof cabinet.

    c. In common open space areas, devices will be installed in protected location and/or in weather tight and vandal resistant controller enclosures with locking exterior disconnect..

6. Any deviation in taps from the approved construction plans to be approved by the City Public Works and Water Utilities Department prior to installation. Any water service line above two (2) inch shall be coordinated with City Public Works and Water Utilities Engineer. All taps of two (2) inches or less shall be installed by the Public Works and Water Utilities Department upon payment of applicable fees to the City. All taps in excess of two (2) inch shall be installed by a Contractor approved by the Public Works and Water Utilities Department to install irrigation systems and shall be inspected by the division upon payment of the applicable fees.

   Tap fee waivers to be applied for in writing through City Public Works and Water Utilities Department with size of tap, address of tap and type of area to be irrigated from this tap described. Eligible taps include those irrigated areas owned by the City including arterial right-of-way or primary greenway improvements. No water from these taps is to irrigate areas outside of the rights of way on areas eligible for fee waiver. The City Public Works and Water Utilities Department reserves the right to rescind this waiver if water usage is being abused.

7. All irrigation taps and electric services are required to have an address and building permit before installation. The billing information will be required at the time of building permit issuance. Addresses are determined by the Planning Division (contact 303-651-8330 for information) and building permits are obtained from the Building Inspection Division.

8. Final location of irrigation controller to be coordinated and approved by the City Parks and Forestry Services for City owned areas or by City inspectors for other areas. Electric source to be coordinated and approved by Longmont Power & Communications (LPC) for all areas. For controllers on a system with a waived tap and per the approval of LPC, the electrical connection will not be metered, provided there are no additional loads on the service. Electric services with any additional loads will be metered. The Developer will be responsible for all applicable LPC connection costs and fees. Maintenance of the service from the LPC source will be the responsibility of the entity in charge of overall maintenance of the area.

603.02 MINIMUM DESIGN CRITERIA

1. For City-owned areas, a system is to be designed to provide head to head coverage with matched precipitation rates. Heads shall not overspray walkways, pavements or other hard surface areas. Temporary establishment irrigation of native grass areas MAY be an allowable variance if accepted by Parks and Forestry. Principles of Xeriscape shall be utilized in the design of irrigation system. Design considerations include: shrub and perennial beds are to be zoned separately from turf areas, sloped areas to have separate zoning for heads at the higher elevations from those at the lower elevation and areas with different exposures to be zoned separately. This design criteria is encouraged for all areas.

2. For Common Open Space areas: a system is to be designed to provide head to head coverage with matched precipitation rates. Heads shall not overspray walkways, pavements or other hard surface areas where possible. Temporary establishment irrigation of native grass areas MAY be an allowable variance if accepted by Planning. Principles of Xeriscape shall be utilized in the design of irrigation system. Design considerations that must be included are: shrub and perennial beds are to be zoned

separately from turf areas, sloped areas to have separate zoning for heads at the higher elevations from those at the lower elevation and areas with different exposures to be zoned separately.

3. For all areas, if the use of untreated, raw water for irrigation is found to be appropriate by the Public Works and Water Utilities Department and Parks & Forestry, such use may be required. The Developer shall install an approved pump in an approved secure above-ground pump enclosure. Pump system to include filtration equipment with self-flushing screens. Typical "dirty-water" equipment shall be required for these systems, including purple valve boxes scrubber valves, pipes and heads. At all times of use, a conspicuous notice shall be posted warning that untreated ditch is being used for irrigation. Sign message to be provided by City.

4. For City-owned areas, if a tap fee waiver is requested for arterial right-of-way or primary greenway areas, the water from the City tap (with waived fee) shall not irrigate areas outside of City-owned areas.

5. For all areas, check valves-in-head required.

6. For all areas, only materials, sizes and other requirements listed in this section and on Parks and Open Space Division Approved Materials List shall be specified for use, per type of area noted. IF THE AREA IS OWNED BY THE CITY BUT MAINTAINED BY DEVELOPER/SUBSEQUENT OWNERS, some exceptions may be granted. No exceptions will be given to any equipment/materials to be buried within these areas. Parks and Forestry Services to approve exceptions to these requirements.

7. Obtain available design pressure and flow from Public Works and Water Utilities Department Engineering staff by calling 303-651-8376. For City-owned areas, design system shall not exceed available pressure at time of Longmont Planning Area final build-out of area. Where available pressure exceeds 85 psi, design the system to 85 psi and include provision for pressure regulator installation to reduce actual pressure to 85 psi if necessary.

8. Remote control valves shall be located to minimize lateral piping and sleeving under walkways and hard surface areas. For all areas, isolation valves shall be placed at both sides of each road crossing, at the upstream end of each leg in the mainline and at other areas as needed to minimize disruption to overall system in the event of system failure.

9. For all areas, no cross-connections between City water and untreated raw water shall be permitted.

10. For all areas, lateral piping shall be sized based on flow demands (gpm's): velocities shall not exceed five and one half (5.5) feet per second in any Class 200 piping. Copper pipe velocities shall not exceed seven (7) feet per second.

11. For all areas, backflow prevention devices are required for all irrigation systems and shall meet Public Works and Water Utilities specifications.

603.03 MINIMUM PLAN INFORMATION

1. The final plan shall include all information required in Section 600.02.4 as well as the following notes:

    a. All Areas: A plan note that shows separate tap sizing calculations for each area served by each separate tap. The calculation shall be based on total ultimate use from the tap including all phases or off-site areas served from the tap even if future build-out is several years out.

        1. The tap sizing calculation shall use the following formula: Total square feet of irrigated area from that tap (including future build-out if applicable) divided by eight (8). Result times 7.48 = gallons per cubic feet per week. Take gallons per cubic feet per week and divide by five (5) days per week, divide that answer by seven (7) hours per day, and divide that answer by sixty (60) to = gallons per minute. Tap size should then be the same as the smallest copper pipe (Type K) that will not exceed seven (7) feet per second. The number of days per week and hours per day are somewhat flexible, but those given above should be the typical. (If the areas include temporary irrigation of dryland turf, call Parks and Forestry for adjustments to this formula).

    b. A note shall read, 'A ___ Inch tap will serve the _____ (Name of area), and a tap fee waiver will (or) will not be requested.'

2. All Areas: The construction plans should separate City owned areas from Common Open Space areas and include final irrigation plan information including piping, heads, valves, tap, controller and other miscellaneous equipment layout. Provide gpm, valve size, and valve number for each remote control zone valve. Provide pipe sizes for each section of mainline and lateral. Provide a separate irrigation schedule for City owned vs. Common open space areas that shows a key for each piece of equipment shown on the plan and describes the manufacturer, model number or other designation.

3. Construction plans shall include the following notes:

    a. All Areas: Minimum design pressure.

    b. All Areas: These plans are diagrammatic and may require field adjustments.

    c. All Areas: It shall be the Contractor's responsibility to install the irrigation system in accordance with these plans and the most current City Standards and Specifications. Field changes to these plans are to be approved by the City inspector prior to work.

    d. All Areas: All heads shall include a check valve. All valves shall have three extra wires looped per detail, and extended to the farthest wire drop or valve of each mainline branch. City Owned Areas: All rotor heads shall include a stainless steel riser.

e. City Owned Areas: Pipe including mainline shall be located within a two (2) foot offset from walks or curbs and to maximize tree planting zones. Field adjustment to this standard must be approved by the City inspector prior to work.

f. All Areas: It is the responsibility of the Contractor to have a copy of the most current City Standards and Specifications on site at all times. All improvements shall be installed per these Standards and Specifications. The Standards and Specifications shall be available to the Contractor at all site meetings/inspections. Any work that proceeds within these regulated areas that does not adhere to current Standards and Specifications and/or without the approved inspection of the City shall be corrected at no cost to the City.

g. All Areas: All sleeves will be marked with a "V" chiseled in concrete path, curb or other paved surface at all crossing points directly over the sleeve location.

603.04 MATERIALS

1. All Areas: For a specific list of materials accepted by the City, please see Parks and Open Space Divisions Approved Materials List.

2. All Areas: Taps: Contractor is responsible for supplying saddle for the PVC or A.C. pipe.

3. All Areas: Backflow Prevention Device & Water Meter: Backflow devices and water meters to be purchased to meet Public Works and Water Utilities specifications.

   a. All Areas: Above ground reduced pressure backflow preventers are required for all potable systems and for all untreated raw water with in-line injection system designs.

4. City Owned Areas: Master valve: sized to match size of mainline.

5. All Areas: Copper: Type K rigid conforming to ASTM Standard B88.

6. All Areas: Mainline: Class 200 PVC, NSF approved.

   a. City Owned Areas: For pipe sizes larger than four (4) inches use gasketed pipe.

   b. City Owned Areas: No mainline to be sized at one and one quarter (1 ¼) inch.

   c. All Areas: Use ductile iron fittings for mainline sizes larger than four (4) inches.

   d. All Areas: No cold weather glue permitted.

7. Laterals:

   a. All Areas: Class 200 PVC, NSF approved.

   b. City Owned Areas: No laterals smaller than one (1) inch or sized at one and one quarter (1¼) inch.

c. All Areas: Polyethylene Drip Pipe: weather and UV resistant material, NSF approved, SDR pressure rated pipe, only as approved for drip applications.

8. Pipe Fittings: All Areas: Pipe fittings shall be molded fittings manufactured of the same material as the pipe.

a. All Areas: Funny Pipe (pop-up heads only): to be compatible with the elbows needed for the sprinkler heads and appropriately sized crimp-type clamps to be used.

b. All Areas: PVC: Schedule 40, Type 1, PVC solvent weld with ASTM Standards D2466 and D1784. No cold weather glue permitted.

c. All Areas: Copper pipe: Wrought copper or cast bronze fittings, soldered or threaded per installation details.

d. All Areas: Use ductile iron fittings for mainline sizes larger than four (4) inches.

9. Sleeving: All Areas: Ductile Iron Pipe or Class 200 PVC under all paved surfaces. Each mainline, lateral or wire crossing of any paved area to be installed in a separate sleeve.

a. All Areas: Sizes to be a minimum of two sizes larger than the pipe being sleeved. Minimum four (4) inch diameter, or larger where appropriate, for irrigation lines.

b. All Areas: Wires to be in separate sleeve from pipe, two (2) inch minimum size pipe for control wire sleeves.

c. All Areas: Shall have marker tape on upper side and both ends for future locates.

10. Valves:

a. Remote Control Zone Valves (including Master Valves): All Areas: Electrically operated, appropriate for the water supply (scrubber type for raw water applications), with manual bleed device and flow control stem. Shall have a slow-opening and slow-closing action for protection against surge pressure.

1. Pressure regulating function to be used as needed per Section 603.2.5.

b. Drip Remote Control Valves: All Areas: Same as remote control zone valves sized to match system requirements, including upstream filter, pressure regulator and y-strainer.

c. Isolation Gate Valves: All Areas: Able to withstand a continuous operating pressure of 150 psi. Clear waterway equal to full diameter of pipe. Shall be opened by turning square nut to the left (wheel opening is unacceptable).

d. Manual Drain Valve: All Areas: three quarter (¾) inch ball valve with tee handle.

e. Quick Coupling Valves: All Areas: one (1) inch brass units with rubber cover and one (1) inch brass key.

11. Valve Boxes: All Areas: House valves in valve box with matching locking cover: One valve per box. Install in Jumbo box sizes, as specified. Also, install a waterproof tag with permanent marker with each valve number. One tag shall be attached to each valve.

12. Control System:

a. Controller (for systems not to be maintained by the City including Common Open space areas): Number of stations shall include two extra stations for possible future use. Controller box shall be weather tight and vandal resistant with locking exterior disconnect.

1. Control System Enclosure: Weatherproof security enclosure with floor stand kit and lock kit.

b. Satellite Control Field Unit (for systems to be maintained by the City):

1. One per water tap. Number of stations shall include three (3) extra stations for possible future use. Toro Sentinel system may be purchased through City Parks and Forestry Services. System shall come pre-assembled with security enclosure.

aa. The Yagi antenna, antenna cable, twenty (20) foot mast and hand held radio and charger are not available through the City and are not considered part of the Toro Sentinel package, if ordered through the City.

2. Hand held remote control with charger (one per field unit).

aa. Hand held unit, programmed to City control frequency, to be turned over to the City Parks and Forestry Services in new condition.

c. Surge Protection: All Areas: eight (8) foot copper grounding rod, #4 solid copper wire, grounding buss receptacle, ground terminal strip and surge protector per details.

13. Electric Control Wiring: All Areas: #14 solid copper direct burial UF or PE cable, UL approved, for systems up to 2,000 feet in length. For larger systems, wire is to be #12 solid copper direct burial UF or PE cable, UL approved, or larger, per system design and manufacturer's recommendations.

a. All Areas: Five (5) wires with consistent color scheme throughout:

Red = live
White = ground
Black = extra (to farthest end of mainline including each branch).
Blue = extra (to farthest end of mainline including each branch)

Green = extra (to farthest end of mainline including each branch)

b. All Areas: Label each wire with waterproof tape and permanent marker at the controller and the furthest end of each wire.

c. All Areas: Wire connectors and waterproofing sealant specific for direct burial to be used to join control wires to remote control valves.

14. Sprinkler heads: All Areas: All heads shall be of the same manufacturer as specified on the plans, and marked with the manufacturer's name and model in such a way that materials can be identified without removal from the system. City Owned Areas: City will specify brand and models to match other equipment in use in public system in the vicinity.

a. All Areas: Include check valve in head.

b. Gear driven rotor heads: City Owned Areas: with stainless riser.

15. Drip system: All Areas: Spiral barb emitters. Install tracer wire over all drip pipes, buried a minimum of six (6) inches under the soil. City Owned Areas: No spaghetti tubing allowed.

16. Thrust blocks: All Areas: 3000 psi concrete with #4 rebar wrapped with asphalt tar based mastic coating.

17. Raw Water Systems: All Areas: For all raw water irrigation systems, typical “dirty-water” equipment shall be required, including purple valve boxes, pipes heads, scrubber valves and bubblers instead of drip emitters. Raw water systems typically include supply turn-out structure (where applicable), storage pond for three (3) days storage. Storage pond to be lined – submit lining material product literature for City review and approval, and rip rap will be installed twelve (12) inch minimum below the lowest water level at draw down of irrigation. All raw water systems to include provision for potable back up in the event of raw water delivery system failure.

a. Potable backup will be from a fire hydrant in close proximity to the storage pond.

18. Pump Systems: City Owned Areas: Irrigation pump systems for raw water use to be coordinated with Parks and Forestry. Submit information on pump equipment for City review and approval – using Approved Materials list for equipment as appropriate. All Areas: Basic system requirements include: Pump system capable of water delivery at required volume and pressure for ultimate landscape build out (Variable Speed Pump to be used if drip irrigation is included in the design or if there is a varying depth of water storage); skid-mounted pump system (typical); pump control system with interface to irrigation controller(s); pump enclosure heating system to maintain 49 degrees minimum temperature at 0 degrees F; lighting and power (GFI) on separate breaker from pump; masonry (typical) enclosure with vandal resistant coatings and steel screen over vent openings; pump access hatch centered over pump; man door access using steel door with lock guard over door hardware; pump enclosure sized to provide adequate walking room around pump skid and controller systems.

19 Signs: All Areas: Raw Water in Use sign for all raw water systems. City Owned Areas: Green with white letters – copy to be provided by Parks and Forestry.

603.05 EXECUTION

1. All Areas: Locate all utilities prior to trenching and protect from damage, per Section 107.04 of these Standards. Call 303-651-8446 for Parks and Open Space Division irrigation locates.

2. All Areas: Inspect tap or other existing irrigation system, as applicable, prior to work.

3. All Areas: Water Service Connections (Taps): Contact Public Works and Water Utilities Department forty eight (48) hours prior to schedule work at 303-651-8468 for water taps and inspections. Tap Fee Waiver request forms need to be submitted to the Public Works and Water Utilities Department and approved prior to tapping. Call Water Meter Shop at 303-651-8469 to purchase water meter. Backflow prevention devices shall meet Public Works and Water Utilities Department requirements. Minimum two weeks prior notice to be given Water Meter Shop for installations which will require meters or backflow devices larger than two inch. Larger devices and meters are not always kept in stock and may have ordering stocking delay.

   a. All Areas: Contractor is responsible for excavation, connection to corporation stop at the water main, providing the saddle for the PVC or A.C. pipe, making the connection to the existing water service, backfill and compaction, and pavement or shoulder surface treatment or replacement as needed. See Section 500 of City Standards and Specifications for Public Works and Water Utilities materials and procedures. All items in Section 500 pertain, including requirement that no soldered joints or fittings are allowed on water service lines where buried. Soldered joints or fittings are permissible above grade or inside a vault. No solder, sealants, fluxes, pipe dope, and other materials shall contain any lead. Call Public Works and Water Utilities Engineer at 303-651-8376 for questions. The Public Works and Water Utilities Department will make the actual tap on the line if the tap is two (2) inch in size or less. Larger taps must be made by the Contractor; all taps and installations are subject to approval and inspection by the Public Works and Water Utilities Department. Water meter jumpers will be furnished from the Water Meter Shop free of charge.

   b. All Areas: Install meter, master valve (City-owned areas), and drain valve inside specified areas and vaults. Inspection of service line (where appropriate), vault, water meter and backflow is to be coordinated with Public Works and Water Utilities Department.

      City Owned Areas: Install meter, master valve, flow meter and drain valve inside specified vault per Detail 603.01. Install backflow, winterization assembly and drain valves as specified adjacent to precast vault per Detail 603.01. Inspection of service line (where appropriate), vault, water meter and backflow is to be coordinated with City Water Department.

      1. City Owned Areas: Meter vaults are to be sixty (60) inch diameter for taps two (2) inches or less in size. For taps larger than two (2) inches,

the pipe layout inside the meter vault must be designed to determine the vault size.

2. City Owned Areas: Non-potable (raw water) irrigation systems with an in-line injection system are required to have a reduced pressure backflow device upstream of injection nipple, which cannot be placed in vault.

c. City Owned Areas: Install flow meter downstream of meter unit within meter vault with the following minimum spacing upstream and downstream of flow meter the first joint, bend or other fittings: ten (10) pipe diameters straight pipe upstream; five (5) pipe diameters straight pipe downstream.

d. City Owned Areas: Install master valve in meter vault within a reasonable distance downstream of flow meter (no closer than ten (10) pipe diameters).

e. All Areas: Copper pipe to be soldered so that a continuous bead shows around the joint circumference. Insert a dielectric union wherever a copper-based metal (copper, brass, bronze) and an iron-based metal (iron, galvanized steel, stainless steel) are joined.

f. All Areas: Install winterization assembly downstream of meter vault on PVC (with no size reduction) for mainlines greater than two (2) inch. Install winterization assembly on PVC (no size reduction) for mainlines two (2) inch or less.

4. Pipe trenching:

a. All Areas: Install pipe in open cut trenches of sufficient width to facilitate thorough tamping/puddling of suitable backfill material under and over pipe. Puddling is not allowed where next to walks, curbs and concrete paths. Install mainline and lateral lines in separate trenches.

b. City Owned Areas: Pipe location to be offset two (2) foot maximum from walks and curbs to maximize tree planting zones. Field adjustments to this standard must be approved by City inspectors prior to work.

c. Trench depths:

1. Mainline: All Areas: Minimum of twenty four (24) inches deep from top of pipe to finished grade.

2. Lateral: All Areas: Minimum of eighteen (18) inches deep from top of pipe to finished grade.

3. Drip laterals: All Areas: Minimum of twelve (12) inches deep from top of pipe to finished grade in the paved and sodded/seeded areas, four (4) inch minimum mulch cover in planting beds.

4. Sleeves: All Areas: Install sleeving at a depth that permits the encased pipe or wiring to remain at the specified burial depth.

5. All Areas: Sleeving: Boring shall not be permitted unless obstruction in pipe path cannot be moved, or pipe cannot be re-routed.

   a. Mainline installed in existing sleeves at greater depth than adjacent pipe, shall have a manual drain valve at the low end.

   b. Install sleeve so both ends extend past edge of curb, gutter, sidewalk, concrete path or other obstruction, a minimum of two (2) feet.

   c. Mark all sleeves with a "V" chiseled in walk (or other surface) directly over sleeve location.

   d. Shall be laid to drain at minimum grade of 5"/100'.

   e. Shall be bedded in two (2) inches of fill sand and covered by six (6) inches of fill sand.

   f. Sleeves installed for future use shall be capped at both ends.

   g. Separate sleeve two (2) inch minimum size) shall be used for all wiring.

   h. Sleeving shall not have joints unless necessary due to length of sleeving run. If joints are necessary, only solvent welded joints are allowed.

   i. Compaction of backfill for sleeves shall be 95% of Standard Proctor Density, ASTM D698-78. Use of water (puddling) around sleeves for compaction, will not be allowed.

6. All Areas except as noted below: Pipe Installation:

   a. Use Teflon tape on all threaded joints; only schedule eighty (80) pipe may be threaded. All threaded joints shall be tightened to eliminate leaks per industry standards.

   b. Reducing pipe size shall be with reducing insert couplings: at least six (6) inches beyond last tee of the larger pipe.

   c. Snake PVC lateral pipe from side to side within trench.

   d. Cut pipe ends square and debur. Clean pipe ends before using primer and solvent cement. Join in manner recommended by manufacturer and in accordance with accepted industry practices. No leaks shall be permitted. Cure for thirty (30) minutes before handling and twenty four (24) hours before allowing water in pipe. No cold weather glue permitted.

   e. City Owned Areas: Backfill mid sections only of mainline pipe and entire lateral piping. Call City inspector to schedule a hydrostatic pressure test. All mainline joints should be open for inspection. Backfilling prior to passing hydrostatic pressure test is at the risk of the contractor. After test passes, backfill remaining mainline pipe. All Areas: Backfill as needed to run hydrostatic pressure test with inspection by irrigation design professional per Testing 603.06 below.

1. Backfill shall be free from rubbish, stones larger than two (2) inch diameter, frozen material and vegetative matter. Do not backfill in freezing weather. If backfill material is rocky, the pipe shall be bedded in two (2) inches of fill sand covered by six (6) inches of fill sand.

f. After puddling or tamping, leave all trenches slightly mounded to allow for settling.

g. Compact to proper densities depending on whether surface area over the line will be paved or landscaped.

h. Drip system installation:

1. Snake polyethylene hose in trenches at twelve (12) inch minimum depth. Where drip laterals enter shrub beds from turf areas, elbow up to finish grade. Snake hose in beds above grade and below fabric weed barrier and mulch. Secure pipe using galvanized tie down stakes (sufficient number to keep pipe stationary). City Owned Areas: Provide a tee connecting to a drip line circling each tree per details.

2. Extend drip pipe to all trees located in native seeded areas, per detail. Extend drip line within shrub beds near each shrub or planting, snaking hose to backfill area of each plant. Where sloped, the drip line is to be placed on the uphill side of each plant.

3. Install flush caps in separate valve box per details. Install flush caps at ends of each lateral or branch. Flush drip lines with full head of water for three minutes prior to installing emitters.

4. Install buried tracer wire on top of all drip pipe buried a minimum of six (6) inches under the soil.

5. Provide emitters to each plant per Section 603.05.13 of these standards. City Owned Areas: Do no use spaghetti tubing.

i. All Areas: Funny Pipe: Attach funny pipe to elbows using appropriately sized crimp-type clamps to secure.

7. All Areas: Thrust blocks:

a. Shall be installed where PVC mainline (two and one half (2½) inches or larger) changes direction over twenty (20) degrees.

b. Minimum of one cubic foot of concrete bearing against undisturbed soil.

c. Keep pipe joint clean of concrete. Do not encase.

d. Place wiring away from thrust block to avoid contact with concrete.

e. #4 rebar wrapped with asphalt tar based mastic coating.

8. All Areas: Valve Installation: Install at least twelve (12) inches from and align with adjacent walls or paved edges.

   a. Automatic Remote Valves: Install in such a way that valves are accessible for repairs. Make electrical connection to allow pigtail so solenoid can be removed from valve with twenty four (24) inch minimum slack to allow ends to be pulled twelve (12) inches above ground. Locate minimum twelve (12) inches from and align with walks, walls, etc.

      1. Thoroughly flush piping system under full head of water for three (3) minutes through furthest valve, before installing valves.

      2. Valve assembly to include ball valve and union per detail for ease of maintenance and repair.

      3. Install in locking valve box per details.

      4. Install a waterproof tag with permanent marker with each valve number. One tag shall be attached to each valve.

   b. Manual Drain Valve: Install per plans, but in no case shall be less than at the low points of the system and at the end of the mainline. Install in six (6) inch CL-200 PVC sleeve access with ten (10) inch locking valve box lid. Install valves on swing joint assembly per detail. Sump to be four (4) cubic feet of crushed gravel over filter fabric.

   c. Quick Coupler Valve: Install in ten (10) inch round locking valve box. Flush completely before installing valve. Thoroughly flush piping system under full head of water for three minutes through furthest valve, before installing valves.

   d. Isolation Gate valves: Install in valve box.

   e. Valve Boxes:

      1. Brand all valve boxes with the following codes as appropriate: "SV" and the controller valve number per as-built plans for all remote control valves; “DV" for all drain valves; "GV" for all isolation valves; "DRGV" for all drip system isolation valves; "QC" for all quick coupling valves; "WA" for all winterization assemblies; "FM" for all flow meter assemblies; and "MV" for all master valve assemblies. Use a branding iron stamp with three (3) inch high letters.

      2. Brand boxes in the center of the lids.

      3. Valve box shall NOT rest on mainline; use brick or other approved non-compressible material per detail. Top of valve box to be flush with finish grade.

4. All equipment shall be centered in valve boxes with adequate space to access equipment with ease. A hand should be able to pass unobstructed under the valve.

5. Valves shall not be so deep as to be inaccessible for repairs. Three (3) inch depth of three quarters (3/4) inch washed gravel to be placed in the bottom of each valve box with enough space to fully turn valve for removal (see detail).

9. All Areas: Head Installation:

a. Set heads plumb and level with finish grade. In sloped area, heads to be tilted to match slope to provide full radius spray pattern.

b. Flush lateral lines before installing heads. Thoroughly flush piping system under full head of water for three minutes through furthest head before installing heads. Cap risers if delay of head installation occurs.

c. Pop-Up Heads along walks and bikeways: Bed heads in six (6) inch layer of sand under the base of the head.

d. Nozzles: Supply appropriate nozzle for best performance.

e. Adjustment: Adjust nozzles and radius of throw to minimize overspray onto hard surfaces.

10. All Areas: Wiring and Electrical Connections:

a. All wire connection and exposed ends to be sealed using wire connectors and waterproof sealant specific for direct burial applications.

b. Electrical installations will be inspected by the City of Longmont's Building Inspection Division and the final connection made by Longmont Power & Communications (LPC). Call 303-651-8386 to discuss the project scope and charges with the LPC engineering staff. Actual connection in the power source will be done by LPC when notification is received by the Building Inspection Division. All work other than actual connection, including the low voltage installation to the electric source where applicable, to be supplied by the contractor. All materials to be provided by the contractor. When working near any LPC facility, prior coordination and approval is required. Reference the building permit for telephone numbers to request an electrical inspection by the Building Inspector.

c. Label each wire with waterproof tape and permanent marker at the controller and the furthest end of each wire.

11. All Areas except as noted below: Controller Installation:

a. City Owned Areas: Minimum four (4) weeks prior notice to be given Parks and Forestry Services for order of Toro Sentinel system assembly. Toro Sentinel systems are not always kept in stock and may have ordering delay.

b. To be installed in an above-ground location suitable to prevent vandalism and provide protection from adverse weather conditions, and per City field direction. All exposed wiring to and from the controller shall be encased in galvanized metal conduit. Exterior controllers to be installed on six (6) inch thick concrete pad with compacted subgrade per concrete specification.

c. Install Controller or Satellite Control Units per City direction and in accordance with manufacturer's specifications. Install surge protection, grounding rods and other accessory components as specified.

d. Attach wire markers to the ends of control wires inside the controller unit. Label wires with the identification number of the remote control valve active by the wire.

e. Sequence wiring for irrigation zones in logical manner and so it matches as-built drawings.

f. City Owned Areas: (Optional - HIGHLY RECOMMENDED!): Install an additional control clock instead of Toro Sentinel unit during warranty/maintenance period for ease of contractor operation. City will not adjust watering schedules via Toro Sentinel system during warranty / maintenance period. If this option is selected, Toro Sentinel system to be fully operational by Final Acceptance site inspection. (If contractor installs Toro Sentinel system and requires Parks and Forestry instruction on use, Parks and Forestry will charge $50/hr.)

12. All Areas except as noted below : Wiring:

a. Comply with City electrical codes.

b. City Owned Areas: Power source brought to controller to a ground fault receptacle installed within controller casing. Clock shall be plugged into receptacle.

c. String control wires as close as possible to mainline, consistently along and slightly below one side of the pipe.

d. Leave minimum loop of twenty four (24) inches at each valve and controller, at each splice, at the ends of each sleeve, at one hundred (100) foot intervals along continuous runs of wiring, and change of direction of 90 degrees or more. Band wires together at ten (10) foot intervals with pipe wrapping tape.

e. Install common ground wire and one control wire for each remote control valve. Multiple valves on a single control wire are not permitted. Install three extra wires, as specified, to the furthest valve on the system and each branch of the system.

13. All Areas except as noted below: Drip Emitter Installation

a. City Owned Areas: Install specified number of emitters directly onto lateral hose (spaghetti tubing not allowed). Groundcover: one single outlet emitter per square foot planting area. Shrubs: two single outlet emitters per shrub. Trees: four single outlet emitters per 2-3" tree; six single outlet emitters per

four (4) inch tree; eight single outlet emitters per six (6) inch + tree. No spaghetti tubing permitted. All Areas: Install specified number of emitters onto drip tubing. Groundcover: one single outlet emitter per square foot planting area. Shrubs: two single outlet emitters per shrub. Trees: four single outlet emitters per two to three (2-3) inch tree; six single outlet emitters per four (4) inch tree; eight single outlet emitters per six (6) inch + tree.

b. All drip emitters are to be tested for operation prior to weed barrier and mulch installation.

14. All Areas: Signs

a. Install Raw Water in use sign in prominent location. See Section 601.04 for post specification if needed.

603.06 TESTING

1. All tests to be run in the presence of City inspector for City Owned Areas, or Irrigation Design Professional for Common Open Space areas. Irrigation Design Professional conducting inspections is to sign the certification statement on the as-built drawings. All City irrigation inspections to be scheduled by calling 303-651-8745 for City Owned and Maintained areas or coordinating with City inspector for other areas. All Areas: Schedule all tests and inspections a minimum of 48 hours in advance of tests. Repeat any failed tests until full acceptance is obtained. No testing shall be done when seasonal conditions minimize the ability to sufficiently inspect the system. Generally, testing is not available between the months of November and April. No chemical spraying shall be done within ten (10) days of any irrigation inspections.

a. All Areas: Hydrostatic Test (during irrigation installation before sleeving and backfilling pipe joints): Maintain 120 PSI for four hours. No leakage or loss of pressure is accepted during test period. Test must be run in the presence of inspector as noted above. Contractors to provide at their own expense hydrostatic pump, water and other materials as necessary for test. The pressure gauge is to be onto the end of a fitting, rather than directly into a quick coupler. The pump is to be disconnected at the start of the test.

1. Parks requires that the Contractor perform an independent pressure test prior to scheduling the required inspection for City Owned and Maintained areas. If numerous tests are required for a system, Parks reserves the option to bill the Contractor for numerous tests at $50/hr. (with a one (1) hour minimum)

b. All Areas: Operational Test (at Construction Acceptance punchlist walk-through): Activate each remote control valve from the controller in the presence of City inspector for City Owned and Maintained areas, or irrigation design professional for Common Open Space areas. Replace, adjust or move heads and nozzles as needed to obtain acceptable performance of system. Replace defective valves, wiring or other appurtenances to correct operational deficiencies.

c. All Areas: Drip Operational Test (after drip lateral installation, but prior to weed barrier and mulch installation): Activate remote control valves in presence of City

inspector for City Owned areas, or irrigation design professional for common open space areas. Replace any emitters that are clogged or not operational. Adjust lateral hose as needed to effectively irrigate plantings.

d. City Owned Areas: Central Control System Acceptance Test (at Construction Acceptance punchlist walk-through): City inspector will activate each remote control valve from the Central Control System base station using the hand-held remote device.

1. The Contractor may elect to install an additional controller for use during the maintenance period between Construction Acceptance and Final Acceptance. If this option is selected, the Central Control system must be installed and fully operational prior to Final Acceptance.

e. All Areas: Raw Water Pump Control Inspection: Demonstrate to City inspectors for City Owned Areas or irrigation design professional for Common Open Space Areas at pump start up that pump system correctly operates automatically, all sensors perform properly and the system is built per approved plans. The pump supplier will be required to attend this inspection.

603.07 COMPLETION SERVICES

1. All Areas: When project construction is substantially complete, request from City inspector for City Owned areas a punch list inspection per Section 600.03. Coordinate with irrigation design professional for inspection of Common Open Space areas

a. Demonstrate system to inspector.

2. All Areas: When project construction is ready for Construction Acceptance, request from City inspectors for City Owned areas an inspection (all punchlist items must be complete) per Section 600.03. Coordinate with irrigation design professional for inspection of Common Open Space areas

a. Demonstrate system to inspector.

b. Submit turn-over items (items must be accompanied by a transmittal letter and delivered to the City inspectors' offices - delivery at the project site is not acceptable) as following:

1. All Areas: Provide list of equipment ordering information including model numbers, size and style for all components.

2. All Areas: Provide one mylar, one blueline set and one pdf format electronic file (for all projects), and one electronic file able to be opened in AutoCAD Release 2006, in .dwg format (for all City capital projects), of as built irrigation drawings no larger than twenty four (24) inch x thirty six (36) inch. Common Open Space as-built drawings are to be a separate drawing package from City Owned areas as-built drawings. The City may require .dwg AutoCAD files for development projects if future development is anticipated in the area. (Construction plans may be used for as-built base map information. Coordinate with developer and

consultant team to obtain). Drawings to have the following information as a minimum:

aa. System shown as installed with each sheet clearly marked "RECORD DRAWINGS".

bb. The name of the project, date of installation, date of as-built drafting, company name of installer, name of as-built drafter, installer company phone number and back-up phone number for night and weekend contact.

cc. Sleeves and valves noted with dimensions to each from two different permanent objects.

dd. Control valves noted with gpm, valve number and valve size clearly indicated for each valve. Valve numbering to match as-built controller sequencing.

ee. Horizontal verification of all irrigation pipes, irrigation heads valve boxes, wiring, electrical boxes, controller, meter, and backflow prevention devices. Noted information shall include all pipe sizes, zone numbers, valve locations, head types, valve types and model numbers, controller type and model number, and drip emitter chart.

ff. Irrigation record drawings shall include all pertinent physical features (such as concrete paths, sidewalks, fences, ponds, buildings, pump house, parking lots and athletic fields).

gg. No contour lines shall be shown on irrigation record drawings unless required by the City.

hh. Common Open Space Areas: Certification statement, signed and executed by irrigation design professional and contractor, see 600.02.4.c.8.

3. All Areas: Provide one set of all irrigation sheets reduced to eleven (11) inch x seventeen (17) inch, with each zone color coded, and each sheet plastic laminated. Provide two (2) sets where the system is to be turned over to non-City personnel for maintenance.

4. All Areas: Provide on-going maintenance personnel with one (1) each of all operating keys, servicing tools, test equipment, remote hand-held radios (programmed to City frequency – City Owned areas only), warranties/guarantees, and maintenance manuals as needed for on-going maintenance of area. Any exceptions to this requirement are to be obtained in writing from City inspector.

c. All Areas: Clean Up: Remove all excess materials, tools, trash and debris from site.

d. All Areas: Complete additional punchlist items if determined necessary by City Inspector or irrigation design professional.

e. All Areas; Schedule re-inspection by City inspector or irrigation design professional to verify completion and acceptance of all punchlist items if necessary.

3. Request Final Acceptance inspection per Section 600.03.

a. All Areas: Problems identified during the punchlist inspection and project work-through will be coordinated with City inspector or irrigation design professional with solutions executed by the Contractor. Contractor shall complete punch list of items requiring resolution prior to issuance of Final Acceptance.

1. At the discretion of City inspector or irrigation design professional , a new pressure test may be required at the time of Final Acceptance inspection.

b. All Areas: Clean up: Remove all excess materials, tools, trash and debris from site.

c. All Areas: Schedule a project re-inspection with City inspector or irrigation design professional to verify completion of punchlist items and project work-through issues if necessary.

603.08 GUARANTEE/WARRANTY

1. All Areas: For the period following Construction Acceptance notice by City and prior to Final Acceptance, all irrigation materials, equipment, workmanship and other appurtenances are to be guaranteed/ warranted against defects. Settling of trenches or other depressions, damages to structures or landscaping caused by settling and other defects to be corrected by the contractor at no cost to the City or homeowners association. Make repairs within seven (7) days of notification by the City staff representative or irrigation design professional unless an emergency or hazardous situation dictates immediate correction. Guarantee/Warranty applies to all originally installed materials and equipment, and to replacements made during the guarantee/ warranty period.

604.00 SEEDING

604.01 GENERAL CRITERIA

1. Seeding shall be done in accordance with the professional standards of the industry for all landscape areas.

2. Seeding is allowed in primary greenways where approved by City, on all areas of detention ponds to be maintained by the City that are not within the five year flood area, and in some temporary dry land applications. No seeding is allowed at the bottom of detention ponds to be maintained by the City. Seeding is allowed in private development areas. No seeding is allowed along arterial rights-of-way. Seeding within City Parks and facilities is allowed on a project specific basis. All proposed seeded areas are to be specifically approved by City staff.

3. All dry land-seeded areas must have a temporary irrigation system for establishment purposes.

4. Drought-tolerant grasses are encouraged in all areas and required in City owned areas. Dry land grasses may be permitted in required landscape areas if deemed appropriate by City staff. These grasses shall be maintained free of weeds and debris and shall not present a fire hazard. The use of several species is encouraged (required in City-owned areas).

5. All Sections (as applicable) shall apply to all City capital projects that reference these Standards. References to the "Developer" in theses Standards shall be considered references to the Contractor. In the event of any conflict between these Standards and the project specifications, the more stringent of the two shall apply.

604.02 MINIMUM DESIGN CRITERIA

1. Seed mix: Shall be approved by City staff based on the activity to take place, planned irrigation method and maintenance to be performed in the area being seeded. In all cases, a drought tolerant seed mix is encouraged and shall be required in all City owned areas with a seed mix that does not contain more than 10% bluegrass.

   a. For pre-approved Native Grass Mixes, see the Approved Materials List

   b. For pre-approved turf grass mixes, see the Approved Materials List.

2. Turf grass seed mix shall be used between the property line and the concrete path in primary greenways and on detention pond side slopes. Native grass mix may be used between the concrete path and ditch.

3. In areas where seed is installed along a road without curb and gutter, traffic delineators with reflectors shall be required at fifty (50) feet intervals set five (5) feet off the edge of asphalt. Posts to be installed to break away in direction of on-coming traffic. The post shall be located near irrigation heads (on the road side of the heads) to protect and shall not obstruct the irrigation system.

4. A sign shall be supplied by the developer in all permanent native seeded areas after seeding, per Section 604.04.6 of these standards. Signs shall be located at all entrance points into the Greenway.

5. Where a fence abuts an irrigated turf area to be maintained by the City, a twenty four (24) inch wide, six (6) inch thick mow band is required along the fence. The mow band may be concrete, three (3) inch cobble over weed fabric with a steel edged border or an approved equal.

604.03 SUBMITTALS

1. Certificates showing State, Federal or other inspection showing source and origin.

604.04 MATERIALS

1. For a specific list of materials accepted by the City, please see Parks and Open Space Divisions Approved Materials List.

2. Seed: Seed shall be of fresh, clean, new crop seed composed of the varieties approved by the City with tested minimum percentages of purity and germination clearly labeled on the package. All seed shall be free of Poa annual and all noxious objectionable weeds with a maximum crop of .10% and maximum weeds of .10% weeds.

3. Mulch:

    a. For slopes 3:1 and less: Certified weed free hay for dry land seeded areas and hydromulch for irrigated turf seeded areas.

    b. For slopes steeper than 3:1, and inaccessible areas: Hydromulch using wood cellulose fiber for hydraulic mulching shall not contain any substance or factor which might inhibit germination or growth of grass seed. It shall be dyed a green color to allow metering of its application.

    c. Tackifier: Per approved materials (Mandatory for hydromulch).

4. Netting: For slopes steeper than 3:1, use Soil Saver jute netting, or approved equal. Netting to be stapled with No. 11 gauge steel wire forged into a six (6) inch long U shape, and painted for viability in mowed areas.

5. Fertilizer: Slow release type Nitrogen.

6. Native grass seeded area signs: A sign is to be erected in all permanent dry land seeded areas in Primary Greenways reading “Native grass seeding is being established in this Primary Greenway. Prior to establishment, the grasses will be mowed approximately four to five (4-5) times per year to help control noxious weeds. After establishment, the dry land grass will be maintained according to approved maintenance procedures and accepted industry standards, including growth heights of over twelve (12) inches and the irrigation system will be turned off. Eventually, these grasses will provide habitat for wildlife in the greenway and will help conserve water. Please call 303-651-8446 with any questions. Thank you for your cooperation.” The sign shall be brown with white letters with City logo and shall be mounted on six (6) inch x six (6) inch wood post, mounted five to six (5-6) feet above grade. See Section 601.04.6 for other sign requirements.

7. Traffic Delineators: In-ground mounted, white with reflectors. See Approved Materials List.

604.05 INSPECTION

1. Inspect finish grade and trim where needed to obtain finish grades of one (1) inch below adjacent pavements. Verify positive drainage away from all structures. Verify or complete removal of rock and debris larger than one half (1/2) inch from all turf grass areas to be seeded, and rock larger than two (2) inches from all native grass areas to be seeded.

604.06 EXECUTION

1. Fertilizer: Apply eight (8) lbs. per 1000 sq. ft. of turf grass seeded area (two to three (2 – 3) lbs. per 1000 sq. ft. of native grass seeded areas), unless soil test recommendation provides alternative fertilization rates, and rake lightly into top one eighth (1/8) inch of soil just prior to seeding operation. Native grass areas do not require fertilizer unless recommended on Soil Fertility test report.

2. Seeding:

    a. Do not sow seed in windy weather or when ground is frozen or otherwise untillable.

    b. Use brillion type drill for slopes less than 3:1 in grade. Drill seed in manner such that after surface is raked and rolled, seed has one quarter (¼) inch of cover.

    c. Hydraulic seeding methods can be used only on slopes steeper than 3:1 or in areas that are not accessible for machine methods. Hydraulic pump capable of being operated at one hundred (100) gallons per minute and at one hundred (100) pounds per square inch pressure to be used. The equipment shall have an acceptable pressure gauge and a nozzle adaptable to hydraulic seeding requirements. Storage tanks shall have a means of agitation and a means of estimating the volume used or remaining in the tank. Do not seed and mulch in the same operation.

    d. Broadcast seeding can be used only on areas not accessible for machine methods and too small to justify hydraulic seeding. Where broadcast seeding is done, seeding rates are to be doubled. Hand rake seed to cover at one quarter (¼) inch depth.

    e. Seeding rates (drilled and hydraulic):

        1. Urban, Non-wildlife Native Grass Mix – twenty (20) lbs. pure live seed per acre.

        2. Native Grass Mix – twelve (12) lbs. pure live seed per acre.

        3. Turf Grass Mix - 150 lbs. pure live seed per acre.

3. Mulching:

    a. Native Grass Mulch: Apply at a rate of two (2) tons per acre. Crimp into seed bed with disk set straight forward and two (2) inch deep. Disk mulch across slopes to prevent erosion. Mulch seed beds within twenty four (24) hours after seeding.

    b. Hydromulching: Wood cellulose fibers must become evenly dispersed when agitated in water. When sprayed uniformly on the soil surface, the fibers shall form a blotter like ground cover, which readily absorbs water and allows infiltration to the underlying soil. Cellulose fiber mulch shall be added with the proportionate quantities of water and other approved materials in the slurry tank.

All ingredients shall be mixed to form homogenous slurry. Using the color of the mulch as a metering agent, apply the slurry mixture by spraying uniformly over the seeded area. Apply with the specified tackifier at a rate of one hundred twenty (120) pounds per acre. Unless otherwise ordered for specific areas, fiber mulch shall be applied at the rate of two thousand (2,000) pounds per acre.

1. Hydraulic mulching shall not be performed in the presence of free surface water resulting from rains, melting snow or other causes.

4. Netting: Net areas with slopes greater than 3:1. If contractor fails to net and subsequent soil erosion occurs, contractor shall re-establish finish grade, soil preparation, seed bed and apply netting at no cost to the City. Staple per manufacturer's specifications.

5. Watering: Immediately after seeding and mulching, water seeded areas lightly to a depth of two inches, but with care so that no erosion takes place and no gullies are formed. Water lightly as needed to maintain moist seedbed until turf is established. Sloped areas should be hand watered until turf is established to prevent erosion; water these areas more often but for shorter periods of time.

6. Clean Up: Remove all hydromulch and other mulch materials from all plant materials, fences, site furnishings, signs, concrete and other areas except for seed bed.

7. Protection: Provide and install barriers as required to protect seeded areas from pedestrian and vehicular damage. Provide signage and barricades if needed.

604.07 COMPLETION SERVICES

1. Turn over items to City inspector: Seed tags to verify seeded mixture matches approved plans.

604.08 MAINTENANCE

1. Mowing: When grasses reach three (3) inches in height, mow to two (2) inches in height. Repeat as needed in dry land areas to encourage spread of grass stolons and prevent seed development of weeds. Repeat in areas where mowing is to be standard maintenance practice, to maintain grass height at two and one half (2-1/2) inches. Do not cut off more than 1/3 of grass leaf in a single mowing operation. Excessive clippings to be removed from turf areas. Adjacent paved areas to be swept after mowing.

2. Weed control: During establishment mechanical weed control should be employed to prevent weed flowering and seed set. When grasses are sufficiently established, chemical weed control can be applied to selectively eradicate invasive and noxious weeds.

3. Fertilizing: Apply balanced fertilizer to maintain turf vigor during warranty period.

604.09 GUARANTEE/WARRANTY

1. Warrant seeded areas for consistency and completion of coverage. Re-seed as needed to ensure a successful stand of grass as accepted by the City. Once a vigorously growing stand of grass is achieved, the request for Final Acceptance may be made. A

stand of grass is considered to be acceptable when each square foot of grass area has at least 90% coverage in turf grass areas. In native grass areas, it is considered established when the grass area has at least 70% coverage. Maximum single bare spot acceptable in dry land areas is two (2) sq. ft. All seeded areas that do not meet the satisfactory standard of establishment qualifications shall be re-seeded and mulched.

a. It is the developer's responsibility to maintain seeded areas in a weed free manner. Eradication of weeds prior to Final Acceptance shall be done on an as-needed basis to generally eradicate the noxious weeds.

b. Extended warranty period may be required as determined by City inspector.

605.00 SODDING

605.01 GENERAL CRITERIA

1. All sod is to be installed according to current industry standards for all landscape areas.

2. All Sections (as applicable) shall also apply to all City capital design and construction projects that reference these Standards. References to the "Developer" in these Standards shall be considered references to the Consultant or Contractor. In the event of any conflict between these Standards and the project specifications, the more stringent of the two shall apply.

605.02 MINIMUM DESIGN CRITERIA

1. Sod Mix: Turf mix for all areas shall be approved by City staff based on the activity to take place, planned irrigation method and maintenance to be performed in the area being sodded. In all cases a drought tolerant mix shall be encouraged. In City-owned areas a drought tolerant mix shall be required using a mix that does not contain more than 10% bluegrass.

   a. For pre-approved Sod Mixes, see the Approved Materials List.

2. Sodded Areas: Sod is required for landscaped areas on arterial rights of way and in all areas of detention ponds to be maintained by the City that are within the five year flood areas. Other areas may require use of sod as determined by the City staff.

   a. If the size of a detention pond area to be owned by the City is ½-acre or less, then the entire area shall be sodded.

3. Sodded areas should be designed to minimize narrow, hard to maintain strips of turf.

4. Where a fence abuts an irrigated turf area to be maintained by the City, a twenty four (24) inches wide, six (6) inches thick mow band is required along the fence. The mow band may be concrete, three (3) inch cobble over weed fabric with a steel edged border or an approved equal.

605.03 SUBMITTALS

1. Certificates showing State, Federal or other inspection showing source and origin.

605.04 MATERIALS

1. For a specific list of materials accepted by the City, please see Parks and Open Space Division Approved Materials List.

2. Sod: Sod shall have a clay-loam base that will not break, crumble or tear during sod installation. Netted sod is acceptable. It shall have a healthy, vigorous root system that has undergone a program of regular fertilization, mowing and weed control to obtain thick turf free of objectionable weeds. It shall be free of nematodes, pests and pest larvae as inspected by the entomologist of the Colorado State Department of Agriculture.

   a. Thickness: one (1) inch thick excluding top growth and thatch.

   b. Thatch: Not to exceed one half (½) inches uncompressed.

   c. Width: Eighteen (18) inch wide strips or forty two (42) inch wide rolls.

3. Fertilizer: Ammonium sulfate and diammonium phosphate, with chemical analysis of N 20%, P 10%, K 5%, S 8%, Fe 3% (Urea and sulphur coated Urea only), unless soil test recommendation provides alternative rates.

605.05 INSPECTION

1. Inspect finish grade and trim where needed to obtain finish grades of one (1) inch below all adjacent paved surfaces. Verify or complete removal of rock larger than one half (1/2) inch which may hinder sodding and perform fine grading as necessary to maintain drainage per plans. Verify that irrigation system is fully operational prior to sodding.

605.06 EXECUTION

1. Clean out drainage inlet structures.

2. Adjust irrigation heads to proper watering height according to depth of sod material but lower than mower blade height to enable lawn mowers to cut grass freely without damage to sprinkler system.

3. Sod Cutting and Delivery: Cut no more than twenty four (24) hours prior to delivery, laid in place within twenty four (24) hours of delivery.

4. Transportation: Do not pile sod more than two (2) feet deep. During delivery process, protect roots from exposure to drying sun, winds and heat. Store in shady area and keep moist or store covered with moistened burlap.

5. Timing: Install sod only between spring and fall. Do not install on frozen or saturated soil.

6. Watering: Lightly water area to be sodded.

7. Fertilizer: Distribute fertilizer uniformly at a rate of fifty (50) lbs. per acre, unless otherwise recommended by soils test. Apply within forty eight (48) hours before laying sod.

8. Sodding:

   a. Lay sod on slightly moist soil.

   b. Lay with longest dimension parallel to contours in continuous right-of-ways.

   c. Tightly butt ends of sod together. Stagger joints. Compact vertical joints between sod strips by rolling so sod will be in contact with the ground surface. Cut right-of-ways terminating on property lines to straight line.

   d. When sod and soil are moist, roll sod lightly as soon as possible after laying. Roll with enough weight to ensure contact with soil for proper rooting.

   e. Add topsoil along exposed edges to match existing grade; feather topsoil out approximately one (1) foot.

   f. Make sure finished sodded areas positively drain so that no irrigation water or storm water will pond in sodded areas. Relay sod if necessary to correct.

   g. Water thoroughly with fine spray immediately after planting.

9. Re-sodding: Re-sod spots larger than one (1) sq. ft. not having uniform stand of grass prior to Final Acceptance.

605.07 MAINTENANCE

1. Mowing: When grass reaches three (3) inches in height, mow to two (2) inches in height. Mow weekly and maintain grass between two (2) inches and two and one half (2-1/2) inches in height. Do not cut off more than one third (1/3) of grass leaf in a single mowing. Remove grass clippings from all paved surfaces.

2. Fertilizing: Distribute fertilizer uniformly at a rate of five (5) pounds of balanced fertilizer per one thousand (1,000) square feet of sodded area unless otherwise recommended by soils test, three weeks after sodding is complete. Fertilizing thereafter is to be in accordance with standard maintenance practices for turf areas, and as needed to achieve and maintain a vigorous and healthy stand of grass.

3. Weed control: During establishment use mechanical means to control weeds. When sod is sufficiently established, chemical weed control can be applied to selectively eradicate invasive and noxious weeds.

605.08 GUARANTEE/WARRANTY

1. Warrant sodded areas for consistency and completion of coverage. Re-sod areas as needed to obtain acceptance by the City. Once a vigorously growing stand of grass is achieved, the request for Construction Acceptance may be made.

606.00 TREES, PLANTS AND GROUNDCOVER

606.01 GENERAL CRITERIA

1. All nursery stock shall conform to the American Standard for Nursery Stock (ANSI Z60.1) and the Colorado State Nursery Act.

2. All Sections as applicable shall also apply to all City capital design and construction projects that reference these Standards. References to the "Developer" in these Standards shall be considered references to the Consultant or Contractor. In the event of any conflict between these Standards and the project specifications, the more stringent of the two shall apply.

606.02 MINIMUM DESIGN CRITERIA

1. Plant material to be designed and installed for ease of maintenance operations and safety. View triangles at intersection and offset of materials from edge of street curbing to comply with Section 205.02 of the City Standards and Specifications. Restricted planting areas are as follows:

    a. No trees, shrubs, ground cover, boulders, berms, fences or other improvements exceeding thirty six (36) inches in height shall be planted within this view triangle or within six (6) feet of a vehicle travel lane.

    b. No landscape improvements exceeding six (6) inches in height shall be placed within three (3) feet of a fire hydrant. No mulch or small rock is to be used around a fire hydrant.

2. Landscape plans to be designed and plant materials installed for long term vigor of urban forest. Diversity of species, selection for hardiness, and suitability for areas shall all be considered in the design (see Plant Materials List in Appendix A of these Standards and Specifications).

    a. FOR ANY ONE PROPOSED DEVELOPMENT PROJECT (including common open space areas): Diversity requirements shall insure that no more than 15% of any one species of tree (for trees considered hardy in this area), or 10% or any one species of tree considered average or marginally hardy for this area, are proposed. This shall be measured per total trees in the development, including existing trees.

        1. Up to 20% of the proposed trees for a project may be of fast-growing species. The remainder of the proposed trees shall be varieties with slower and medium growth rates.

    b. FOR SMALL DEVELOPMENT PROJECT (where there are no or very small common open space areas): Variances from the above diversity requirement may be allowable where size of development makes minimum diversity percentages unreasonable. In such cases, a specific request for variance to the City Forester is to be made by the developer citing reasons that diversity requirements are unreasonable. Variance request to be made by a note on the landscape plans.

3. There shall be a minimum distance of eight (8) feet between trees and any adjacent vertical surface unless a variance is obtained. Trees to be spaced to accommodate the full canopy of the mature tree. Large deciduous trees to have minimum spacing of forty feet (40'), mid -sized trees to have minimum spacing of twenty-five (25) feet and small trees (ornamental) to have minimum spacing of fifteen feet (15'). Coniferous trees to have a minimum spacing of twenty-five (25) feet for large spreading varieties, ten (10) feet for upright columnar varieties.

    a. When space is limited or a special design effect is desired, closer spacing may be allowed upon agreement from the City Forester.

    b. In City owned areas, trees shall be planted in the center of the tree lawn (area between sidewalk and curb) when the space is less than twelve (12) feet wide. No trees are to be planted in turf areas narrower than eight (8) foot in width without approval from the City Forester. Narrow tree lawns approved as a variance would be required to use ornamental or small canopy trees (See Approved Materials List – Tree Recommendations).

    c. Spacing in tree lawns between hard surfaces (including concrete paths and curbs) to be a minimum of eight (8) foot, where possible.

4. Trees are not to be planted on slopes that are steeper than 3:1.

5. Principles of Xeriscaping are to be followed in all City owned landscape areas, and are strongly encouraged for all other areas.

6. Trees to be located five (5) foot minimum away from all underground utilities, measured from the pipe edge.

    a. Where underground or overhead utilities unduly restrict planting areas within the right-of-way, planting in areas immediately adjacent to the right-of-way may be allowable in certain cases. Request for this variance is to be made by a note on the landscape plans.

    b. Electrical facility height restrictions:

        1. Residential metering pedestal/pit: six (6) inch maximum height within four (4) feet of the window (meter) side of the cabinet and forty (40) inches maximum height within two (2) feet elsewhere.

        2. Residential pad mount transformers: no landscape material on top or front (street side) shall be used.

        3. Utility poles: no climbing vines.

        4. Vaults: no landscape material on top of the vault and six (6) inch maximum height within four (4) feet.

        5. Pad mount switchgear and cabinets: sod, cobble, mulch or other low growing shrubs or groundcover only within ten (10) feet of the unit doors.

c. Plants with aggressive, shallow root systems with high potential (Cottonwood, Willow, Poplar, etc.) to cause damage facilities and utilities, such as roadways and sewer and water lines, are not permitted within twenty five (25) feet of any such facility.

7. Large canopy deciduous trees are encouraged in the design for placement between the curb and the concrete path/ walkway along streets. Ornamental and small canopy deciduous trees shall be used in these areas where space is limited.

8. Ornamental trees can only replace large canopy deciduous trees at a rate of three (3) ornamental trees to one large canopy deciduous tree and not to exceed 25% of the total tree requirement when calculating minimum materials per City code requirements. Ornamental trees may be used in addition to large canopy deciduous trees. Fruit bearing or thorny trees are not allowed within five (5) feet of concrete paths or streets (as calculated from mature canopy width of tree).

   a. Where overhead lines or other site-specific restriction prohibits use of large canopy deciduous trees, ornamental trees can be used at a 1:1 ratio for large canopy deciduous trees. Where overhead power lines exist and are not proposed for burial within ten (10) years, large canopy deciduous trees shall not be placed under those lines. Ornamental trees with mature height less than the power line height shall be used.

9. Coniferous trees shall comprise 25% of any landscape area where suitable. Unsuitable areas include areas where icy conditions may be created with the use of conifers at road intersections, road curves, concrete path intersections, concrete path curves, site distance restricted areas, or narrow areas. Place Conifers so mature spread will not overgrow walks or streets.

10. Shrubs to be a mixture of evergreen and deciduous species of reasonable diversity. Large (over four (4) feet in height) species should be placed between the concrete path and the property line to provide buffering. Shrubs four (4) feet and less in height to be used between the concrete path and the curb along street rights of way to avoid safety obstructions. Shrubs four (4) feet and less in height to be used between the nearest road / parking area and restroom or other structures to enhance visibility. Shrubs should be selected for wildlife habitat value along primary greenways. Shrubs within primary greenway low-flow channels shall be selected for water tolerance, flood frequency and velocity.

11. Arterial rights-of-way shrub beds placed between the curb and concrete path to have an eighteen (18) inch minimum wide bomanite (or approved equal) strip along the curb edge to prevent mulch displacement into streets and to ease sand removal in the spring.

12. No Junipers shall be within five (5) foot of back of curb, as they are easily damaged by magnesium chloride used in snow removal.

13. No artificial or synthetic plant materials such as artificial grass, shrubs, trees or flowers shall be used to fulfill any landscaping requirement.

14. All landscaping materials shall consist of healthy specimens compatible w/ local climate, soil characteristics, drainage and water supply. All plant material shall be reasonably resistant to drought and disease. The use of native and drought-tolerant species is encouraged. Non-nursery derived stock shall not be used to satisfy these requirements.

15. Ground covers other than grass may be planted in required landscape areas if they are reasonably able to provide complete coverage within two growing seasons and if they provide cover year-round. Vines shall not be used adjacent to pedestrian areas.

16. Materials such as river rock, cobble, boulders, patterned concrete, mulch and pole peelings shall be limited to shrub beds and other small areas that shall not exceed 25% of the required landscape area. Lightweight matter such as bark mulches shall not be used in areas unshielded from high wind.

17. All tree and shrub excavations shall be backfilled per Details 606.01 and 606.02 of these Standards and Specifications.

18. Loose gravel shall not be used in areas abutting public streets or sidewalks. Cobble greater than three (3) inch minimum aggregate size is permitted in these areas. In commercial areas where on-street parking is prevalent and the sidewalk is off set from the curb, the area between the curb and walk shall be landscaped to safely and comfortably accommodate pedestrians crossing to the walk. Cobble, gravel and other uneven surfaces shall not be permitted.

19. CITY CAPITAL PROJECTS – Cut edging is allowed in some cases if approved by Parks. ALL AREAS – Steel edging is the typical standard.

20. Street tree minimum standards are as follows:

    a. Species that generally have branches less than fifteen (15) feet above the roadway at maturity shall not be used as street trees unless they are located such that no interference with the roadway will occur at maturity. Minor trimming and branch removal should be performed to maintain the fifteen (15) feet requirement and eight (8) foot minimum clearance over sidewalks and concrete paths.

21. Trees prohibited from planting within the City include the following: cotton-bearing Cottonwood, Lombardy Poplar, Box-elder, Siberian Elm, and Russian Olive.

    a. Trees prohibited from planting within City street right-of-ways, unless otherwise approved by the City Forester, include the above plus the following: Fruit and/or thorn bearing trees (prohibited from within five (5) feet of concrete path as measured from edge of mature canopy), willow (all varieties), Tree of Heaven, Cottonwood (all varieties), and Silver Maple.

    b. No plant material also classified as a noxious weed or invasive species is allowed.

22. A Developer is required to provide maintenance pruning to any existing trees and shrubs designated to remain on a project within the project limits, according to the City Forestry Standards, ANSI A300 Standards and under the direction of the City Forester. A tree

service Contractor licensed with the City must be used. A current list of licensed Contractors is available by calling 303-651-8446 or the City website.

23. Where Siberian Elm or Russian Olive trees exist within land to be dedicated to the City, these trees shall be removed by the Developer as part of Construction. The trees shall be cut to grade and treated with tinted Garlon herbicide to prevent re-growth except where hardscape is proposed, where stump must be ground and removed in its entirely.

24. Beaver Protection: Projects by or adjacent to waterways, including ditches, streams, lakes, ponds, creeks, etc. may be required to include beaver protection at the direction of the City inspector. A site visit to coordinate this issue is to be scheduled during construction design.

25. Prairie Dog Protection: Projects with prairie dogs established near the project limits will be required to comply with the City of Longmont Wildlife Management Plan. Installation of an approved prairie dog barrier to keep the prairie dogs outside of the public property will be required. Projects with prairie dogs established within the project limits and approved to remain will be required to install prairie dog barrier to contain the prairie dogs to a manageable space within the public property. The size of the area to be enclosed is to be determined by Parks and Open Space staff. A prairie dog inventory is required prior to development, or on an annual basis from the time of the project's first phase to the end of it's last phase, with information on the number of prairie dogs present, date of survey, and management proposal for maintaining population within the prescribed management areas and proposed removal techniques, if any. The City of Longmont highly recommends humane management techniques.

26. Trees recommended for use within the City include those listed in Plant Materials List found in the Approved Materials List of these Standards and Specifications.

606.03 SUBMITTALS

1. Certificates: State, Federal and other inspection certificates showing source or origin, (when requested by City).

2. Samples: Mulch; canvas strap or approved equal (when requested by City).

606.04 MATERIALS

1. Plants: Plants shall be first class representatives of specified species or variety, in healthy condition with normal developed branch and root systems, free of objectionable features. Must conform to: American Joint Committee on Horticulture (plant names); American Standard for Nursery Stock (ANSI Z60.1); Colorado Nursery Act.

    a. Only plants grown in hardiness zones 2, 3, 4, and 5 are acceptable.

    b. All material shall be free of disease, insects, eggs, larvae, and parasites of objectionable or damaging nature.

    c. Inspect plants to make sure they meet minimum size requirements of the ordinance and the plans, and for proper form including strong central leader and good branching pattern on trees and number and length of canes on shrubs:

1. Large or small canopy deciduous trees (>thirty (30) foot mature height): two (2) inch caliper measured six (6) inches above ground, balled and burlapped.

2. Ornamental deciduous trees (< thirty (30) foot mature height): One and on half (1½) inch caliper measured six (6) inches above the ground, balled and burlapped.

3. Evergreen trees: six (6) feet in height, balled and burlapped.

4. Shrubs: #5 plastic container with deciduous shrubs approximately two (2) feet high and spreading shrubs having eighteen to twenty four (18 – 24) inch spread.

5. Groundcovers, vines, perennials: #1 plastic container.

2. Backfill mix: Mix shall consist of the following and be used in backfilling all plant materials:

   a. One part composted soil amendment; Two parts topsoil; Three parts native soil from planting pits; superphosphate amendment.

   b. All materials to be thoroughly blended.

3. Stakes and Guys: Shall be guying system unless previously approved by City Parks and Forestry.

   a. Guying System:

      1. Stakes – See approved materials list.

      2. Guys - See approved materials list.

4. Miscellaneous - See approved materials list.

5. Mulch: See approved materials list.

6. Weed barrier fabric: See approved materials list.

7. Steel edging: See approved materials list.

8. Beaver protection: See approved materials list.

9. Prairie Dog enclosure: If required, contact Parks and Open Space at 303-774-4691 or the Colorado Division of Wildlife for recommended enclosures.

606.05 INSPECTION

1. Locate all utilities prior to trenching and protect from damage, per Section 107.04 of these Standards. Call 303-651-8446 for Parks Division irrigation locates.

2. Schedule a tree delivery and layout inspection with City Foresters by calling 303-651-8446. Trees will be inspected for form, condition and health. Rejected trees to be removed immediately from site and replaced. Replacements are subject to re-inspection by City Forester. Inspection requirements include trees to be off-loaded from trucks to allow for full access. Binding material and trunk protection to be removed by Contractor prior to inspection.

    a. Tree layout inspection shall be done at the same time the tree materials are delivered. Utility line locates to be visible in all planting areas. Stakes for proposed tree locations to be placed in planting areas requiring City inspection.

606.06 EXECUTION

1. Delivery and storage of Plant Materials:

    a. Shade cloth shall be used to cover trees during transportation. Balled (B&B) trees should have limbs bound to prevent injury during delivery. Keep root systems moist and protect plants from adverse climate and transportation conditions. B and B stock shall be heeled in immediately upon delivery to the site unless it is planted within four (4) hours. Store other plants in shade and protect from adverse weather and from drying out. When handling, do not lift plants by trunk or stem; handle only ball or container. Obtain City inspection per 606.05.2.a.

2. Layout:

    a. Stake plant locations or set out plants per plans. Verify prior to planting that plants when mature will not interfere with existing trees, irrigation, lighting, utilities and other equipment, both underground and overhead. Also verify proper spacing between trees and other hard surfaces. Notify City for approval if plant locations must be changed.

    b. Obtain new utility locates if needed – all utilities must be clearly visible at the time of City plant material layout inspection.

    c. Obtain City inspection per 606.05.2.

3. Excavation of Planting Site: Excavate planting pits per City details; dispose of any rocks off site.

    a. Trees: Trees shall be planted at a depth where the root flare above the solid rootball is at grade in non-irrigated areas and four (4) inches above grade in irrigated turf areas. Contractor to contact City staff if they are not sure where the root flare is located on the tree. Modify depth of pit if soil type or conditions warrant and/or per City direction. Minimum diameter of the base of the planting pit shall be two (2) times the diameter of the root ball. The width of the hole at the top of the pit shall be three (3) times the diameter of the root ball

    b. Shrubs, perennials and ground cover: top of root ball shall be positioned slightly higher (one to two (1-2 inches) than finish soil grade so that water will drain away

from plant. Modify depth of pit if soil type or conditions warrant and/or per City direction. Diameter of the pit shall be two (2) times the diameter of the root ball (minimum).

4. Planting:

a. Balled and Burlapped trees (B&B) (Do not plant if tree trunk is loose in root ball or if ball is cracked or broken before or during planting process.):

1. Remove bottom one third (1/3) of wire basket from root ball. Wire basket must be completely removed. Place wire on tree stakes for City inspection prior to removal from site.

2. Place in pit with burlap intact on undisturbed soil in center of pit to proper grade, and plumb.

3. Face for best effect.

4. Cut and remove remaining wire and twine. Do NOT pull wrapping or wire from under ball as it may damage the root ball.

5. Backfill two thirds (2/3) of pit; remove top one third (1/3) of burlap; complete backfill. DO NOT compact backfill mix by tamping. DO NOT backfill over crown of root ball or exceed soil depth of root ball; crown must be at proper planting depth.

6. Install five (5) inch high watering basin around trees.

aa. Remove and grade out berm around basin after two thorough waterings in irrigated areas. Mulch after berm basin is removed.

bb. Mulch and leave basin in dryland areas.

b. Container grown stock (Do not plant if root ball is cracked or broken before or during planting process):

1. Carefully remove plants from containers without injury or damage to root ball; do not cut cans with spade or ax.

2. Vertically score root ball using sharp knife, about one eighth (1/8) inch deep and about every two to three (2-3) inches in circumference. If stock is root bound, butterfly root ball by cutting ball in half, halfway up from the bottom; flair root ball out to sides when planting.

3. Set plant plumb, face for best effect, make sure crown of root ball is at correct grade.

4. Backfill and install four (4) inch high watering basin around planting pit. DO NOT compact backfill mix by tamping. DO NOT backfill over crown of root ball or exceed soil depth of container; crown must be at or slightly above finished ground level. Mulch after two thorough waterings.

c. Completion of planting:

1. Shape surface of finish grade around root ball so water drains away from trunk or stems and to match finish grade at the edge of the planting pit.

2. Remove plant tags from trees and shrubs.

5. Edging:

a. Steel Edging: Install so top of edging is two (2) inch maximum above finish grade and flush with the top elevation of curb or pavement which it abuts. Edging shall meet pavement or curb at right angle. Stake at manufacturer's recommended intervals on smooth radius using steel stakes. Punch holes as needed for drainage.

b. Cut Edging: Where steel edging is not used, cut six (6) six deep vertical straight sided trench at shrub bed edge. For individual trees, edger cut is to be a three (3) foot radius from trunk of tree. Transition 6" deep cut edge to specified mulch depth of four (4) inches at a 45 degree angle.

6. Mulching:

a. Mulch depth:

1. Tree pits - four (4) inches deep, keep two (2) inches from trunk.

2. Shrub pits – three (3) inches deep (minimum).

3. Remaining shrub bed - four (4) inches deep (minimum).

4. Groundcover beds – three (3) inches deep (minimum).

b. Place geo-textile landscape fabric under mulch in all areas except in individual tree rings or in any other areas specifically approved for omission. Lay straight and even with eight (8) inch overlap at edges. Staple along edges with steel U pins on twenty four (24) inch spacing. Staple folds in fabric to keep below mulch material.

c. Tree rings – mulch to extend to edge of planting pit and shall encompass tree stakes in mulch area.

d. Timing: The City recommends delaying mulch application at tree rings in irrigated turf areas until after turf is established to minimize moisture build-up at tree bases. All other plants shall be mulched within two days of planting or after specified number of waterings for individual trees and shrubs.

7. Staking and Guying:

a. Pound six (6) foot long metal or wood stakes into undisturbed soil beyond the planting pit so that stake is secure. Secure STRAP-X or wire through metal grommets on canvas strap to tree and wrap above first branch on deciduous

trees or at mid-point of tree on coniferous trees. Secure guy to stake so that it is taut but allows some movement. Where wire is used as a guy, secure it so that no sharp projections are extending from post and flag it with one half (½) inch PVC pipe or white plastic flagging for visibility. Adjust tension on guy if needed. If metal t-posts are used, place PVC caps on top of stakes. Wooden pole stakes two by six (2x6) inch may be used without PVC caps.

8. Pruning: Prune minimum necessary to remove injured twigs and branches, deadwood and suckers to insure healthy tree. Do not prune central leader.

9. Beaver protection: Install fencing in circle around all deciduous trees (existing and new) in areas prone to harvesting by beaver, as determined by Parks and Forestry. Fencing to be cut in lengths long enough to provide a minimum twelve (12) inch separation between trunk and fence (all sides). Additional sections of fencing are to be wired together in sections if needed to fully cover trunk from ground to first branch. Ends and additional sections of wire fence loop to be securely fastened. Fencing to be cut into lengths in such a manner as to allow cut ends to be bent to secure enclosure around trees. Ends to be bent in to tree to prevent safety hazards and projections. Fence must be in contact with ground around entire tree using steel U pins to secure, if needed.

10. Prairie Dog enclosure: Contact Parks and Open Space at 303-774-4691 or Colorado Division of Wildlife for recommended installation.

606.07 COMPLETION SERVICES

1. Project Clean Up: Remove all excess materials, tools, rubbish and debris from site.

2. Record Drawings: List of all plant material installed, including sizes and quantities as certified by a Landscape Architect.

606.08 GUARANTEE/WARRANTY

1. For the period prior to Final Acceptance, all plant materials, landscape materials, workmanship and other appurtenances are to be guaranteed/warranted against defects. Settling of depressions, replacement of dead or diseased plant materials and other defects are to be corrected by the contractor at no cost to the City. Plant materials that are in an unhealthy or unsightly condition or that have lost their natural shape due to dead branches or excessive pruning of dead branches are to be replaced at no cost to the City. Guarantee/Warranty applies to all originally installed materials, and to replacements made during the guarantee/warranty period.

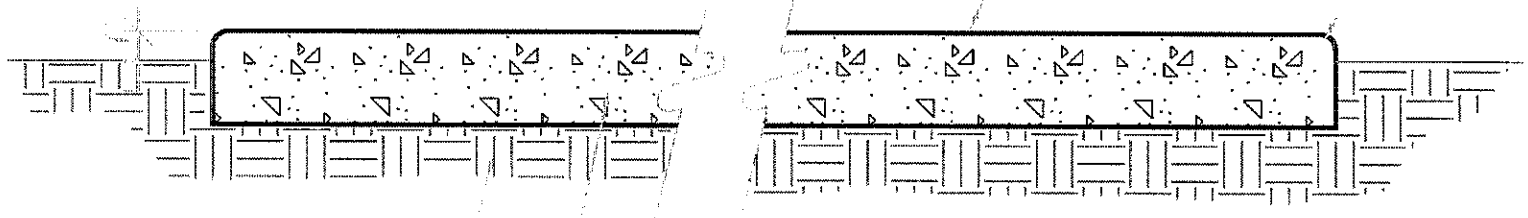
2. For areas to be maintained by Developer or subsequent property owners/HOAs, requirements per 606.08.1 apply in perpetuity.

TYPICAL 8' WIDE BIKEPATH
WIDTH MAY VARY, SEE PLAN

SLOPE 2%/DIRECTION
PER PLAN OR WITH GRADE

1" PRIOR
TO SOD/SEED

1" RADIUS



COMPACTED SUBGRADE
PER SPECS

6" THICK CONCRETE WALK
4,000 PSI WITH
FIBERMESH, PER SPECS.

PROVIDE CONTROL & EXPANSION JOINTS
CONTROL: 1–1/2" ZIPSTRIP OR SAWCUT, 8' O.C. MAX.
EXPANSION: 400' O.C. MAX.

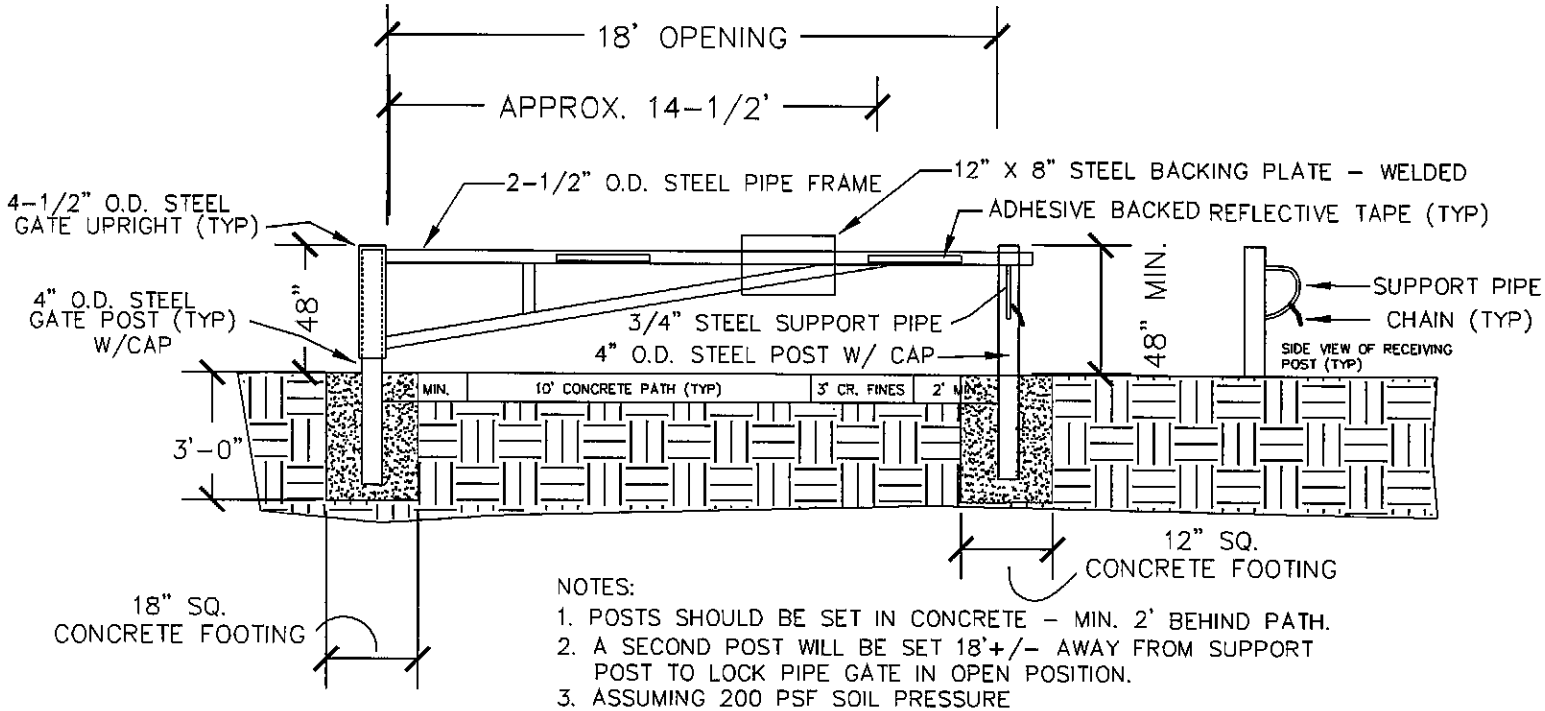
FINISH TO BE LIGHT BROOM.
NO TOOLED JOINTS – PATH EDGE ONLY.

NOTE: SEE CITY OF LONGMONT DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.

601.01

CONCRETE BIKEPATH

Rev. 10/07



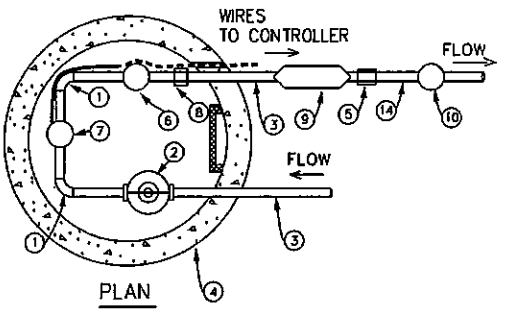
NOTES:

1. POSTS SHOULD BE SET IN CONCRETE - MIN. 2' BEHIND PATH.
2. A SECOND POST WILL BE SET 18'+/- AWAY FROM SUPPORT POST TO LOCK PIPE GATE IN OPEN POSITION.
3. ASSUMING 200 PSF SOIL PRESSURE
4. PROVIDE SHOP DRAWINGS FOR REVIEW
5. ALUMINUM SIGN READING "PATH CLOSED DUE TO HIGH WATER - PLEASE USE ALTERNATE ROUTE. EL PASADERO CERRO DEBIDO REGAR ALTO - POR FAVOR USE ALTERNA LA RUTA PASADERO" TO BE INSTALLED ON BACKING PLATE.
6. REFLECTIVE TAPE REQUIRED ON ALL POSTS.
7. 3/16" CHAIN REQUIRED ON POSTS TO SECURE GATE OPEN AND CLOSED.
8. FINISH TO BE GALVANIZED OR APPROVED EQUAL.

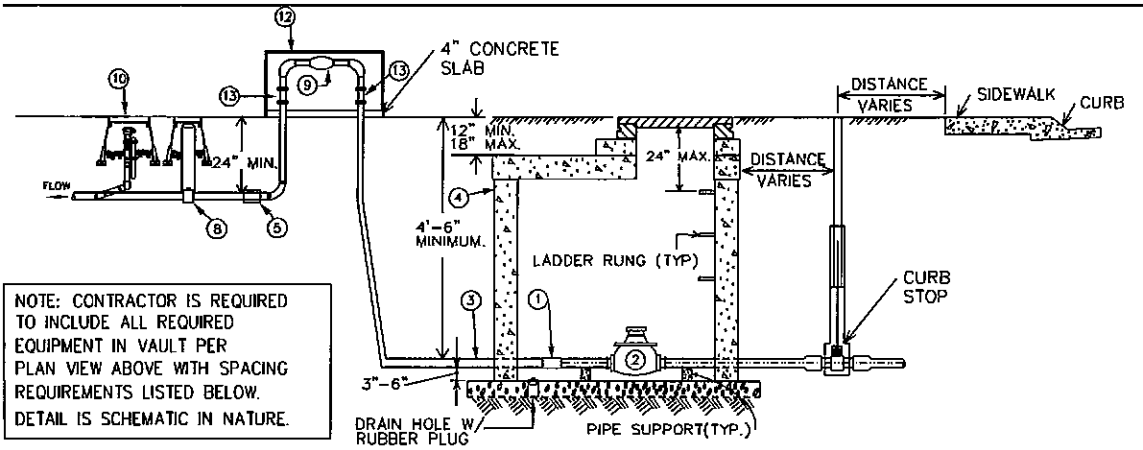
601.02 18' FLOOD GATE

NOT TO SCALE

Rev. 10/07



1 - 90 DEG. ELBOW
2 - METER UNIT
3 - TYPE K 'SOFT' COPPER TUBING
4 - 60" CONCRETE VAULT
5 - PVC ADAPTER
6 - MASTER VALVE
7 - FLOW METER
8 - DRAIN VALVE
9 - REDUCED PRESSURE PRINCIPLE BPD
10 - WINTERIZATION ASSEMBLY
11 - 2" CLASS 200 PVC OR SMALLER
12 - STRONGBOX ENCLOSURE
13 - UNION



NOTE: CONTRACTOR IS REQUIRED TO INCLUDE ALL REQUIRED EQUIPMENT IN VAULT PER PLAN VIEW ABOVE WITH SPACING REQUIREMENTS LISTED BELOW. DETAIL IS SCHEMATIC IN NATURE.

ELEVATION

NOTES:

A – BASE AND BOTTOM BARREL SECTION SHALL BE PRECAST AS A SINGLE UNIT. THE VAULT IS INTENDED TO BE WATERTIGHT. USE APPROVED GASKET MATERIALS TO SEAL PIPE PENETRATIONS.

B – A 60" DIA. VAULT IS REQUIRED FOR ALL TAPS 3/4" – 2" IN SIZE. METERS LARGER THAN 2" OR NON-POTABLE SYSTEMS WILL REQUIRE A SPECIAL DESIGN TO VERIFY VAULT SIZE.

C – COPPER JOINTS INSIDE METER VAULT SHALL BE EITHER THREAD OR SOLDERED WITH 95-5 TINANTIMONY SOLDER.

D – COORDINATE WITH CITY OF LONGMONT WATER/WASTEWATER OPERATIONS & MAINTENANCE FOR PICK-UP OF METERS & METER CONNECTERS.

E – METERS TO BE INSTALLED PER WATER/WASTEWATER STANDARDS AND DETAILS.

F – NO CONNECTIONS OR CHANGES IN PIPE DIRECTION SHALL BE MADE IN 10 PIPE DIAMETERS UPSTREAM OF THE FLOW SENSOR OR 5 PIPE DIAMETERS DOWNSTREAM OF THE FLOW SENSOR.

G – LADDER RUNGS SHALL BE CENTERED UNDER EITHER SIDE OF PIT LID AND OVER METER.

H – EXTEND 2 SPARE WIRES BETWEEN THE FLOW SENSOR AND THE CONTROLLER. WIRES TO BE IN 3/4" PVC CONDUIT THROUGH VAULT WALL. CONDUIT TO BE SEALED WITH WATERPROOF SILICONE FROM INSIDE OF VAULT.

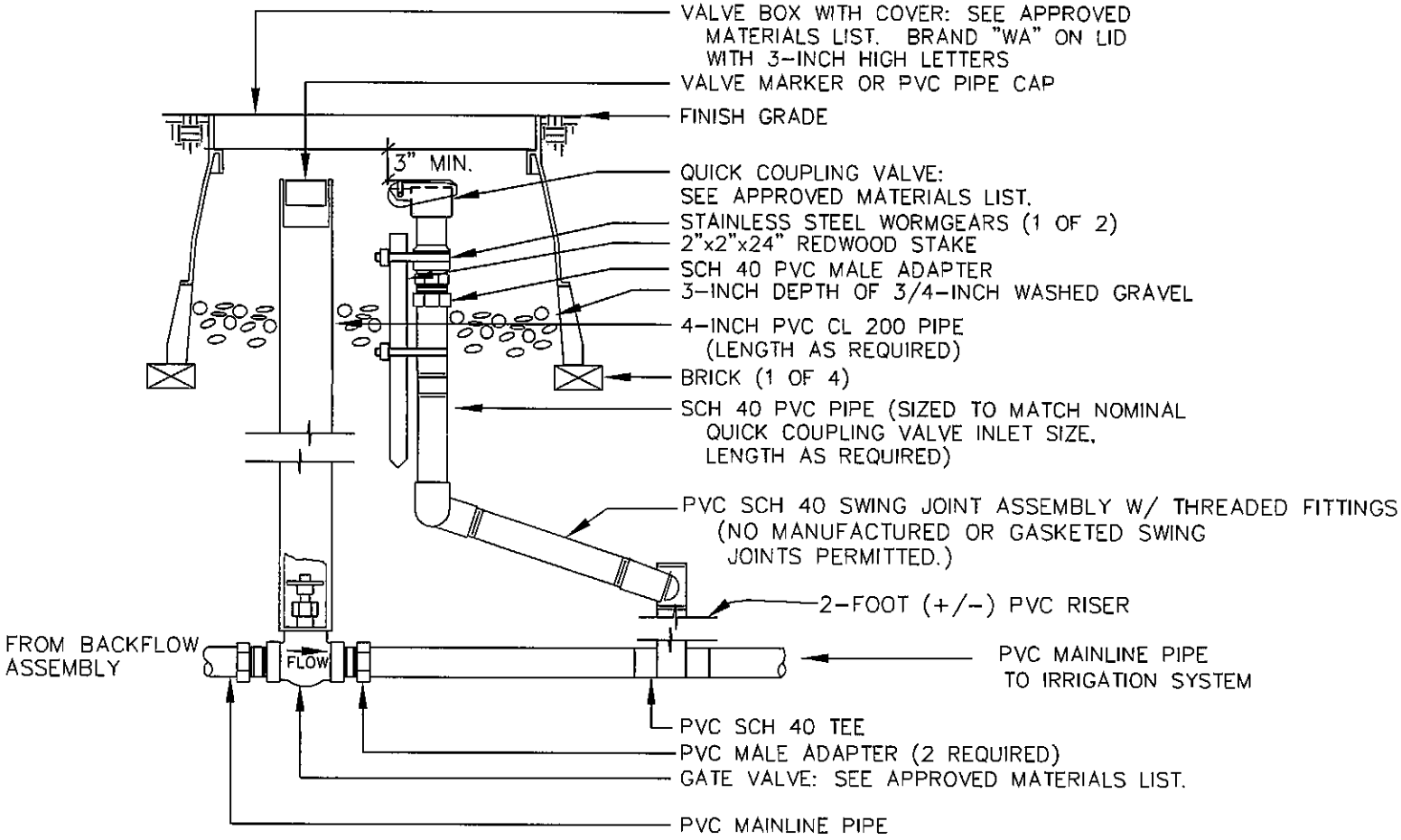
I – REDUCED PRESSURE BPDS ARE TO BE LOCATED SO SURROUNDING GRADES DRAIN TO A PAVED SURFACE WITHOUT ENCOUNTERING BUILDINGS OR OTHER STRUCTURES.

J – SEE CITY OF LONGMONT DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.

K – SEE WINTERIZATION, FLOW METER AND MASTER VALVE DETAILS.

603.01 BACKFLOW PREVENTER, CONCRETE VAULT AND DOWNSTREAM ASSEMBLIES (NOTE – DETAIL ONLY FOR TAPS WITH A WAIVED FEE SIZED 2" OR LESS.)

REV. 10/07



NOTES:

1) NOMINAL VALVE AND FITTING SIZES SHALL BE IDENTICAL WITH MAINLINE PIPE SIZE UNLESS OTHERWISE NOTED.

2. DEPTH OF BURY OF GATE VALVE TO BE 24" MIN.

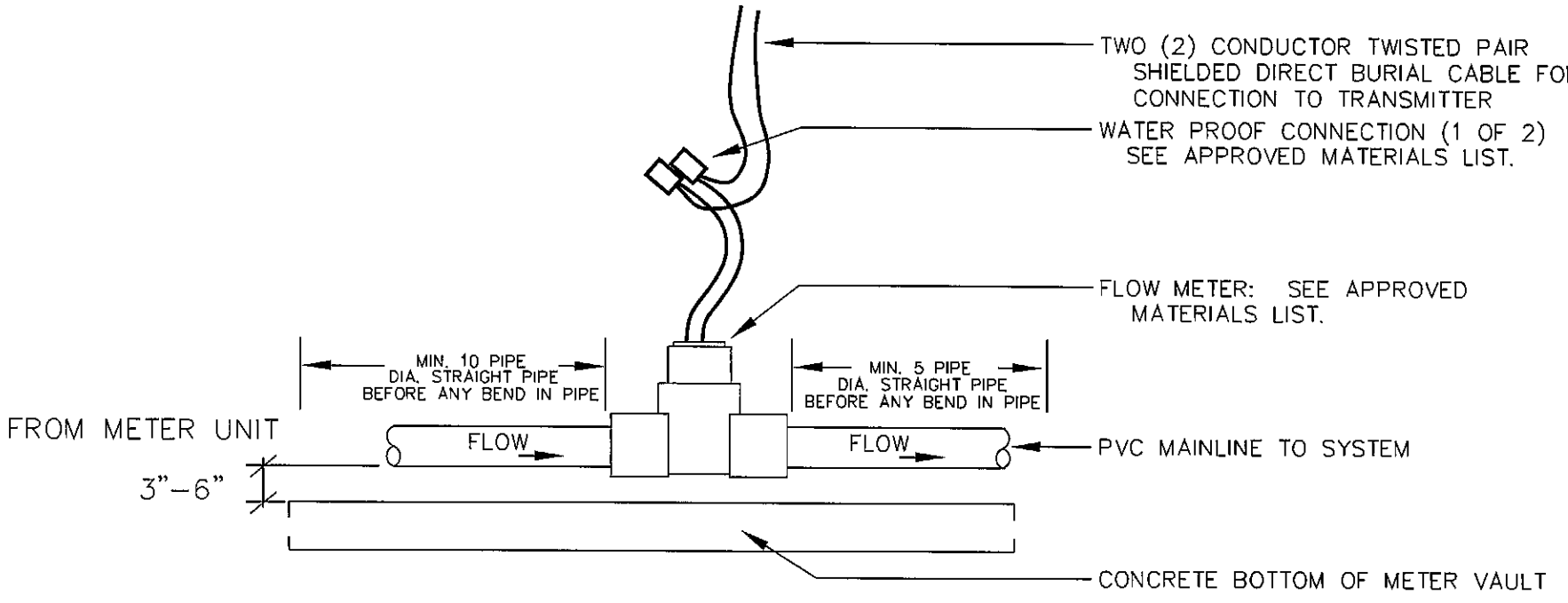
3. SEE BACKFLOW PREVENTER, METER PIT & DOWNSTREAM ASSEMBLIES DETAIL.

4. SEE CITY OF LONGMONT DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.

603.02

WINTERIZATION ASSEMBLY

Rev. 10/07



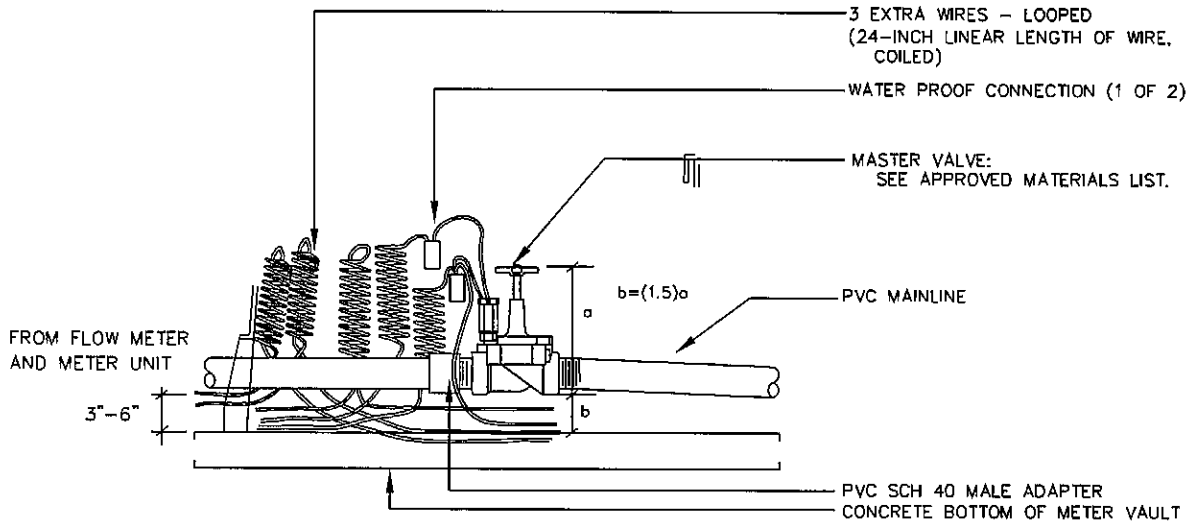
NOTES: 1. LOCATION OF FLOW METER ASSEMBLY TO BE LOCATED WITHIN METER PIT (SEE DETAIL) AND DETERMINED BY DISTANCES NOTED ON DETAIL ABOVE.

2. SEE CITY OF LONGMONT DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.

603.03

FLOW METER ASSEMBLY

Rev. 10/07



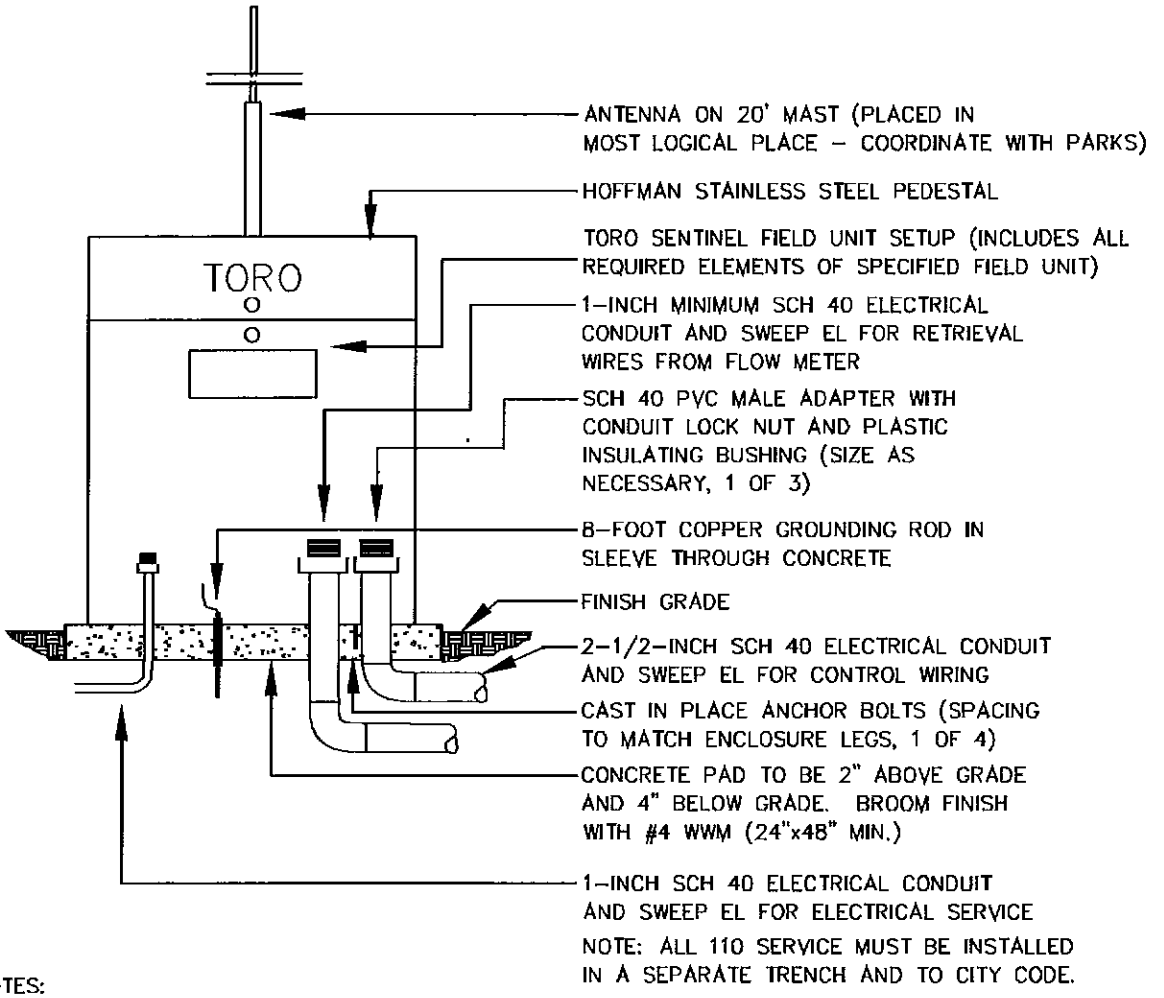
NOTES:

1. FITTINGS AND MASTER VALVE TO BE SIZED IDENTICALLY WITH MAINLINE.
2. MASTER VALVE TO BE LOCATED WITHIN METER PIT (SEE DETAIL).
3. SEE CITY OF LONGMONT DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.

603.04

MASTER VALVE ASSEMBLY

Rev. 10/07



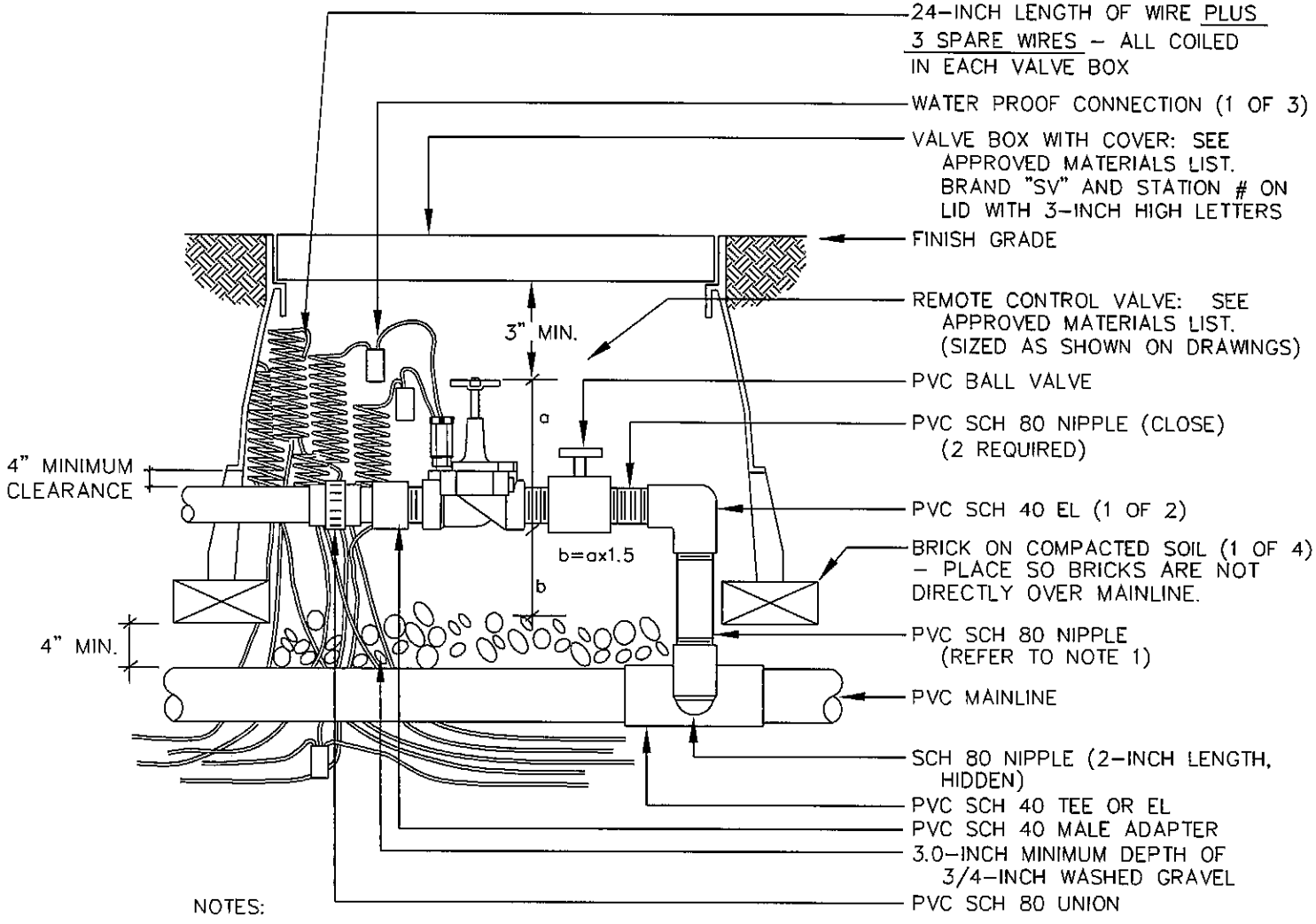
NOTES:

1. CONTRACTOR SHALL ARRANGE AND PAY COST ASSOCIATED WITH INSTALLATION OF ELECTRICAL POWER.
2. ALL ELECTRICAL COMPONENTS AND INSTALLATIONS SHALL BE IN ACCORDANCE WITH CITY OF LONGMONT REGULATIONS AND ALL APPLICABLE ELECTRICAL CODES.
3. CONNECT FLOW METER AND MASTER VALVE WIRING TO TRANSMITTER.
4. SEE SPECIFICATIONS FOR EQUIPMENT AND INSTALLATION REQUIREMENTS.
5. AREAS NOT TO BE MAINTAINED BY THE CITY OF LONGMONT – HUNTER ICC SERIES CONTROLLER INSTEAD OF SATELLITE FIELD UNIT. HOFFMAN SECURITY ENCLOSURES REQUIRED FOR ALL SYSTEMS.
6. IF MULTIPLE CONTROLLERS ARE NEEDED, PIGGYBACK UNITS ARE REQUIRED. NO SEPERATE CONTOLLERS PERMITTED FOR THE SAME SYSTEM WITHOUT APPROVAL FROM PARKS.
7. PURCHASE OF SATELLITE FIELD UNIT THROUGH CITY OF LONGMONT PARKS AND AND FORESTRY IS AN AVAILABLE OPTION. CONTACT PARKS FOR INFORMATION.
8. ONE PROGRAMMED HAND HELD REMOTE AND CHARGER WITH EACH FIELD UNIT REQUIRED.
9. SEE CITY OF LONGMONT DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.

603.05

CONTROLLER, SATELLITE & ENCLOSURE

Rev: 10/07



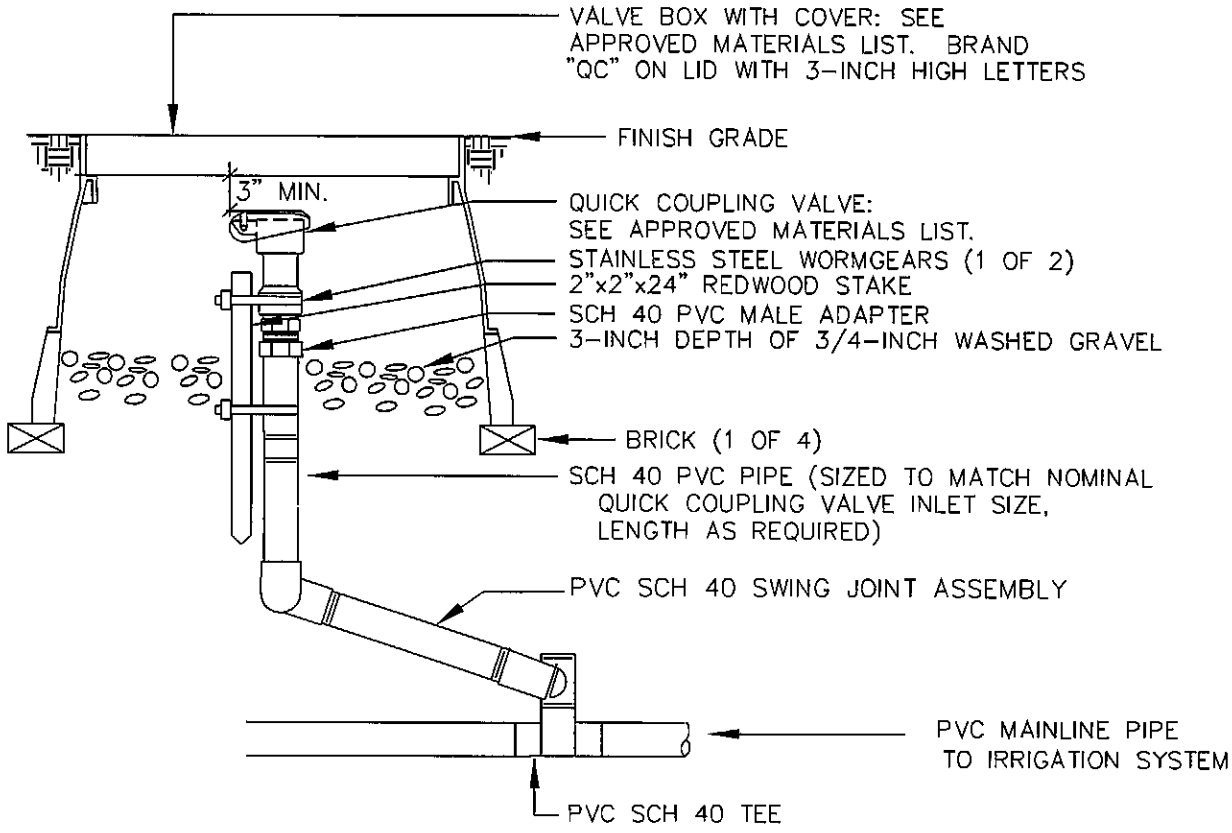
NOTES:

1. INSTALL VERTICAL NIPPLE WITH LENGTH ADEQUATE TO ALLOW REMOVAL OF REMOTE CONTROL VALVE WITHOUT CUTTING PIPE OR REMOVING BONNET (IE. VALVE STEM SHOULD CLEAR MAINLINE PIPE).
2. FITTINGS AND BALL VALVE TO BE SIZED IDENTICALLY WITH CONTROL VALVE.
3. SEE CITY OF LONGMONT DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.

603.06

REMOTE CONTROL VALVE ASSEMBLY

Rev. 10/07



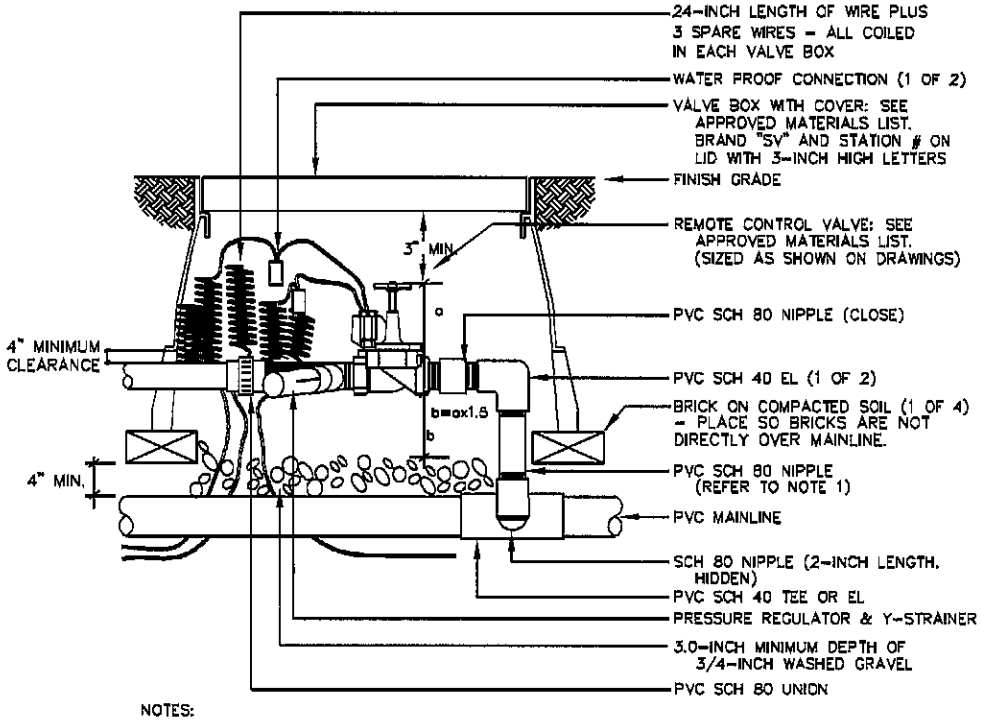
NOTES:

1. QUICK COUPLER TO BE LOCATED IN THE CENTER OF THE VALVE BOX – PLACED AND STAKED COMPLETELY VERTICAL.
2. DEPTH OF BURY OF MAINLINE TO BE 24" MIN.
3. SEE DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.

603.07

QUICK COUPLER ASSEMBLY

Rev. 10/07

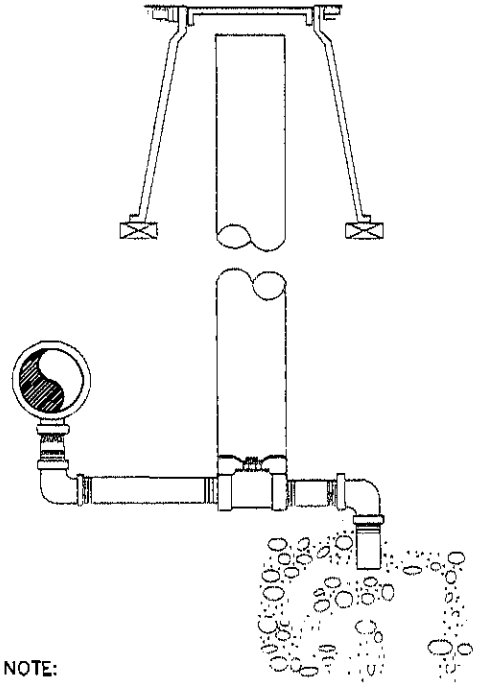


NOTES:

1. FITTINGS AND BALL VALVE TO BE SIZED IDENTICALLY WITH CONTROL VALVE.
2. SEE CITY OF LONGMONT DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.

603.08 DRIP REMOTE CONTROL VALVE ASSEMBLY

Rev. 10/07



TEE OR EL ON MAINLINE PIPE

10" VALVE BOX WITH COVER: SEE APPROVED MATERIALS LIST. BRAND "DV" IN LID WITH 3-INCH HIGH LETTERS.

FINISH GRADE

6-INCH PVC CL 160 PIPE (LENGTH AS REQUIRED)

BRICK (1 OF 2)

PVC SCH 80 NIPPLE (2.0-INCH LENGTH)

PVC SCH 80 NIPPLE (4.0-INCH LENGTH)

PVC SCH 80 EL (1 OF 2)

PVC SCH 80 NIPPLE (4.0-INCH LENGTH)

SUMP OF 4.0 CUBIC FEET OF 3/4-INCH WASHED GRAVEL

3/4-INCH BALL VALVE WITH TEE HANDLE: SEE APPROVED MATERIALS LIST.

PVC SCH 80 NIPPLE (8.0-INCH LENGTH)

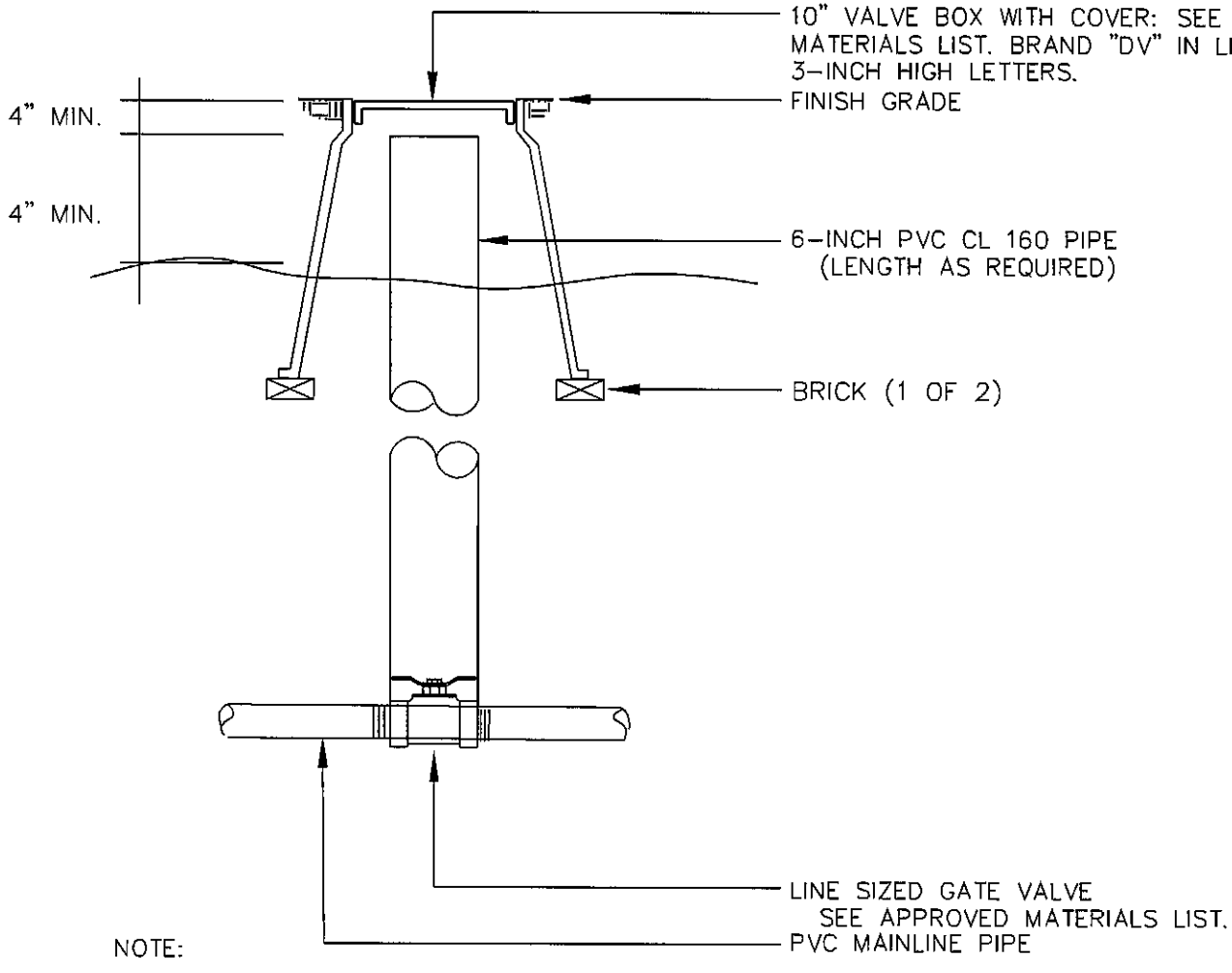
NOTE:

1. SLEEVE TO BE SET SQUARE OVER BALL VALVE TO ALLOW FOR OPERATION OF VALVE WITHOUT BINDING.
2. SEE CITY OF LONGMONT DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST.

603.09

MANUAL DRAIN VALVE ASSEMBLY

Rev. 10/07



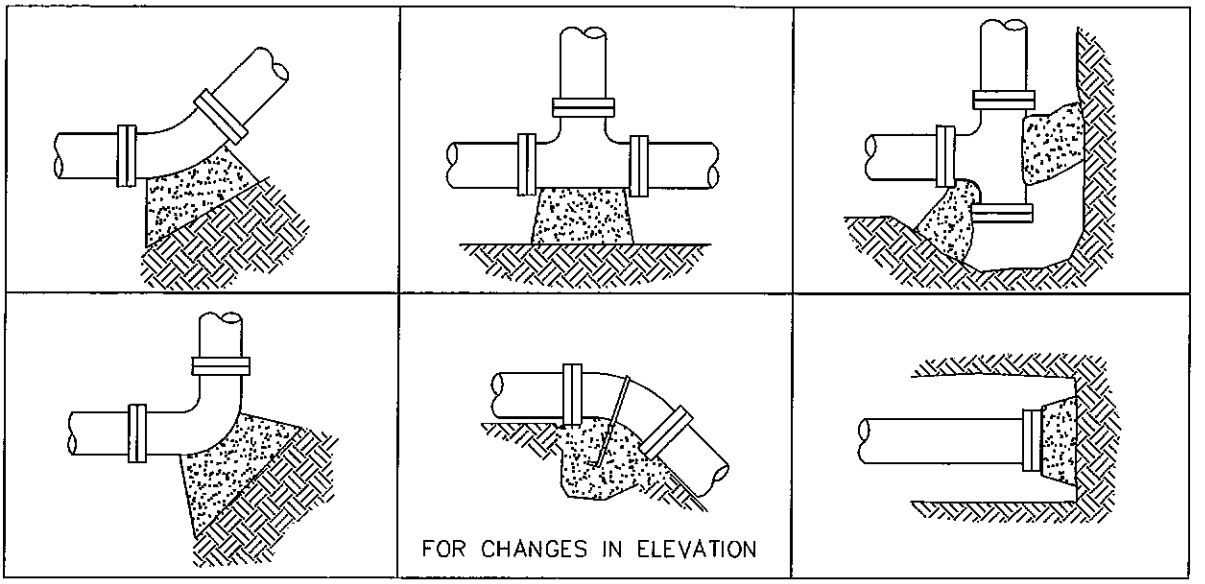
NOTE:

1. SLEEVE TO BE SET SQUARE OVER BALL VALVE TO ALLOW FOR OPERATION OF VALVE WITHOUT BINDING.
2. SEE CITY OF LONGMONT DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.

603.10

GATE VALVE ASSEMBLY

Rev. 10/07



THRUST BLOCK SURFACE AREA AGAINST UNDISTURBED SOIL (SF)

PIPE SIZE	BENDS			TEE OR DEAD END
	22-1/2°	45°	90°	
3"	0.3	0.6	1.1	0.8
4"	0.5	1.1	1.9	1.4

*BASED ON 2,000 PSF SOIL BEARING CAPACITY

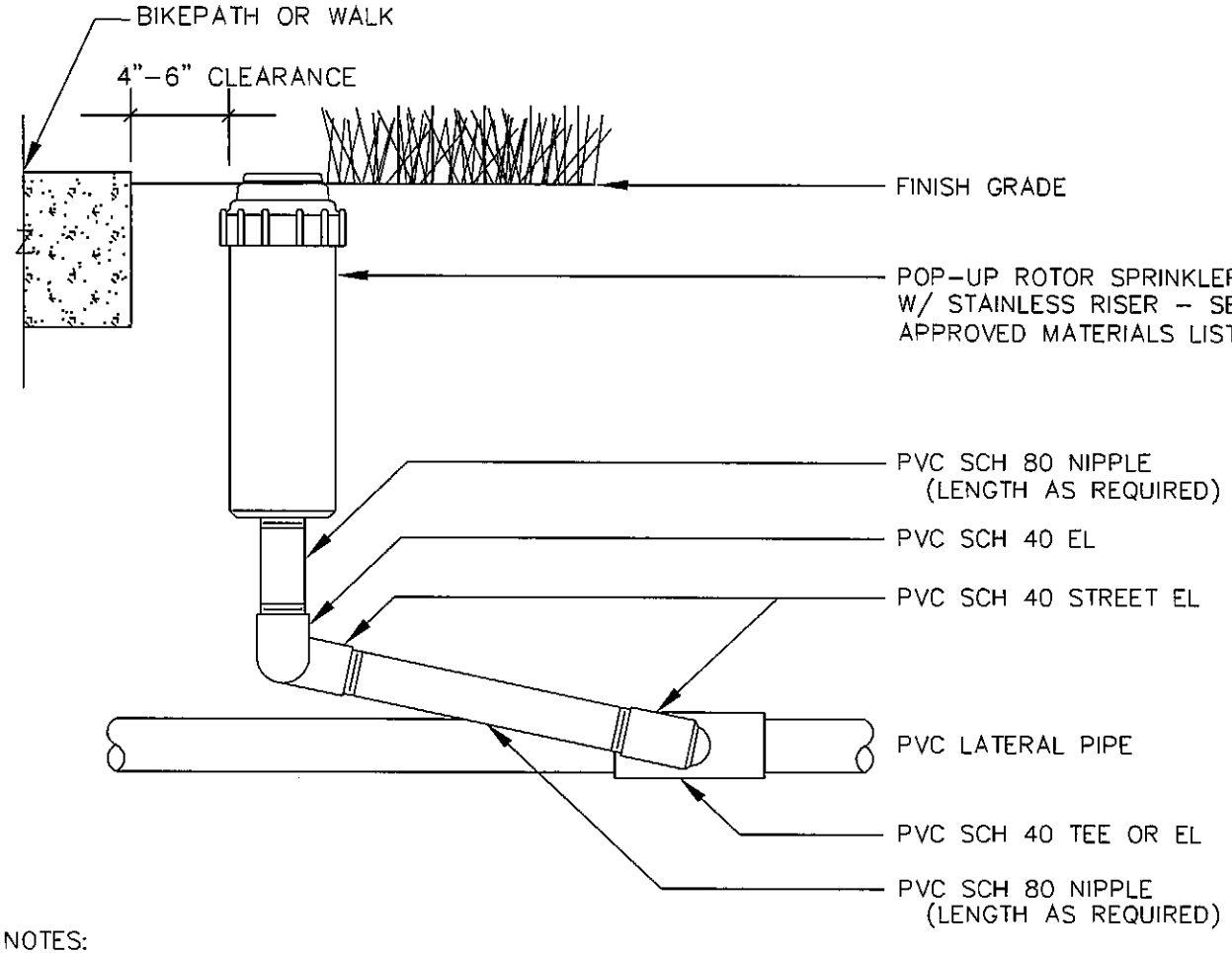
NOTES:

1. USE NO. 4 REBAR WITH MASTIC COATING WHERE PIPE MUST BE ANCHORED TO THRUST BLOCK.
2. INSTALL THRUST BLOCK SO THE HORIZONTAL AND VERTICAL DIMENSIONS OF THE THRUST BLOCK ARE APPROXIMATELY EQUAL.
3. INSTALL THRUST BLOCKS AGAINST UNDISTURBED SOIL.
4. KEEP WIRES CLEAR OF THRUST BLOCK.
5. IRRIGATION CONTRACTOR SHALL VERIFY SOIL BEARING CAPACITY. IF SOIL BEARING CAPACITY VARIES FROM ASSUMPTION LISTED ABOVE, CONTRACTOR SHALL RE-DESIGN AS NEEDED.

603.11

CONCRETE THRUST BLOCK DETAIL

Rev. 10/07



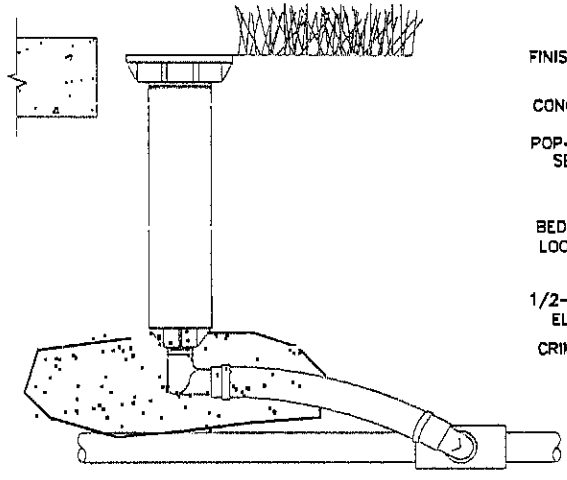
NOTES:

1. SEE CITY OF LONGMONT DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.

603.12

POP–UP ROTOR SPRINKLER ASSEMBLY

Rev. 10/07



FINISH GRADE

CONCRETE BIKE PATH

POP-UP SPRAY SPRINKLER:
SEE APPROVED MATERIALS LIST.

BED HEADS IN 6" DEPTH OF SAND WHEN LOCATED ADJACENT TO WALKS & BIKEPATHS.

1/2-INCH MALE NPT x .490 INCH BARB ELBOW: SEE APPROVED MATERIALS LIST.

CRIMP-TYPE CLAMP

PVC LATERAL PIPE

PVC SCH. 40 TEE OR EL

SWING PIPE, 12-INCH LENGTH (MIN.):
TO MATCH PIPE BRAND. SEE APPROVED MATERIALS LIST.

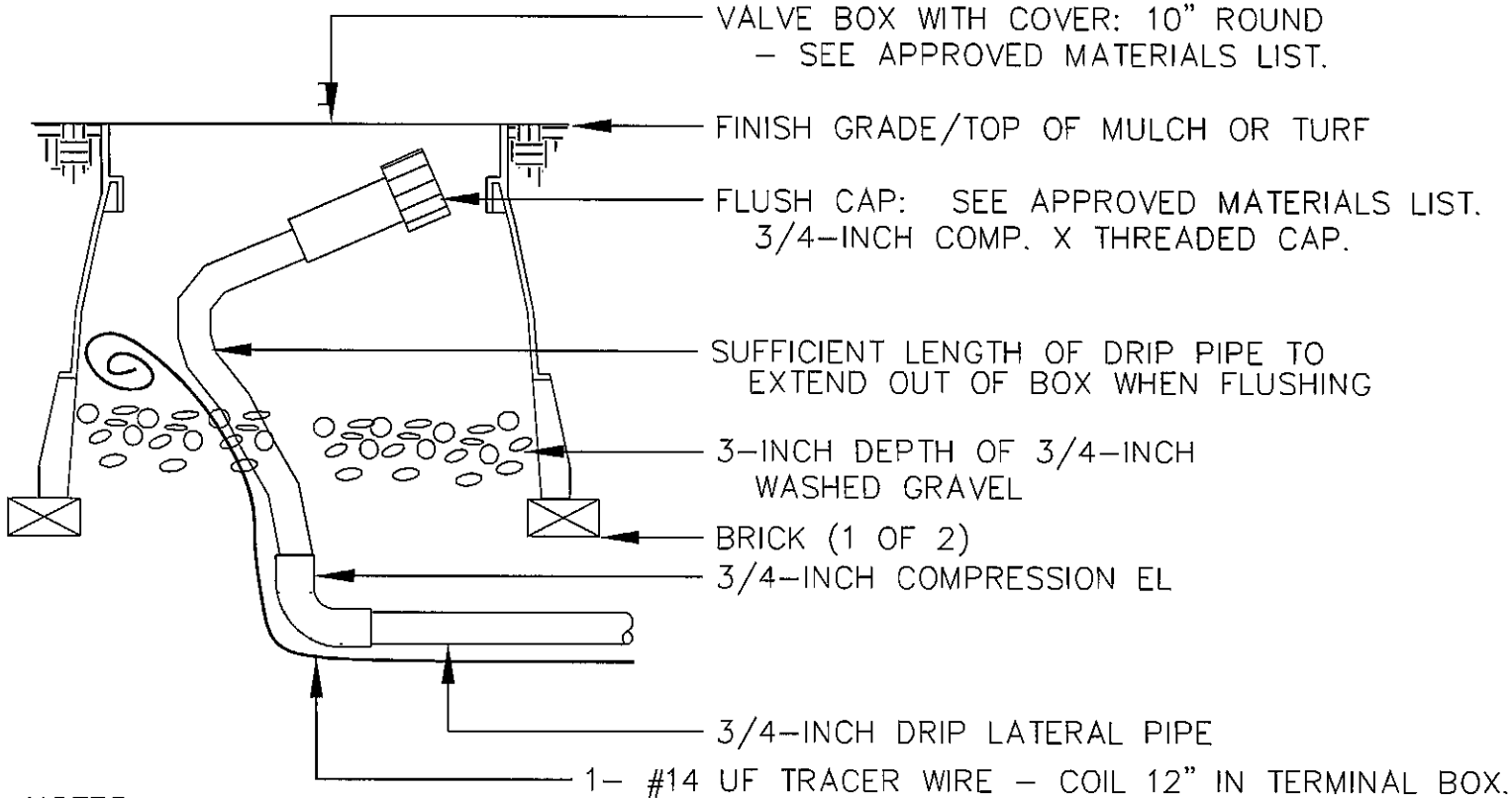
NOTES:

1. SEE CITY OF LONGMONT DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.

603.13

POP-UP SPRAY SPRINKLER ASSEMBLY

Rev. 10/07



NOTES:

1. FLUSH CAP ASSEMBLY TO BE LOCATED AT THE TERMINUS OF EACH DRIP LINE.
2. INSTALL TRACER WIRE TO END OF EACH DRIP LINE BRANCH (TO TREES IN TURF AREAS ONLY) FOR EASE OF FUTURE LOCATES.
3. SEE CITY OF LONGMONT DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.

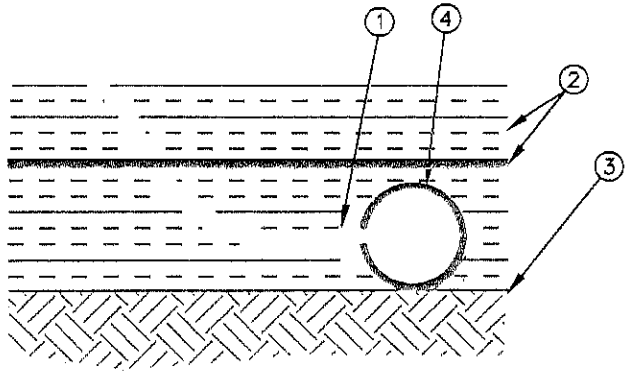
603.14

FLUSH CAP ASSEMBLY

Rev. 10/07

LEGEND

1. SPIRAL BARB EMITTER – SEE APPROVED MATERIALS LIST.
2. 4" MINIMUM DEPTH OF MULCH OVER WEED BARRIER
3. UNDISTURBED SOIL
4. DRIP LATERAL PIPE – SEE APPROVED MATERIALS LIST.



NOTES:

1. PROVIDE SUFFICIENT STAKES TO SECURE PIPE BELOW MULCH.
2. EMITTER TO BE PLACED WITHIN PLANTING PIT AREA OF SHRUBS OR TREES. IF SLOPED AREA, PLACE ON UPHILL SIDE OF PLANTING.
3. 2 – 1 GAL/HR EMITTERS PER SHRUB & 4 1 GAL/HR EMITTERS / TREE (2" CAL. SIZE) ARE REQUIRED. SPACE EMITTERS EVENLY.
4. SEE CITY OF LONGMONT DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.
5. NO SPAGHETTI TUBING ALLOWED!
6. TRACER WIRE TO BE INSTALLED WITH ALL VURIED DRIP PIPE IN NATIVE GRASS AREAS AND IN OTHER AREAS WHERE NOT LOCATED AT THE SURFACE IN A SHRUB BED.

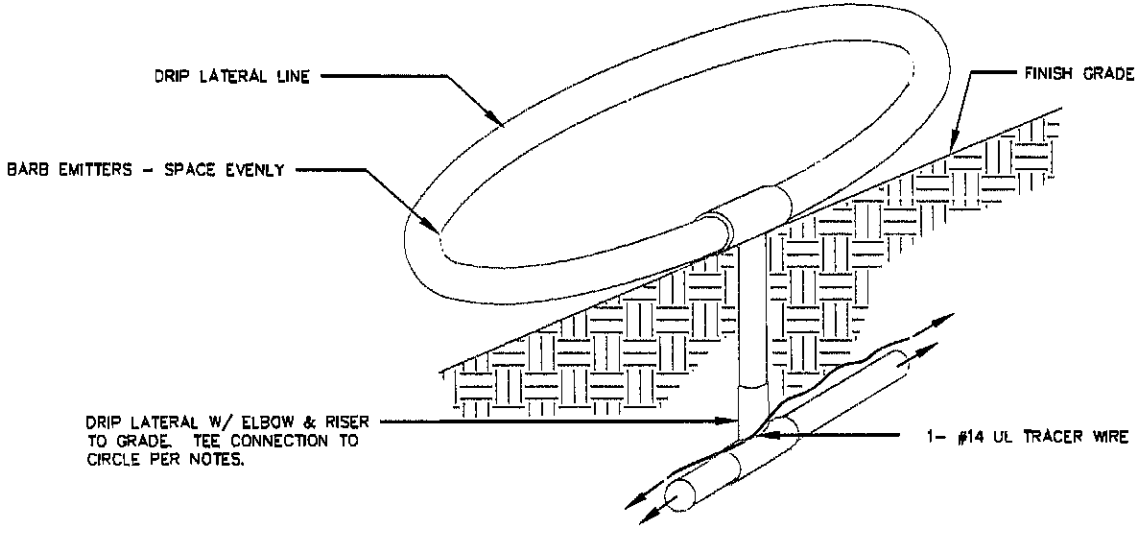
603.15

DRIP DETAIL IN SHRUB BEDS

Rev. 10/07

NOTES

1. SPIRAL BARB EMITTER – SEE APPROVED MATERIALS LIST.
2. 3" MINIMUM DEPTH OF COVER BELOW MULCH IN PLANTING PITS
3. 12" MIN. TRENCH DEPTH FOR DRIP LATERALS BETWEEN PLANTINGS
4. DRIP LATERAL PIPE – SEE APPROVED MATERIALS LIST. (NO 1/4" DISTRIBUTION TUBING (SPAGHETTI TUBING) ALLOWED!)
5. 2' DIAMETER DRIP PIPE TO CIRCLE EACH TREE, 18" DIAMETER DRIP PIPE TO CIRCLE EACH SHRUB IN OPEN TURF AREAS. STAKE SECURELY AT PERIMETER OF PLANTING PIT AND COVER WITH 3" MIN. DEPTH MULCH.
6. ALL FITTINGS TO BE SECURED WITH STAINLESS COMPRESSION TYPE FITTINGS, OR APPROVED EQUAL.
7. INSTALL TRACER WIRE DIRECTLY ABOVE DRIP LATERALS BURIED UNDER TURF AREAS FOR EASE OF FUTURE LOCATES.



NOTES:

1. SEE CITY OF LONGMONT DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.

603.16

DRIP TO TREES IN OPEN TURF AREAS

Rev. 10/07

NOTE: SET ROOT FLARE OF ALL TREES 4" ABOVE GRADE IN IRRIGATED AREAS AND AT GRADE TO 2" ABOVE GRADE IN NON-IRRIGATED AREAS. MODIFY IF SOIL CONDITIONS WARRANT & PER CITY DIRECTION. INSTALL A 5" HIGH BERM AROUND TREES TO CREATE A WATERING BASIN. BERM IS TEMPORARY IN IRRIGATED AREAS. REMOVE BERM AFTER TWO THOROUGH WATERINGS IN IRRIGATED AREAS & MULCH. LEAVE BERM & MULCH IN NON-IRRIGATED AREAS & IN AREAS ONLY IRRIGATED BY DRIP SYSTEMS AFTER DRYLAND GRASS ESTABLISHMENT PERIOD.

3" – 4" DEEP APPROVED MULCH FLUSH WITH SOD AT EDGE. & TO BE KEPT 2" FROM TRUNK. TREE WELL TO BE 5' MINIMUM DIAMETER.

PLANTING HOLE: ROOTBALL TO BE PLACED ON UNDISTURBED SOIL AT DEPTH AS NOTED. HOLE TO BE MORE OF A "DISH" SHAPE RATHER THAN CYLINDRICAL.

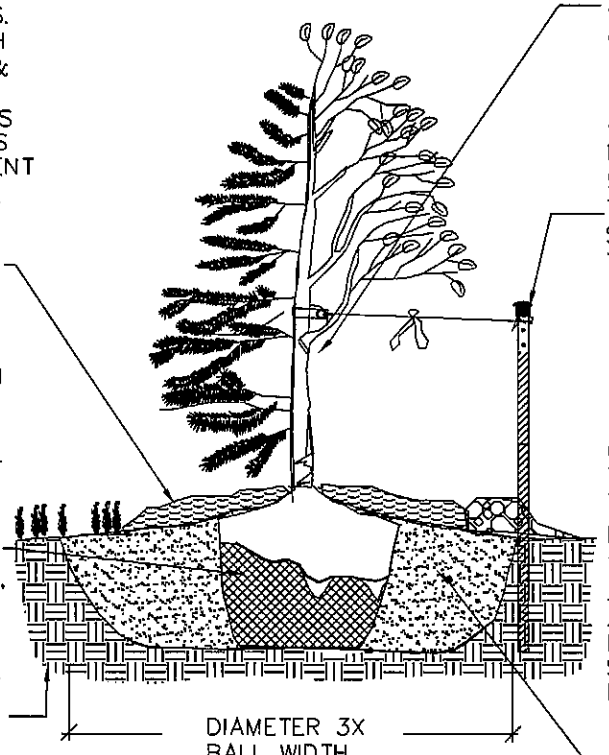
REMOVE BOTTOM 1/3 OF WIRE BASKET. SET TREE IN PIT TO PROPER GRADE AND PLUMB. REMOVE REMAINING WIRE & TWINE. IF PLASTIC OR TREATED BURLAP, REMOVE AS MUCH AS POSSIBLE & BACKFILL. IF REGULAR BURLAP, BACKFILL 2/3 OF PIT, REMOVE TOP 1/3 OF BURLAP & COMPLETE BACKFILL.

UNDISTURBED SOIL

TREES IN GRASS AREAS: PROVIDE A MINIMUM 4' RADIUS FROM TRUNK TO SEED/SOD.

PRUNE AS DIRECTED BY OWNER'S REPRESENTATIVE. DO NOT PRUNE OR DAMAGE CENTRAL LEADER.

WRAP TRUNK FROM GROUND LEVEL TO SECOND BRANCH WITH 4" KRAFT TYPE TREE WRAP. SECURE ENDS WITH FLEXIBLE TAPE.



APPROVED GUYING SYSTEM:

MIN. 6' LONG HEAVY DUTY T-BAR STEEL POST STAKES WITH WHITE T-POST CAPS OR 6' WOODEN POLE STAKES (PREFERRED). GUYS ARE TO BE 17 GAUGE GALVANIZED STEEL WIRES OR STRAP-X GUYS (PREFERRED) SECURED TO TREE WITH CANVAS STRAP ABOVE FIRST BRANCH. WIRE TO BE TAUT BUT NOT OVER-TIGHT. FLAG WIRE WITH WHITE PLASTIC FLAGGING TAPE OR PVC PIPE. CONIFERS TO HAVE 2 STAKES FOR TREES 6' AND LESS, 3 STAKES FOR TREES ABOVE 6'. NO SHORT STAKES PERMITTED FOR EVERGREENS. DECIDUOUS TREES TO HAVE 2 STAKES FOR TREES 2-1/2" CAL. AND LESS, 3 STAKES ABOVE 2-1/2" CAL. ONE STAKE ALWAYS IN DIRECTION OF PREVAILING WINDS. REMOVE STAKES & GUYS AFTER 1 YEAR OR BEFORE FINAL ACCEPTANCE BY CITY.

PREPARED BACKFILL MIXTURE:

1. ONE PART SOIL AMENDMENT – SEE APPROVED MATERIALS LIST.
2. TWO PARTS TOPSOIL.
3. THREE PARTS NATIVE SOIL.
4. SUPERPHOSPHATE AMENDMENT
5. MATERIALS TO BE THOROUGHLY BLENDED.

NOTES: SEE CITY OF LONGMONT DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.

ADD BEAVER PROTECTION AROUND DECIDUOUS PLANTINGS WITHIN 200' OF ALL RIPARIAN AREAS, PER CITY STANDARDS.

606.01

TREE PLANTING DETAIL

Rev. 10/07

NOT TO SCALE

PROVIDE 18" MINIMUM DISTANCE FROM EDGE OF MATURE PLANT SPREAD TO EDGER OR CONCRETE.

18" MINIMUM

PRUNE DEAD OR DAMAGED BRANCHES PRIOR TO PLANTING. IF FORM IS COMPROMISED BY PRUNING, REPLACE SHRUB.

SET SHRUB PLUMB. TOP OF ROOT BALL TO BE SLIGHTLY ABOVE FINISH GRADE.

SPACE PLANTS AND SET PLUMB FOR BEST EFFECT.

MOUND COMPACTED BACKFILL UNDER ROOTBALL OR SET ON UNDISTURBED SOIL.

3" – 4" DEEP APPROVED MULCH INSIDE SAUCER, ON GEO-TEXTILE WEED BARRIER. BUILD A 4" BASIN AROUND PIT IN NON-IRRIGATED AREAS ONLY.

SPLIT BOTTOM 1/2 OF BALL. SPREAD AND PLANT.

2"

PREPARED BACKFILL MIXTURE:
1. ONE PART SOIL AMENDMENT – SEE APPROVED MATERIALS LIST.
2. TWO PARTS TOPSOIL.
3. THREE PARTS NATIVE SOIL.
4. SUPERPHOSPHATE AMENDMENT.
5. MATERIALS TO BE THOROUGHLY BLENDED.

REMOVE ALL CONTAINERS, BASKETS, WIRE ETC. FROM ROOTBALL

DIAMETER
2X'S BALL WIDTH

NOTES: SEE CITY OF LONGMONT DESIGN STANDARDS & CONSTRUCTION SPECIFICATIONS AND APPROVED MATERIALS LIST FOR APPROVED PRODUCTS AND INSTALLATION REQUIREMENTS.

ADD BEAVER PROTECTION AROUND DECIDUOUS PLANTINGS WITHIN 200' OF ALL RIPARIAN AREAS, PER CITY STANDARDS.

606.02 SHRUB PLANTING DETAIL

REV. 10/07 NOT TO SCALE

CITY OF LONGMONT

SECTION 700 – LONGMONT POWER AND COMMUNICATIONS (LPC)

TABLE OF CONTENTS

SECTION	PG #	SECTION TITLE
700.00	**3**	**MINIMUM DESIGN CRITERIA**
700.01	3	ABBREVIATIONS
700.02	3	DEFINITIONS
700.03	4	GENERAL
700.04	4	EASEMENTS
700.05	6	CLEARANCES
700.06	7	STANDARD NOTES FOR PLAN SUBMITTALS
700.07	7	REQUEST FOR SERVICE
700.08	7	DESIGN
700.09	7	SLEEVE REQUIREMENTS
700.10	8	CHARGES
700.11	8	FEES
700.12	9	SITE DEVELOPMENT PERMITS
701.00	**10**	**CUSTOMER INSTALLATIONS**
701.01	10	SUBSURFACE INFRASTRUCTURE
701.01A	10	SLEEVE INSTALLATION
701.01B	11	TRENCH
701.01C	11	PVC INSTALLATION
701.01D	11	TRACER WIRE INSTALLATION
701.01E	11	CONNECTION TO EXISTING SYSTEM
701.01F	11	GROUND VAULTS
701.01G	12	BACKFILLING
701.01H	12	MATERIALS
701.01I	13	MATERIALS HANDLING
701.01J	13	INSPECTION
701.02	13	SERVICE LINE SIZES AND INSTALLATION
701.02A	13	RESIDENTIAL SERVICES
701.02B	13	MULTI-FAMILY AND COMMERICAL DEVELOPMENT SERVICES
701.03	14	SECONDARY CABINET INSTALLATION
702.00	**15**	**INSTALLATIONS**
702.1	15	SUBSURFACE INFRASTRUCTURE
702.2	15	ELECTRICAL APPARATUS
703.00	**16**	**METERING REQUIREMENTS**
700.01	16	GENERAL
700.02	17	METER LOCATION
700.03	17	CONSTRUCTION POWER
700.04	18	RESIDENTIAL – SINGLE SERVICE
700.05	18	SINGLE-PHASE SERVICES: 201 – 400 AMPS (CLASS 320 METERING)
700.06	18	THREE-PHASE SERVICES: 201-400 AMPS (CLASS 320 METERING)

SECTION	PG #	SECTION TITLE
700.07	18	COMMERCIAL: -200 AMPS
704.00	**20**	**SMALL CELL FACILITIES**
704.01	20	COMBINATION SMALL CELL AND LPC STREET LIGHT POLES

700.00 MINIMUM DESIGN CRITERIA

700.01 ABBREVIATIONS

Whenever the following terms or words are used in this chapter, they shall have the following meanings ascribed to them. For abbreviations not defined below, reference the Abbreviations Section 101 of these City Standards:

ANSI – American National Standards Institute.

ASCE – American Society of Civil Engineers

ACI – Association of Construction Inspectors

CT – Current Transformer

CIC – Cable in Conduit

ECIF – Electric Community Investment Fee

FNQ-R – type of Advanced Protection Class CC current-limiting, time-delay fuse

IBC – International Building Code

IEC – International Electrotechnical Commission

IEEE – Institute of Electrical and Electronics Engineers

KVA – kilo-volt-ampere

KW – kilowatt

KWh – kilowatt-hour

LPC – Longmont Power & Communications

NEMA – National Electrical Manufacturers Association

NEC – National Electrical Code

NESC – National Electrical Safety Code

PT – Potential Transformer

TIA – Telecommunications Industry Association

UL – Underwriters Laboratory

700.02 DEFINITIONS

Whenever the following terms or words are used in this chapter, they shall have the following meanings ascribed to them. For definitions not defined below, reference the Definitions Section 101 of these City Standards:

CUSTOMER - means the developer/owner or builder/contractor where appropriate.

ELECTRICAL CONNECTION FEE - means meter and connection fee/charge.

GOVERNING AGENCY - means that governmental agency, including the City of Longmont or Counties of Boulder or Weld, with authority to inspect and approve an electrical installation.

700.03 GENERAL

A. Longmont Power & Communications (LPC) is responsible for standards, electrical engineering and design associated with City owned and maintained LPC utility distribution systems. The following sections will outline requirements, charges, and fees to initiate a request for electric utility service through the final installation of electric distribution facilities into new developments.

B. City Standards provide direction for LPC distribution facilities installed in previously constructed developments.

C. All LPC distribution systems will comply with the requirements outlined in the City Standards for electric and communication distribution systems and service line construction, and as referenced in Chapter 14.32, City Code. Additional criteria may be outlined by LPC during the development plan review.

D. As outlined in Chapter 14.32, City Code, the City will own and maintain LPC utility distribution systems including: primary voltage systems switchgear, circuit vaults, transformers, rights-of-way lighting, etc.

E. Street lighting design and installation shall be the responsibility of LPC and follow standard design guidelines as outlined in Chapter 13.18, City Code. Detail 700-13 “Street Light Poles” and 700-14 “Street Light Base” are included in the Section 700 Details for reference.

F. Any deviations to the following guidelines must be approved by LPC and, if necessary, Public Works.

G. The following represents Longmont Power & Communications general design standards. If the applicant is pursuing an Urban Neighborhood design, refer to Urban Neighborhood Design Section 800 Text and Details.

700.04 EASEMENTS

A. The customer and/or developer shall provide easements for the purpose of surveying, locating, installing, constructing, using, operating, maintaining, inspecting, repairing, altering, removing, and replacing cable, conduit, and equipment in whole or in part, and all necessary subsurface and surface appurtenances, as well as the right of ingress and egress over and on the easement area that is necessary and appropriate.

B. Identify the width and label all electrical easements as LPC easements.

C. Identify the width and label all combined electrical and water easements as LPC/Water Easement.

D. Architectural features such as porches, overhangs, cantilevers, and window wells are not permitted in easements.

E. Fences, landscaping with plant shrubs, woody plants, nursery stock, or other crops may be located within these easements provided they do not interfere with the use of, obstruct the operation of, or prevent access to said easement. Any fence, landscaping, or other improvement that obstructs the operation of, or access to, easements may be removed by grantee without liability for damages arising therefrom.

F. LPC Easements are for the purpose of surveying, locating, installing, constructing, using, operating, maintaining, inspecting, repairing, altering, removing, and replacing cable, conduit, equipment, and all necessary subsurface and surface appurtenances or other uses approved by LPC. Together with a

perpetual right of ingress and egress for installation, operation, maintenance, repair, and/or replacement of such.

G. LPC/Water Easements are located on private property immediately adjacent to the rights-of-way. These easements are for the purpose of surveying, locating, installing, constructing, using, operating, maintaining, inspecting, repairing, altering, removing, and replacing cable, conduit, equipment, valves, water meters, fire hydrants, and all necessary subsurface and surface appurtenances or other uses approved by the City of Longmont. Together with a perpetual right of ingress and egress for installation, operation, maintenance, repair, and/or replacement of such.

H. Utility Easements (UE) are for the purpose of utilities and drainage facilities including but not limited to irrigation lines, electric lines, communication lines, gas lines, and cable T.V.; together with a perpetual right of ingress and egress for installation, operation maintenance, repair, and replacement of such lines. Said easements and rights are to be utilized in a responsible and prudent manner.

I. Single Family Residential shall include a corridor seven (7) feet in width adjacent to the right-of-way. The use of the specific easement will be shared with Water/Wastewater and labeled as "7' LPC/Water Easement".
    (1) A 12-foot-wide easement will be required along any main feeder network path. Any deviations to this must be approved by LPC.
    (2) Switchgear will require a 15' X 15' pocket easement.

J. Multi-family Residential:
    (1) Shall have a minimum five (5) foot wide easement throughout the site with:
        i. 10-foot pocket easements around each single-phase transformer
        ii. 12-1/2-foot pocket easements around each three-phase transformer.
    (2) A 12-foot-wide easement shall be required along any main feeder network path. Any deviations to this must be approved by LPC.
    (3) Once the electrical design has been completed, this easement may be provided by choosing one of the following options:
        a. Provide a specific easement on the Final Plat; or
        b. Provide an easement over the entire lot or out-lot, exclusive of buildings, for LPC on the Final Plat; or
        c. If a Re-plat or Final Plat is not available, then provide an easement by separate document. This option must be completed before Final Approval.

K. COMMERCIAL:
    (1) Shall have a minimum five (5) foot wide easement throughout the site with:
        a. 10-foot pocket easements around each single-phase transformer
        b. 12-1/2-foot pocket easements around each three-phase transformer or other LPC equipment as necessary
    (2) A 12-foot-wide easement will be required along any main feeder network path. Any deviations to this must be approved by LPC.
    (3) Once the electrical design has been completed, this easement may be provided by choosing one of the following options:
        a. Provide a specific easement on the Final Plat; or
        b. Provide an easement over the entire lot or out-lot, exclusive of buildings, for LPC on the Final Plat; or

c. If a Re-plat or Final Plat is not available, then provide an easement by separate document. This option must be completed before Final Approval.

L. STREET LIGHTING

(1) As a part of the developer's infrastructure costs, LPC will design, procure, and install all street lighting within and adjacent to the site along the right-of-way only. LPC will then own and maintain the street lighting once final acceptance has been granted. All private and supplemental lighting needs are the developer's responsibility.

(2) Additional easements may be required for lighting in areas where primary electric facilities are not installed adjacent to the rights-of-way.

M. Vacation of rights of way or easements: Draw and label existing LPC utility facilities that are located within the easement/s or rights-of-way that are being requested to be vacated or relocated. It is solely up to LPC's discretion to relocate existing equipment when vacation of rights of way or easements is requested. LPC will bill the customer for any and all relocation of existing equipment when warranted due to a vacation request.

700.5 CLEARANCES

A. Electrical equipment serving residential subdivisions will be installed adjacent to the rights-of-way and straddle the property line to provide service to two parcels. Refer to the specific section of City Standards on the spacing requirements for installation of water and sewer service lines and applicable rights-of-way infrastructure, i.e. fire hydrants. The locations and clearances from LPC facilities are established to provide adequate clearances and access for the two utilities sharing an easement.

B. Traffic signs shall not be installed above underground LPC distribution facilities. Maintain clearance requirements as outlined in Section 103 "Utility Separation & Crossings" of the City Standards and Detail 700.01 "Trench Clearances".

C. Electrical equipment requires proper clearances or setbacks on all sides for the safety of city staff, customers, and the public to ensure safe access and maintenance as well as protection from vehicular traffic. This includes driveways, alleys, parking lots, etc. Protection such as bollards will be installed at the Customer's expense when electrical equipment is located in areas where less than the recommended clearances exist or the equipment is at risk of vehicular damage. Reference Details 700-01 "Trench Clearances", 700-02 "Equipment Clearances", and 700-18 "Bollard Installation". Default clearances shall be as follows:

(1) Five (5) feet along the sides and back and (10) feet directly in front from landscape material

(2) Five (5) feet along the sides and back and (10) feet directly in front from structures

(3) Five (5) feet along the sides and back adjacent to residential driveways

(4) Five (5) feet minimum from vehicular traffic with use of bollards

(5) Five (5) feet or greater from a driving surface behind a curb or protective feature

(6) 10 feet from a driving surface where no curb or protective feature is proposed

(7) Specific clearances from overhead and underground electric utility facilities are outlined in Section 103 "Utility Separation & Crossings" of these City Standards and in Details 700-01 "Trench Clearances" and 700-02 "Equipment Clearances". Additional clearances may be required according to the current version of the NESC at the time of construction.

700.06 STANDARD NOTES FOR PLAN SUBMITTALS

Specific notes are to be included on Plats, Site Plans, and Public Improvement Plan submittals as applicable and are listed in the Appendix.

700.07 REQUEST FOR SERVICE

The following items are to be included with the initial submittal of the construction drawings to the Design Review Committee (DRC).

A. Electronic file submission as outlined in Section 103 Engineering Design Submittals of these City Standards.

B. Completed electric service request checklist including acknowledgement signature located in the appendix. Additional electrical information required for services is outlined below:
   (1) Residential service electrical information shall include:
      a. Product types and locations;
      b. Square footage of homes;
      c. Electric panel rating;
      d. Number and size of air conditioning units;
      e. Electric heat if applicable.
      f. Any other significant loads such as EV, PV, Heat Pump loads, batteries, etc.
   (2) Commercial and multifamily service electrical information shall include:
      a. One-line diagram;
      b. Load calculations;
   (3) Irrigation controller loads and private lighting requirements.
   (4) Billing information, including names and mailing addresses of the parties responsible for payment of construction costs and month-to-month billing when meter sets are complete.

700.08 DESIGN

A. LPC will complete a design with the first submittal of Public Improvement Plans or the first submittal of the Site Plan if no Public Improvement Plans are required. Multi-phase developments may require LPC to complete an overall capacity design with the first phase submittal. LPC may request additional information or files and coordinate the design with the Design Engineer. The trench line and equipment locations shall be shown on the second submittal of the master utility plan and landscape plans. As revisions are required, updates will be reflected with each submittal. The Design Engineer and LPC will coordinate this effort.

B. Customer and/or developer will provide an electric one-line diagram for all commercial and multi-family developments that shows the proposed service size/ampacity and voltage. All unit numbers, as well as house panels, must be labeled on the one-line document.

700.09 SLEEVE REQUIREMENTS

Crossings for roadways, ditches, or other surface features will be shown on the master utility plan as shown on LPC's provided CAD file. The Customer is responsible for coordination and installation of the appropriate quantity and size of sleeve as directed by LPC. Sleeve locations, sizes, and quantities shall be provided by LPC and shown on plan and profile drawings. The Design Engineer, LPC, and other City staff will coordinate conflicts as they arise in the planning stages to mitigate conflicts during the construction effort. See the installation requirements.

700.10 CHARGES

A. Charges for the development review and design effort are billable and collected with charges for the installation of LPC distribution facilities. If the project does not move forward to the construction phase, review and design charges will be invoiced to the Customer and are due upon receipt.

B. The Customer can either request the City complete the excavation and subsurface installation for local LPC distribution facilities or has the option to use a contractor. Such distribution facilities include:
   (1) PVC and/or cable in conduit (CIC);
   (2) Ground vaults; and
   (3) Street light poles.

C. In all cases, LPC is responsible for installing and connecting the electric equipment specific to electrical apparatus.

D. It is the responsibility of the Customer to advise LPC of subsurface installation choices prior to the preparation of the Public Improvement Agreement.

E. The Customer shall pay all costs associated with the installation of LPC distribution facilities to serve the site. LPC will complete an estimate and invoice of the project costs.

F. The Public Improvement Agreement will outline the subsurface infrastructure responsibilities. For Customer installations of the electric conduits, conductors, ground vaults / junction boxes, etc., the Public Improvement Agreement will outline the securities and warranties. The subsurface installation will be organized as all other public improvements including the acceptance process.

G. Payment in full is required when the Customer elects to have LPC complete the subsurface installation separate from the Public Improvement Agreement. This will place the project on a construction schedule pending notification from the Customer of site readiness.

H. Change orders will be issued to the Customer when the site conditions, scope changes, material requirements, or initial estimating changes occur.

I. Damages that occur to LPC facilities due to development construction activity are invoiced directly to the Customer for payment and are due within 30 days.

700.11 FEES

An Electric Community Investment Fee (ECIF) is charged to specific projects requiring a building permit. LPC must expand system facilities if it is to accommodate new development, which includes substations and main feeder networks. The funding for these capital expenditures is collected through the imposition of the ECIF. The fee schedule and policy is outlined in Chapter 14.32, City Code.

700.12 SITE DEVELOPMENT PLANS

The Customer will include LPC as a Contractor installing on behalf of the Customer in the permits required for on-site development. Such permits include, but are not limited to, the following:

Stormwater Permit for Construction activities	CDPHE
Stormwater Permit for Construction Activities	City of Longmont
Work in Ditch Right-of Way	Individual Ditch Companies
City Work in Right-of-Way Permit	City of Longmont
County Work in Right-of-Way Permit	Boulder County
State Work in Right-of-Way Permit	Colorado Department of Transportation

701.00 CUSTOMER INSTALLATIONS

701.01 SUBSURFACE INFRASTRUCTURE

A. SLEEVE INSTALLATION

(1) The Customer is responsible for providing crossings of surface features as outlined. Reference Detail 700-03 “Customer Installed Sleeve”.

(2) The Customer will install schedule 40 PVC. All sweeps shall have a 48-inch radius. PVC joints shall be made with long line bell ends and couplings using cold weather glue. The location, size, and quantity of sleeves will be outlined on the utility sheets and details of the construction plans or as specified by LPC.

(3) The conduit shall be installed so that it lines up with the trench path as identified on the Public Improvement Plans. A minimum of 36 inches of cover over the conduit shall be provided, as measured from final grade, and shall not be installed at a depth greater than 48 inches. Any deviation from these specifications must be approved in advance by LPC. Trench compaction shall be 95% and meet all applicable criteria specified in Section 109 “Utility Trenching of these City Standards” and Detail 700-04 “Trench Detail”. Trenches must remain open until they have been inspected and approved to be closed by LPC. The Customer must maintain access to the ends until the crossing is utilized for the LPC distribution system installation. Each crossing location shall be identified using a red tie marker, purchased at the LPC Warehouse. The marker shall have one end wrapped around the conduit(s) at each end of the crossing and extend above grade for a visual reference. Where multiple conduits are installed, use only one marker tie at each crossing end point as referenced in Detail 700-03 “Customer Installed Sleeve”.

(4) Conduit crossings for communication utilities may be placed in the same trench as LPC with approval. The conduit shall be extended beyond the LPC easement for future access by the communications utility Refer to Detail 700-03 “Customer Installed Sleeve”.

(5) In no case shall a crossing for use with a gas line be placed closer than five (5) feet from electric conduits. The conduits shall be extended beyond the LPC easement for future access by the gas utility.

(6) It is the responsibility of the Customer to ensure the integrity of the crossing until used by LPC. Prior to use, any damage to the crossing must be repaired by the Customer prior to LPCs mobilization.

(7) Should the Customer identify a conflict with the proposed depth, location, or other considerations for the conduit crossing, they must immediately contact LPC.

(8) When LPC is installing the subsurface infrastructure they will excavate along the tie marker to expose the conduit ends. If the tie marker has been damaged or removed during construction, LPC will excavate within three (3) feet either side of the crossing location, as shown on the plans, up to a depth of 52 inches to attempt to expose the conduit. If the conduit cannot be located or is inaccessible, LPC will inform the Customer’s Representative that the conduit cannot be accessed due to surface features, the installation does not meet the criteria in this specification, and/or the conduit appears to be missing. LPC will move to another portion of the job or leave the job site. The Customer is responsible for all work necessary to provide access to the conduit to the satisfaction of LPC, or to make other changes as necessary to correct the problem. The corrections may include but are not limited to installing new conduits using open trench or horizontal boring methods. In the event LPC is required to leave the project and re-mobilize, an additional mobilization charge may occur.

(9) Any existing rights-of-way landscaping disturbed during LPC distribution infrastructure installation shall be repaired by the Customer to meet Section 600 of the City Standards. It will be the Customer’s responsibility to schedule all necessary inspections for this work with the City of

Longmont. Any work that does not adhere to current City Standards and/or is without the approved inspection by the City shall be corrected at no cost to the City.

B. TRENCH

The trench alignment is determined by the development's final electric design and/or the easement location chosen by LPC. As required, the Customer is responsible for surveying property lines, trench alignment, elevations, and equipment locations as needed. The minimum trench width is eight (8) inches and must be at a depth that will provide a minimum of 36 inches to a maximum 48 inches of cover over the top of the conduit. The bottom of the trench must be smooth and continuous. Where soil conditions require, the Customer may be required to provide bedding material. The trench must remain open and accessible until inspected. Reference Trench Detail 700-04.

C. PVC INSTALLATION

(1) As required, the Customer will install schedule 40 PVC. All sweeps shall have a 48-inch radius. PVC joints shall be made with long line bell ends and couplings using cold weather glue. The location, size and quantity of conduits will be outlined in the utility sheets and details of the construction plans. Conduits shall enter ground vaults / junction boxes as shown in Details: 700-09 "Single-Phase Transformer Vault", 700-11 "Primary Junction Vault" and 700-12 "Secondary Junction Box (J-Box)".

(2) All pipes shall be carefully placed in the trench as level and straight in the bottom as possible. Pipe and accessories shall be inspected for defects prior to being lowered into the trench. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed into the trench. The ends of the pipe shall be plugged or capped when work stops or is directed into equipment locations. Trenches must remain open until they have been inspected and approved to be closed by LPC.

(3) At any time, the electrical design may call for multiple conduits in specific trench segments. The Customer is responsible for assuring proper pipes are directed to equipment locations as shown on the plans provided by the City.

D. TRACER WIRE INSTALLATION

Where a PVC conduit is installed for future use and no electrical conductor exists, a tracer wire will be installed along the entire length of the pipe as directed by LPC. A #14 AWG copper wire with insulation will be taped securely to the top of the pipe and three (3) feet of excess wire coiled in the ground vault / junction box as shown in the Detail 700-06 "Tracer Wire Installation".

E. CONNECTION TO EXISTING SYSTEM

The Customer shall coordinate all access into existing electrical equipment with LPC. At no time is a Customer to access LPC equipment without approval by LPC and an LPC representative on site. Charges for the standby personnel will be invoiced to the Customer.

F. GROUND VAULTS

(1) Ground vaults / junction boxes are subsurface features that support electrical equipment. They are specific to equipment types and shall be installed as shown on the plans. They shall be installed two (2) inches higher than the proposed sidewalk or finished surface area, and level with the sidewalk. Following excavation for ground vaults / junction boxes, the subgrade shall be compacted and three quarter (3/4) inch washed rock shall be installed below the ground vault / junction box as specified in Details 700-09 "Single-Phase Transformer Vault", 700-11 "Primary Junction Vault" and 700-12 "Secondary Junction Box (J-Box)".

(2) Where electrical equipment is installed on a hill or slope, the Customer shall design a retaining wall that meets the requirements outlined in the City Standards and may be subject to the approval of the Utilities & Public Works Division and/or LPC.

(3) Transformer

a. Residential single-phase: Install an eight-foot ground rod. Refer to Detail 700-09
b. Commercial three-phase: Install an eight-foot ground rod and a Concrete pad. Refer to Detail 700-10 "Three-Phase Transformer Pad"
c. Primary junction vault: Install an eight-foot ground rod. Refer to Detail 700-11
d. Secondary junction box. Refer to Detail 700-12
e. Street light poles. Refer to Detail 700-13

G. BACKFILLING

(1) Backfilling of LPC trenches and equipment locations in the rights-of-way or adjacent to concrete surface features will be to 95% compaction. This shall be achieved by using Flow-Fill to backfill the trench to a point 12 inches below finished grade. Flow-Fill is required for trenches less than 12 inches wide unless directed otherwise by LPC or when requested by the customer and approved by LPC. For trenches greater than 12 inches wide, where Flow-Fill is not utilized as backfill, the Customer shall use native backfill material that is free from angular rock as outlined in Section 109 "Utility Trenching" of these City Standards. Inspection of the trench and native backfill material may dictate the use of six (6) inches of sand as bedding and/or backfill material to protect the conduit as approved by LPC. When Flow-Fill is not used, compaction tests shall meet the requirements in Section 109 "Utility Trenching" of these City Standards and shall be completed every one (1) foot of trench depth for every 150 lineal feet of pipe installation, and at all road crossings unless otherwise specified by LPC. Compaction around transformer and primary junction ground vaults / junction boxes must use Flow-Fill.

(2) The Customer shall install warning ribbon to signal buried LPC facilities. The ribbon is to be placed at a depth of 12 inches below finished grade. The final 12 inches may be backfilled with native material. Compaction under hard surfaces must be compacted to 95% and when adjacent to the surface 90% is acceptable.

(3) Any existing rights-of-way landscaping disturbed by the Customer during backfilling or electrical installation shall be prepared to meet Section 600 of the City Standards. It will be the Customer's responsibility to schedule all necessary inspections for this work with the Utilities & Public Works Division. Any work that does not adhere to current City Standards and/or without the approved inspection of the Utilities & Public Works Division shall be corrected at no cost to the City.

H. MATERIALS

(1) LPC will provide materials specific to the electrical installation. Payment in full by the Customer is required before these materials can be picked up at the City Warehouse by the Customer.

(2) Once material payment has been received, a two-week notice is required from the Customer to initiate the staging of materials at the City Warehouse located at 1100 South Sherman Street. The Warehouse will place materials in a staging area where the Customer is responsible for confirming the material type, integrity, and quantities by signing a receiving document. The materials are to be transported from the Warehouse to the site by the Customer within 48 hours. The City will not be responsible for materials which are damaged or stolen after the receiving document is signed. If additional materials are needed, the Customer is to request a change order from LPC prior to going to the Warehouse.

(3) When the subsurface installation is complete, the City and Customer will review all materials used for the project. Material changes will be charged or credited to the project appropriately. Upon

completion of the itemized review, the City will review all material and determine if additional charges or credits to the Customer are required.

I. MATERIALS HANDLING

Reference details 700-07A and 700-07B for material handling.

J. INSPECTION

(1) Inspections for trench, conduit, and ground vault / junction box installations will occur as outlined in Trench Detail 700-04. At no time shall a trench be closed without the approval of LPC. PVC conduit installed by the Customer is required to be tested by the customer after the trench has been closed and before LPC line crews pull cable. Customer must proof conduit with installation of pull tape. If LPC is unable to install conductor in a section of pipe or if ground vaults / junction boxes are not level, or to proper elevations, the Customer's representative shall be advised of the situation. It is the responsibility of the Customer to make the repairs. The Customer shall discuss the schedule for repairs with LPC. Job delays may result in additional costs.

(2) The facilities installed by the Customer are subject to the acceptance and warranty process as outlined in the Public Improvement Agreement.

(3) Charges for inspection will be based on the actual time and equipment required by the project and billed upon completion.

701.02 SERVICE LINE SIZES AND INSTALLATION

A. RESIDENTIAL SERVICES

(1) All residential electric service conductors will be installed, owned, and maintained by the customer according to the current NEC standards. The installation, ownership, and maintenance of conductors and metering equipment beyond LPC's point of delivery are the property owner's responsibility. The point of delivery is dependent upon site conditions and may be defined as:

a. Electric transformer

b. Ground vault / junction box

Residential services larger than 200 amps may adhere to additional termination standards in secondary ground vaults or junction boxes when directed by LPC.

c. Overhead attachment point on Customer owned structure

(2) It is the Customer's responsibility to restore compaction when entering into LPC equipment locations. Prior to the installation of the final meter, LPC will advise the Customer listed on the permit of any required corrections needed. Items deemed a safety issue must be corrected within 10 working days or will be subject to disconnect at LPC's discretion. All other repairs must be corrected prior to the Certificate of Occupancy. Any work completed by LPC to correct any damages, grade issues, or compaction deficiencies will be charged to the Customer and are due within 30 days.

B. MULTI-FAMILY AND COMMERCIAL DEVELOPMENT SERVICES

(1) Multi-family and commercial development service conductors and conduits are installed, owned, and maintained by the customer. They must meet the National Electric Code and be approved by the Building Inspection & Permits division. The Customer will install cable of sufficient length for termination.

(2) In multi-family or commercial developments where more than two (2) service lines are installed out of a transformer or junction facility, the use of heat shrink tubing is required to identify the secondary conductors. Each service line requires heat shrink tubing with a color that is unique to

the unit it serves at both the meter housing and the electric source. The heat shrink tubing is not provided by the City. Reference Detail 700-15 “Service Line Identification”.

a. All 3 phase service conductors shall have unique jacket colors and be color coordinated according to current industry standards.

(3) All connections to underground City-owned facilities will be made by City personnel after approval by the Building Inspection & Permits division.

701.03 SECONDARY CABINET INSTALLATION

A. In the event that more than the allowed number of conductors are required, a secondary cabinet shall be required. The secondary cabinet shall be supplied, installed, owned, and maintained by the Customer and shall be the point of attachment for the service. The Customer shall install 4-inch PVC conduits from the transformer to the secondary cabinet. The total quantity of 4-inch PVC conduits will be determined by the size of the utility transformer. LPC will install, own, and maintain the cable(s) from the transformer to the secondary cabinet. LPC will terminate all cables within the utility transformer. The Customer will terminate all cables within the secondary cabinet. The secondary cabinet shall have a minimum clearance of 5 feet from the utility transformer but not exceeding 10 feet. For additional information refer to Detail 700-19 “Secondary Cabinets”.

B. All connections to City owned facilities will be made by LPC or its authorized contractor or representative.

C. The total number of connections within a single-phase transformer is limited to four (4) with a max cable size of 500 kcmil.

D. The total number of connections within a 25 kva to a 225 kva, three-phase transformer will be limited to six (6), with a max cable size of 500 kcmil.

E. The total number of connections within a 300 kva to a 2500 kva, three-phase transformer will be limited to 10 and the maximum cable size which will be terminated is 750 kcmil. No more than 8 runs of 750 kcmil secondary may be installed in three-phase transformers sized from 300-2500 Kva.

F. When 9 or 10 runs of 750 kcmil secondary conductors are necessitated, customer will be required to install a concrete cable tray as shown on drawing (700-10).

G. The customer will install sufficient length for termination. Refer to detail 700-15 “Service Line Identification”.

702.00 INSTALLATIONS

702.01 SUBSURFACE INFRASTRUCTURE

LPC will install the site-specific subsurface infrastructure as requested by the Customer. The Customer is responsible for preparation of the site. Additional charges may be incurred when the site is not properly prepared prior to the start of work by LPC. These charges may result from soil conditions, inadequate grading, surveying, road crossings, or construction phasing of other utilities.

A. Project designs and invoicing for the installation of LPC facilities are based on the Customer having met all of the following site readiness requirements:
   (1) For All Development Types
      a. Customer installed street and sidewalk crossings shall be located and installed in accordance with City Standards. Reference Detail 700-03 Customer Installed Sleeve
      b. A 10-foot corridor along LPCs trench path must be graded to within two (2) tenths of final grade at the time of LPCs installation. This path must be sloped relatively flat and smooth to facilitate trencher access and cable installation.
      c. LPCs trench path shall be free of construction equipment, materials, scrap, concrete, or any object(s) that may inhibit trenching operations.
      d. The Customer is to coordinate the installation of facilities according to specifications, from deepest to shallowest, (i.e., sewer, water, electric, gas, communications, irrigation, landscaping). Facilities requiring an installation depth less than LPC utilities, which are installed prior to LPC facilities, will require a change order and may result in additional installation charges.
      e. Customer installed facilities shall be placed as shown on the master utility plan, back-filled, and compacted. (i.e., sewer, water, storm drainage, etc.)
      f. The Customer shall provide utility locates for underground infrastructure installed but not currently owned and maintained by the City, i.e., sewer, water and storm drainage. Additionally, all empty conduits used as sleeves for irrigation and dry utilities must be located and clearly identified. LPC shall not be responsible for repairs to underground utility infrastructure that is not properly located and marked by using standard utility locating materials, paint, stakes, locating flags, per the typical locating procedure. Minimum accuracy of all locate marks must be within 18 inches either side of the underground infrastructure to be considered properly located.
   (2) For All Development Types except Single Family Residential
      The Customer is responsible for accurate survey information, including elevations, for the center of LPCs trench path and five (5) feet offsets for two corners of each of LPCs equipment locations.
   (3) For Single Family Residential only
      a. Concrete sidewalks, curbs, gutters and pavement shall be installed.
      b. Concrete Driveways and landscaping and irrigation shall not be installed prior to LPCs facilities.
      c. Sidewalks shall be free of all debris with front property lines painted on the sidewalk and the rear property lines clearly staked. The Customer shall not place property pins within LPCs prepared path until the installation of LPCs infrastructure has been completed.

702.02 ELECTRICAL APPARATUS

Upon completion of the subsurface infrastructure either by the Customer or LPC, LPC will schedule the installation of specific electrical equipment. Construction power will be available when all on-site and off-site electric distribution is installed and energized.

703.00 METERING REQUIREMENTS

703.01 GENERAL

A. Meter housings, service disconnects, and associated metering equipment for all types of services shall be located on the outside of the building or structure and accessible to LPC as referenced in Chapter 14.32, City Code. Single meters shall be installed at a height of five feet, six inches above ground or platform to the center of the meter and shall not be fenced in. Meter banks shall be cold-sequenced and installed with the lowest meter at least 24 inches above the ground or platform and the highest meter is not to be over 75 inches above the ground or platform.

B. Meter housings for irrigation controllers, site entryways, or any other private use may be installed on Customer owned and maintained unistrut or cedar post. The installation shall be hot-sequenced and the meter housing shall have a phenolic badge as outlined below. All installations must be maintained and in good working order. Installations deemed unsafe will be de-energized until all electrical equipment is brought up to current code.

C. All metering installations with aluminum conductors must have oxide inhibitor to provide an airtight seal around conductors and to prevent oxides from forming.

D. All installations other than fire pump services must have a hot-sequence disconnect.

E. Current Transformer (CT) and Potential Transformer (PT) requirements: All electrical services over 400 amps, single-phase, three-phase, 120/240 volt, 277/480 volt & 120/208 volt require CTs. All other services over 400 amps, will require CTs and PTs. Meter housings, CTs, and PTs are required to be obtained from LPC at 1100 South Sherman Street. The Customer will be charged for this material.

F. Labeling of single, commercial, and multiple meter sockets are the Customer's responsibility. Each meter of a multiple meter socket and all individual meter sockets will have a permanent phenolic badge which corresponds exactly to the labeling of the apartment, office, or room is metered by each meter. Badge requirements are as follows:

G. The badge will be a minimum size of one (1) inch by two (2) inch. Letters and numbers must be with text a minimum of three eighths (3/8) inch height.

H. Meters will not be installed until all sockets are labeled correctly with phenolic badges and riveted permanently to the electric equipment. When internal number and/or lettering schemes are changed or incorrect labeling creates inaccurate information in the City records, the Customer will be responsible for all electricity delivered through unmarked, illegible, or incorrectly labeled meter sockets and is responsible for ensuring that mis-wiring does not occur between tenant spaces. The City will bill all expenses incurred to the owner, who shall pay such expenses within 30 days of receipt of billing. This will include actual labor, equipment, and material charges incurred by LPC to correct the situation.

I. Meters will not be installed until a ring-out inspection has been approved via the metering department. See detail drawings MTR-9 & MTR-13 for additional details.

J. Bolt in (K-Base) metering equipment is not allowed.

K. Exceptions to the metering specifications must be approved by LPC staff at 303-651-8386.

L. Reference Standards for Metering for additional details.

703.02 METER LOCATION

A. Meter housings, service disconnects, and associated metering equipment for all types of services shall be located on the outside of the building or structure and accessible to LPC staff.

B. Residential meter housings, service disconnects, and associated metering equipment must be located on the quarter of the building in closest proximity to the service connection point.

C. Meters shall not be installed in places difficult to access, such as over open pits, moving machinery, hatchways, in the path of water from at least 36 inches in front of and around the meter. Refer to detail drawing MTR-8. No plants, shrubs, or other obstructions including HVAC line sets and condensing units shall be placed within 36 inch clearance area. Customers shall be given seven (7) days to comply after written notice. After the expiration of the seven (7) days, the City, in its discretion, may modify the meter access to this regulation at the Customer's expense or discontinue service.

D. Where the meter is recessed in the wall of the building, a space of not less than twelve inches on each side of the center line of the meter base shall be provided to permit access for City test equipment or meter changes.

E. Meters currently located on the inside of Customer premises shall be moved to the outside whenever the existing service is modified or there is any change of service.

F. All meter equipment must be installed in readily accessible locations for LPC personnel.

703.03 CONSTRUCTION POWER

A. Construction power will be available for site trailers and model homes after LPC has completed their construction efforts and the approval for temporary use applications has been completed by the City. All electric services require a building permit and inspection by the Building Inspection & Permits division. The City provides temporary construction power for a period of 12 months or less where electrical service is required.

B. On single family residential the Customer shall post the address on the meter housing that is large enough to be seen from the street.

C. The Customer shall install the construction power within two (2) to three (3) feet of the secondary junction box or transformer. Refer to drawing MTR-1. In locations where the transformer will be the source, the temporary construction power shall not be located in front of the transformer and shall maintain minimum clearance requirements as referenced in Detail 700-02 "Equipment Clearances".

D. All requirements for permanent wiring found in the latest version of National Electric Code (NEC) apply to temporary installations.

E. All service installations must have an approved meter socket with sealing mechanism. All electric meters shall have a lever-operated bypass, excluding CT rated services.

703.04 RESIDENTIAL – SINGLE SERVICE

A. Meters shall be in direct line of sight with the secondary ground vault /junction box. Reference Detail 700-16 “Metering Single Family” for additional information.

B. All residential services must have a load side service disconnect sized accordingly and located next to the meter. Gutters, raceways, and conduit after metering point is allowed. OH duplexes or paired homes will each have their own OH stack and weather head.

703.05 SINGLE-PHASE SERVICES: 201-400 AMPS (CLASS 320 METERING)

Single-phase three (3)-wire, 120/240 volt, or 120/208 volt, 400 amp services utilize a class 320 (CL320) meter and require the installation of an approved CL320 meter socket purchased by the Customer. The CL320 meter socket must include a lever operated bypass that can operate as a 320-amp continuous duty bypass device. (Meter socket combined with the service disconnect). Any single-phase three (3)-wire, 120/240 volt and 120/208 volt service shall have a five-jaw meter socket installed. The fifth jaw shall be installed in the nine (9) o’clock position and connected to the neutral.

703.06 THREE-PHASE SERVICES: 201-400 AMPS (CLASS 320 METERING)

Three-phase 4-wire, 120/208-volt, 277/480 volt or 120/240 volt, 400 amp services utilize a class 320 meter and require the installation of an approved CL320 meter socket purchased by the Customer. The CL320 meter socket must include a lever operated bypass that can operate as a 320-amp continuous duty bypass device. (Meter socket combined with the service disconnect). Any three-phase, four (4)-wire, service shall have a seven-jaw meter socket installed. The seventh jaw shall be installed to the neutral.

703.07 COMMERCIAL: - 200 AMPS

A. All commercial services must be hot-sequenced. All service installations must have an approved meter socket with sealing mechanism and shall be equipped with a lever-operated bypass. All 200 amp, three-phase, four (4)-wire, 120/208 volt or 277/480-volt self-contained services shall have a seven-jaw meter socket installed. See Detail MTR-16.

B. Services rated at 277/480 volt up to 400 Amp will be non-CT Rated. When the load is greater than 400 amps, PTs with CTs are required. A CT cabinet with integral PT mounting provisions is required. PT mounting height must not exceed eight (8) feet. Electrical conductors shall not be placed in front of the PTs.

C. CTs and PTs shall only be installed in approved NEMA Type 3R CT cabinets equipped with a hinged door, lockable hasp, and fasteners that cannot be removed from the exterior of the cabinet, which will be supplied and installed by the Customer. Keyed door locks are not allowed. The CT cabinet and meter socket shall be installed such that the meter socket is not obstructed with the cabinet door in the full open position. For Switchgear CT compartments, barriers shall be installed on all 4 sides of compartment. The compartment shall not have any Customer installed equipment behind hinged sealable doors. All panels providing access to unmetered conductors shall have fasteners that cannot be removed from either the exterior or the Customer compartment. No conductors, other than those serving the CT compartment and the ground bus shall be installed in or routed through the compartment. 277/480 volt switchgear shall be manufactured with provisions for unobstructed mounting of PTs inside the same compartment as CTs. If switchgear is to have door fronts, there shall be no other Customer equipment inside the metering section. CT cabinets and meter sockets may not be used as a pull-box or junction box. No connections shall be made in the CT compartment or meter socket to supply another meter, more than one load circuit, or Customer equipment. For multiple loads a switchboard or combination CT/multi-main equipment must be used. Gutters, raceways, and conduit after metering point is allowed. Minimum distance from the floor or

the ground shall be 24 inches to the bottom of the cabinet. Refer to Detail MTR-13 “Commercial Switchgear Specifications”.

D. Cabinet dimensions are identified in Detail MTR-10.

704.00 SMALL CELL FACILITIES

704.01 COMBINATION SMALL CELL AND LPC STREET LIGHT POLES

A. Pole shall be round, straight, galvanized steel with a preferred 12.75-inch outer diameter. Pole shall be galvanized in accordance with AASHTO M 111. Pole shall be dark brown in color and paint shall be powder coated over zinc paint. Other colors may be approved by LPC. Pole shall be designed to withstand a minimum wind velocity of 110 mph per TIA-222 revision G and IBC 2012 with ASCE / SEI 7-10. A minimum 15% of the pole structural capacity shall be reserved for future Longmont Internet- Of-Things installations. Weatherproof grommets shall be integrated into the pole design to allow for cable to exit. A hand hole shall be provided to maintain current and future LPC facilities. An optional hand hole may be provided above the base. Pole shall be architecturally compatible with the equipment cabinet.

B. The luminaire mast arm length shall match that of the existing pole unless otherwise directed by LPC. All luminaires shall be mounted at the same height as surrounding streetlights unless otherwise directed by LPC. All luminaires shall be provided by LPC. Luminaire mast arms shall be galvanized steel and painted to match the pole.

C. Cantenna shall be 16-inch maximum outer diameter with shroud. The height of the cantenna – including all associated equipment and hardware required for installation – from the top of the mast arm connection to the top of the cantenna shall not exceed eight (8) feet. A tapered transition between the upper pole and cantenna shall be included.

D. Antennas located on the side of a pole, along with all other hardware required for complete installation, shall fit within a 38-inch height by 16-inch width by 12-inch depth maximum shroud and securely strapped to the pole. The shroud shall be colored to match the pole.

E. Radio frequency warning labels shall be mounted exterior to the pole. 4-inch by 6-inch maximum plate with carrier's name, location identifying information, and emergency telephone number shall be permanently fixed to the pole.

F. Equipment cabinet shall be round, galvanized steel with a preferred 16-inch diameter (20-inch diameter maximum) and five (5) feet eight (8) inch maximum height. Equipment cabinet shall be galvanized according to AASHTO M 111. Equipment cabinet and pole shall match color. All equipment shall be located internal to the equipment cabinet or recessed as much as possible. 100 A meter housing (with lever bypass) for carrier electric service shall be recessed into the equipment cabinet. Meter disconnect shall be recessed into the cabinet. Meter shall be properly grounded per current NEC. A hand hole for streetlight electrical service shall be provided. At each equipment cabinet hand hole, provide a submersible, waterproof, in-line fuse holder with a FNQ-R 15A fuse for each hot and a submersible, waterproof connector on neutral (if required). A passive ventilation system shall be provided for temperature control. Pole and equipment shall be grounded to meet applicable NEC sections including (but not limited to) 410.30(B) (5), 250.118, AND 250.122. All hardware attachments shall be hidden.

G. Precast concrete foundations designed to meet ACI 318-14 are preferred and should be installed whenever possible. A minimum of four 2-inch PVC Schedule 40 conduit sweeps shall be installed. Conduit shall accommodate LPC electrical, carrier electrical, and fiber. Any additional conduit sweeps are for future LPC use. Anchor bolts shall be hidden from view. Top of foundation shall be four (4) inches above final grade. Foundation depth, embedment depth, dimensions and reinforcement shall be designed by a Professional Engineer.

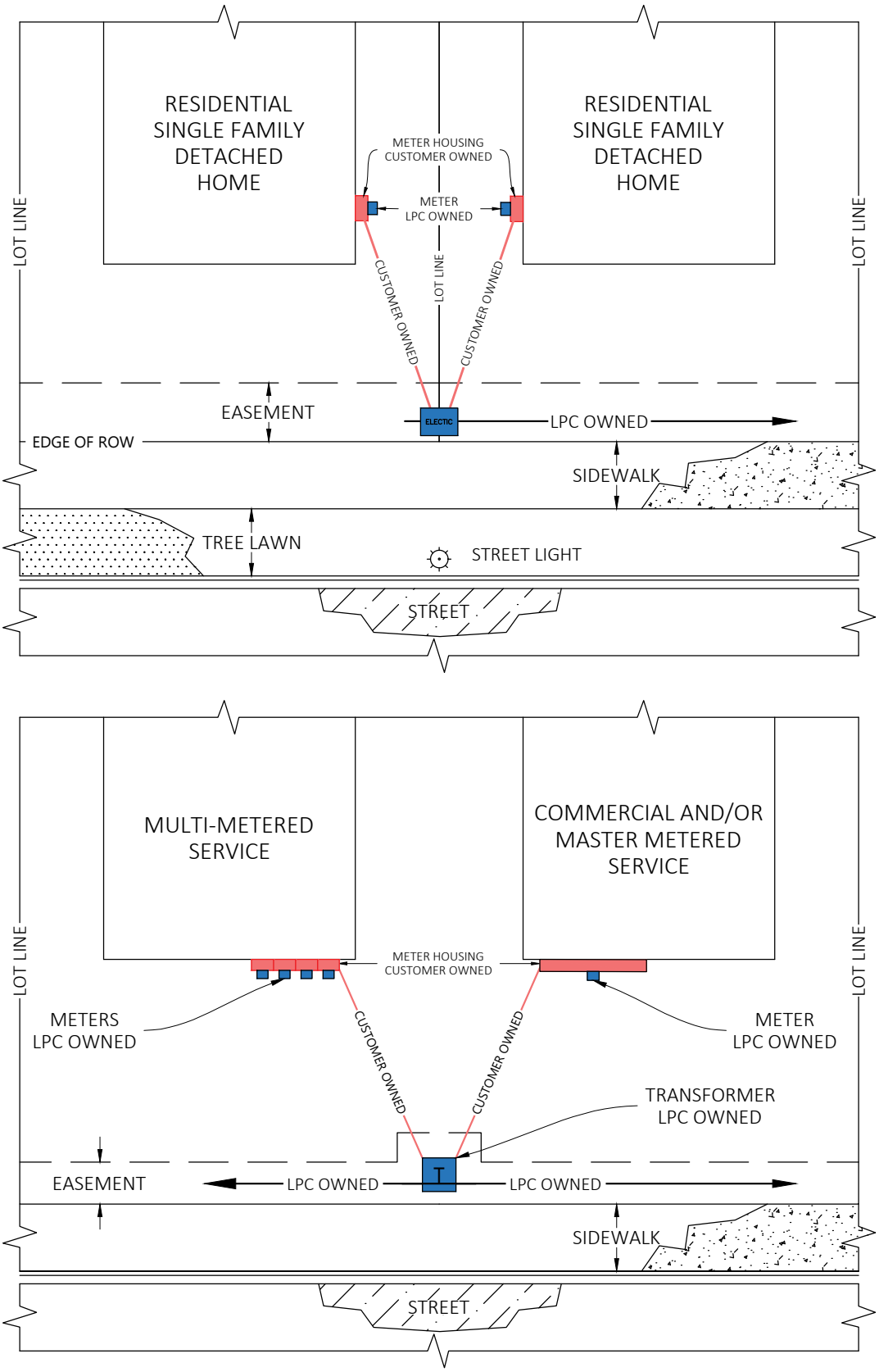
H. Fiberglass Pull/splice boxes are required for separate electrical and fiber services. Refer to NEC article 314 “Pull and Junction Boxes and Conduit Bodies Minimum Size" for box size requirements based on conduit and wire sizes. Fiberglass pull/splice boxes shall be set one (1) to three (3) feet from the concrete foundation. The wire terminations in this box shall be made using submersible insulated pedestal lug connections. Provide one multi-lug connector for each phase, neutral, and ground connector to be spliced in this in-grade splice box.

SECTION 700 – LONGMONT POWER & COMMUNICATIONS
INDEX OF DETAILS

700-00	SERVICE LATERAL
700-01	TRENCH CLEARANCE
700-02	EQUIPMENT CLEARANCES
700-03	CUSTOMER INSTALLED SLEEVE
700-04	TRENCH DETAIL
700-05	EQUIPMENT ALIGNMENT ON TRENCH
700-06	TRACER WIRE INSTALLATION
700-07A	CABLE HANDLING AND STORAGE PROCEDURES
700-07B	CABLE HANDLING AND STORAGE PROCEDURES (CONTINUED)
700-08	COLD SHRINK INSTALLATION
700-09	SINGLE PHASE TRANSFORMER VAULT
700-10	THREE PHASE TRANSFORMER PAD
700-11	PRIMARY JUNCTION VAULT
700-12	SECONDARY JUNCTION BOX (J-BOX)
700-13	NOT USED (STREET LIGHT POLE; shown for reference only)
700-14	NOT USED (STREET LIGHT BASE; shown for reference only)
700-15	3 PHASE SERVICE LINE INDENTIFICATION
700-16	METERING SINGLE FAMILY
700-17	NOT USED (METERING COMMUNICATION LINE; shown for reference only)
700-18	BOLLARD INSTALLATION
700-19A	SECONDARY CONNECTION CABINET (SCC) PART 1
700-19B	SECONDARY CONNECTION CABINET (SCC) PART 2
700-20A	SMALL CELL FACILITIES LPC STREET LIGHT POLES
700-20B	SMALL CELL FACILITIES LPC STREET LIGHT POLES (CONTINUED)
700-21	BROADBAND J-BOX WITH LOCATE WIRE
700-22A	PRIMARY METERING CABINET CLEARANCES
700-22B	PRIMARY METERING CABINET CONSTRUCTION DETAILS
700-22C	PRIMARY METERING RESPONSIBILITY TABLE

SECTION 700 – LONGMONT POWER & COMMUNICATIONS
INDEX OF METERING DETAILS

MTR-1	TEMPORARY POWER 1-6 MONTHS USE
MTR-2	TEMPORARY POWER 1-12 MONTHS USE
MTR-3	TEMPORARY POWER OVERHEAD
MTR-4	OVERHEAD BUILDING ATTACHMENT
MTR-5	POINT OF DELIVERY FOR RESIDENTIAL SERVICES 201 – 400 AMPS
MTR-6	NOT USED
MTR-7	NOT USED
MTR-8	METER HOUSING CLEARANCES
MTR-9	MULTIPLE METER SOCKET INSTALLATIONS FOR INDIVIDUAL SERVICE SIZES 400 AMPS (CLASS 320) OR LESS
MTR-10	CT CABINET SPECIFICATIONS
MTR-11	CT & PT METERING SPECIFICATIONS
MTR-12	NOT USED
MTR-13	COMMERCIAL / MIXED USE SWITCHGEAR SPECIFICATIONS
MTR-14	SINGLE PHASE METER HOUSING 400 AMPS (CL320) OR LESS
MTR-15	NOT USED
MTR-16	WIRING CONFIGURATION FOR 3 PHASE NON-CT RATED
MTR-17	WIRING CONFIGURATION FOR 1 PHASE 120/240 OR 280 VOLT SERVICES 400 AMP (32- CLASS METER)
MTR-18	FORM 1S DIAGRAM, 2-WIRE, 120 VOLTS
MTR-19	UNISTRUT METER STAND



ELECTRIC SERVICES

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

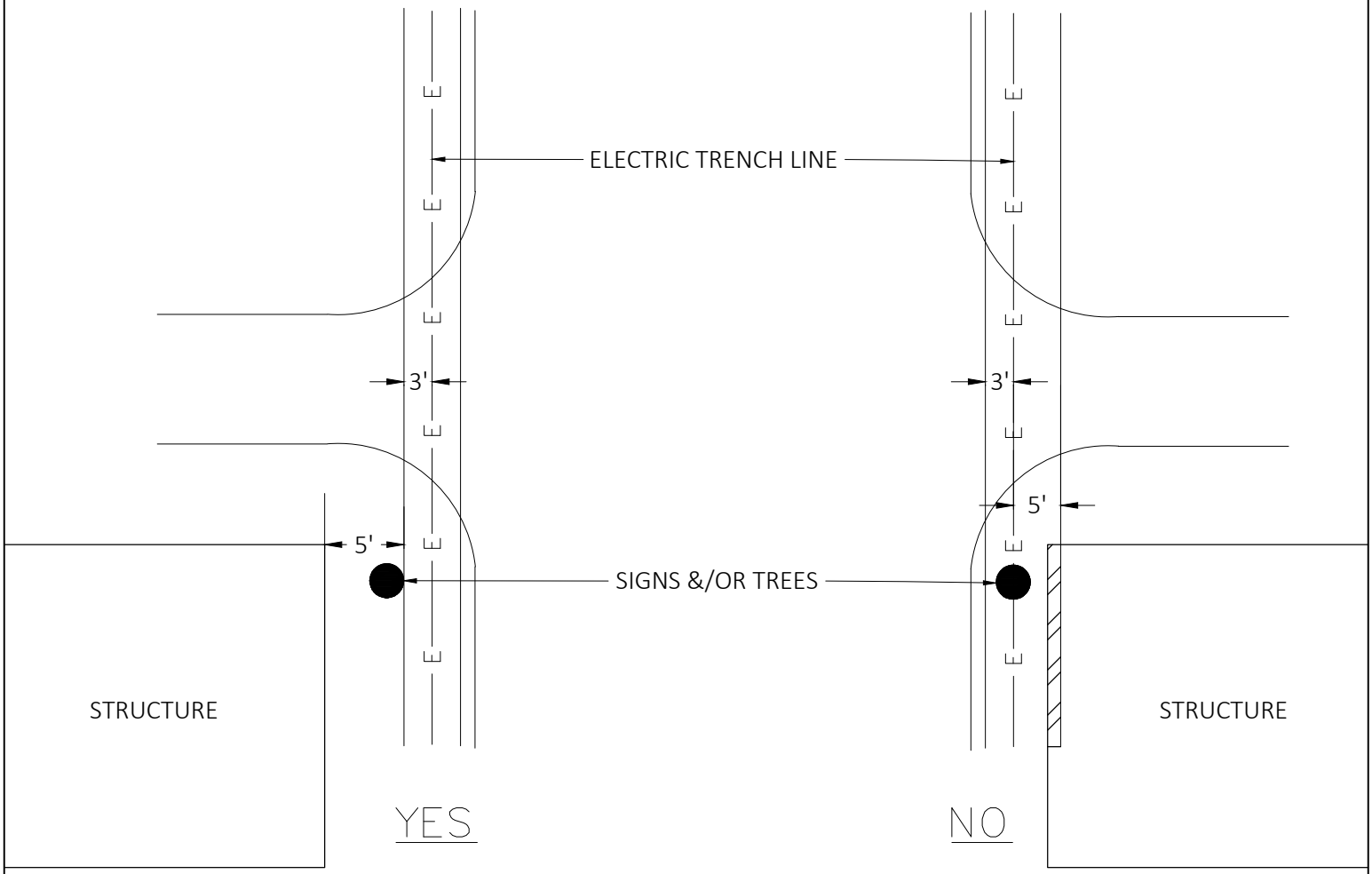
CITY OF
LONGMONT
COLORADO

SERVICE LATERAL

Revision #:	
Approved by:	
Date Approved:	
File: UG DRAWINGS_2025	
DETAIL	
700-00	

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796



MINIMUM CLEARANCES;
- 3' FROM TREES
- 3' HORIZONTAL & 18" VERTICAL FROM COMMUNICATION CABLES/CONDUITS/EQUIPMENT
- 3' FROM POLES; STREET LIGHT/UTILITY/SIGNAL/ETC.
- 5' HORIZONTAL & 18" VERTICAL FROM WATER LINES
- 5' FROM HYDRANTS
- 5' FROM STRUCTURES (EXCLUDING TRASH ENCLOSURES)
- 10' HORIZONTAL & 18" VERTICAL FROM STORM/SEWER

NOTE:
1. MINIMUM CLEARANCES, AS NOTED ABOVE, MUST BE MAINTAINED WHEN THE INFRASTRUCTURE'S EXACT LOCATION HAS BEEN DETERMINED VIA POT-HOLING

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

CITY OF
LONGMONT
COLORADO

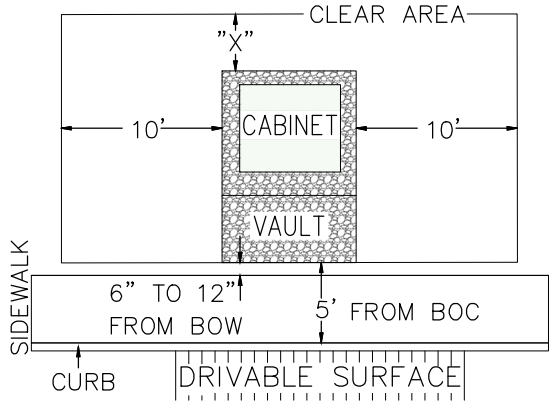
1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

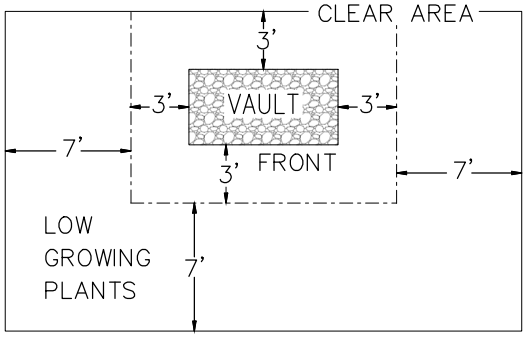
TRENCH CLEARANCE

Revision #:	
Approved by:	
Date Approved:	
File: UG Drawings 2025	
DETAIL	
700-01	

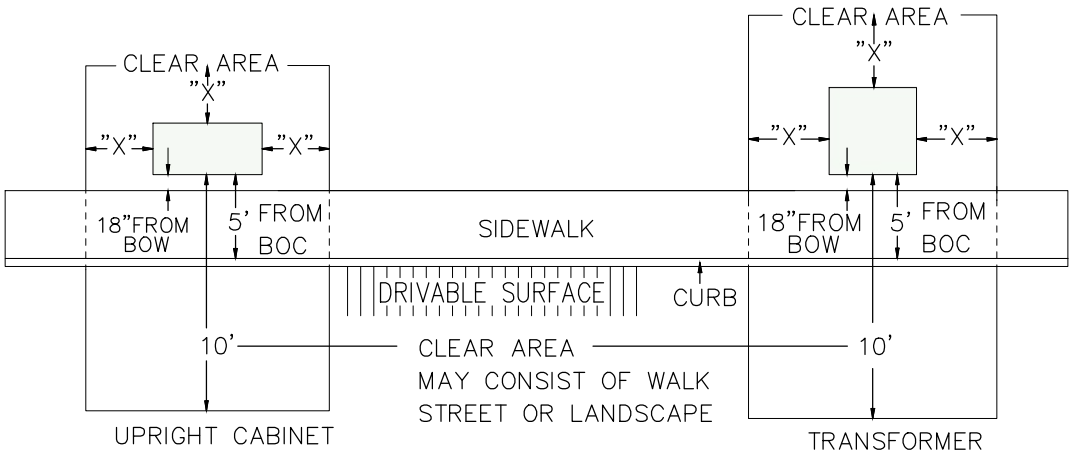
SWITCH VAULT 10' x 7'



CIRCUIT VAULT OR FLUSH VAULT



APPROVED LANDSCAPING AROUND VAULT
1ST 3' : SOD OR ROCK/COBBLE
NEXT 7' : LOW GROWING PLANTS



CLEARANCES "X"
- 3' FROM LANDSCAPE MATERIAL
- 5' MINIMUM FROM STRUCTURES
- 3' ADJACENT TO RESIDENTIAL DRIVEWAYS
- 3' MINIMUM FROM A DRIVING SURFACE WITH THE USE OF BOLLARDS
- 5' FROM A DRIVING SURFACE BEHIND A CURB OR PROTECTIVE FEATURE
- 10' FROM A DRIVING SURFACE WHERE NO PROTECTIVE FEATURE IS PROPOSED

NOTES:

1. MAINTAIN MINIMUM CLEARANCES AS NOTED ABOVE
2. BOLLARDS WILL BE INSTALLED AT THE DEVELOPER/OWNER'S EXPENSE WHEN EQUIPMENT IS NOT PROTECTED FROM VEHICULAR TRAFFIC
3. TRANSFORMER LOCATIONS SHALL BE ESTABLISHED BY THE OWNER TO MEET LPC'S MINIMUM CLEARANCES AND ALL FIRE CLEARANCES REQUIRED BY APPLICABLE CODES
4. CLEAR AREAS: 1ST 3' CONTAINING SOD, MULCH, OR ROCKS/COBBLE; MAX. 1.5" DIA.
5. NEXT 7' AREA CAN CONTAIN LOW GROWING PLANTS; MAX. 1 FT. HEIGHT
6. REPOSITIONING EQUIPMENT IS ONLY ALLOWED AT CUSTOMER EXPENSE.
7. ANY DEVIATIONS TO LANDSCAPE MATERIALS WITHIN CLEAR ZONES MUST BE APPROVED BY LPC.

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

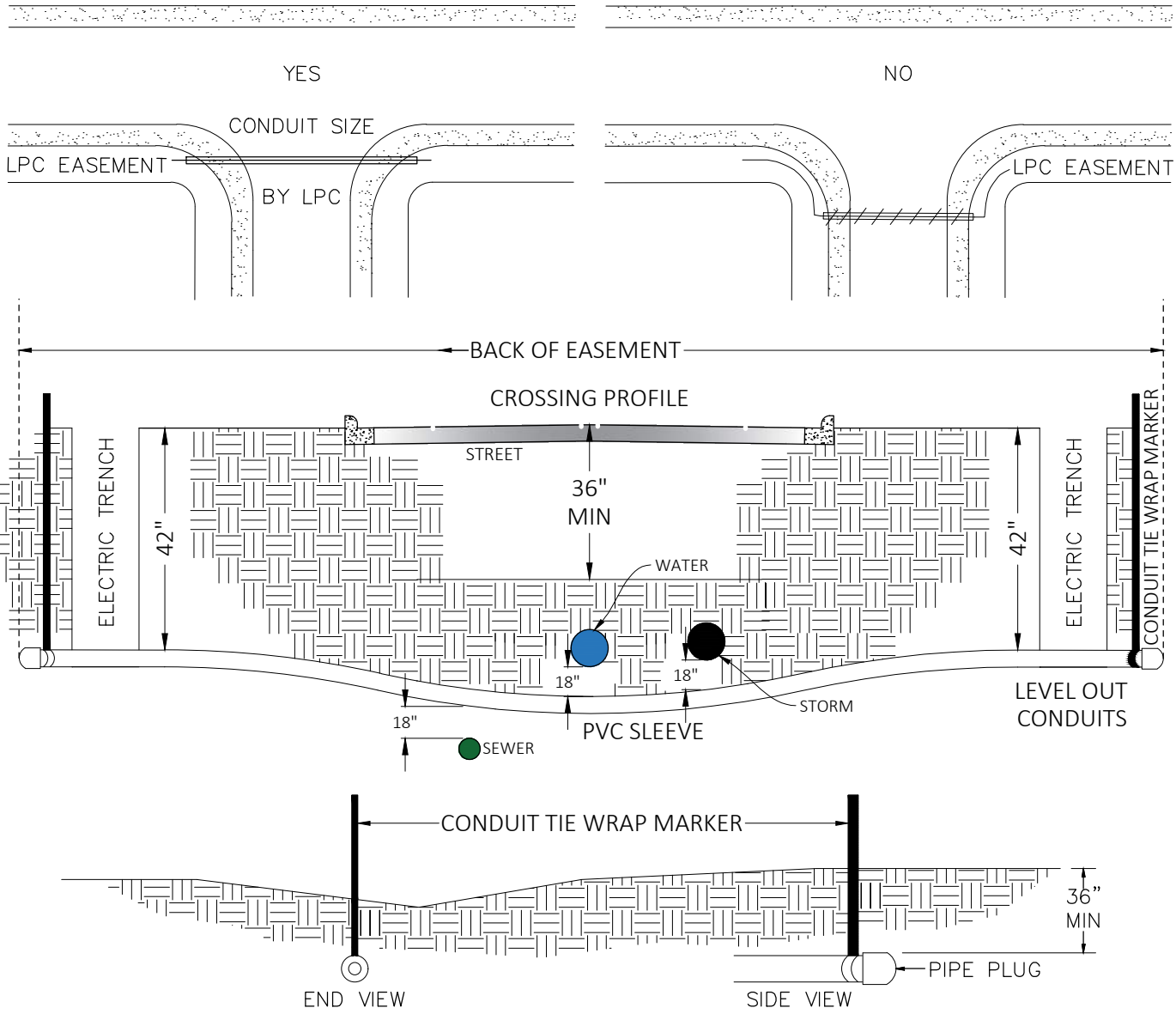
CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

EQUIPMENT CLEARANCES

Revision #:	
Approved by:	
Date Approved:	
File: UG Drawings 2025	
DETAIL	
700-02	

PHONE: 303-651-8386
FAX: 303-651-8796



NOTES:

1. DEPTH: MINIMUM 36", MAX 48" OF COVER, COMPACTED TO 95%
2. EACH END OF THESE CONDUITS MUST BE INSTALLED AT A DEPTH OF 42" AS THEY CROSS LPC'S TRENCH PATH
3. EACH END OF THESE CROSSINGS MUST HAVE A BURIED CABLE MARKER ATTACHED TO IT AND EXTENDED TO THE BACK SIDE OF THE EASEMENT AS SHOWN ABOVE.
4. CONDUIT TIE WRAP MARKERS, PROVIDED BY LPC, ARE TO BE USED AT EACH END OF THE SLEEVES. THEY ARE RED IN COLOR AND HAVE FOOTAGE MARKERS TO INDICATE DEPTH.
5. THE SPECIFIC CABLE MARKERS CAN BE PICKED UP AT LPC'S WAREHOUSE LOCATED AT 1100 S SHERMAN ST
6. SCHEDULE 40 PVC SHALL BE INSTALLED WITH ALL JOINTS HAVING LONG LINE BELL ENDS AND COUPLINGS USING COLD WEATHER GLUE
7. OTHER UTILITY CROSSINGS SHALL BE LOCATED AND MARKED WITH A STAKE. THE STAKE SHALL IDENTIFY THE SIZE AND DEPTH OF THE CROSSING.
8. CROSSINGS FOR COMMUNICATION UTILITIES MAY BE PLACED IN THE SAME TRENCH AS LPC WITH APPROVAL.
9. GAS CROSSINGS SHALL MAINTAIN 5' CLEARANCE FROM ELECTRIC. REFER TO SECTION 701-01-01 SLEEVE INSTALLATION
10. EXTEND OTHER UTILITY CROSSINGS BEYOND THE ELECTRIC EASEMENT
11. FOR TRENCH DETAILS REFER TO 700-04
12. ANY DEVIATIONS TO MAX SLEEVING DEPTH MUST BE APPROVED BY LPC

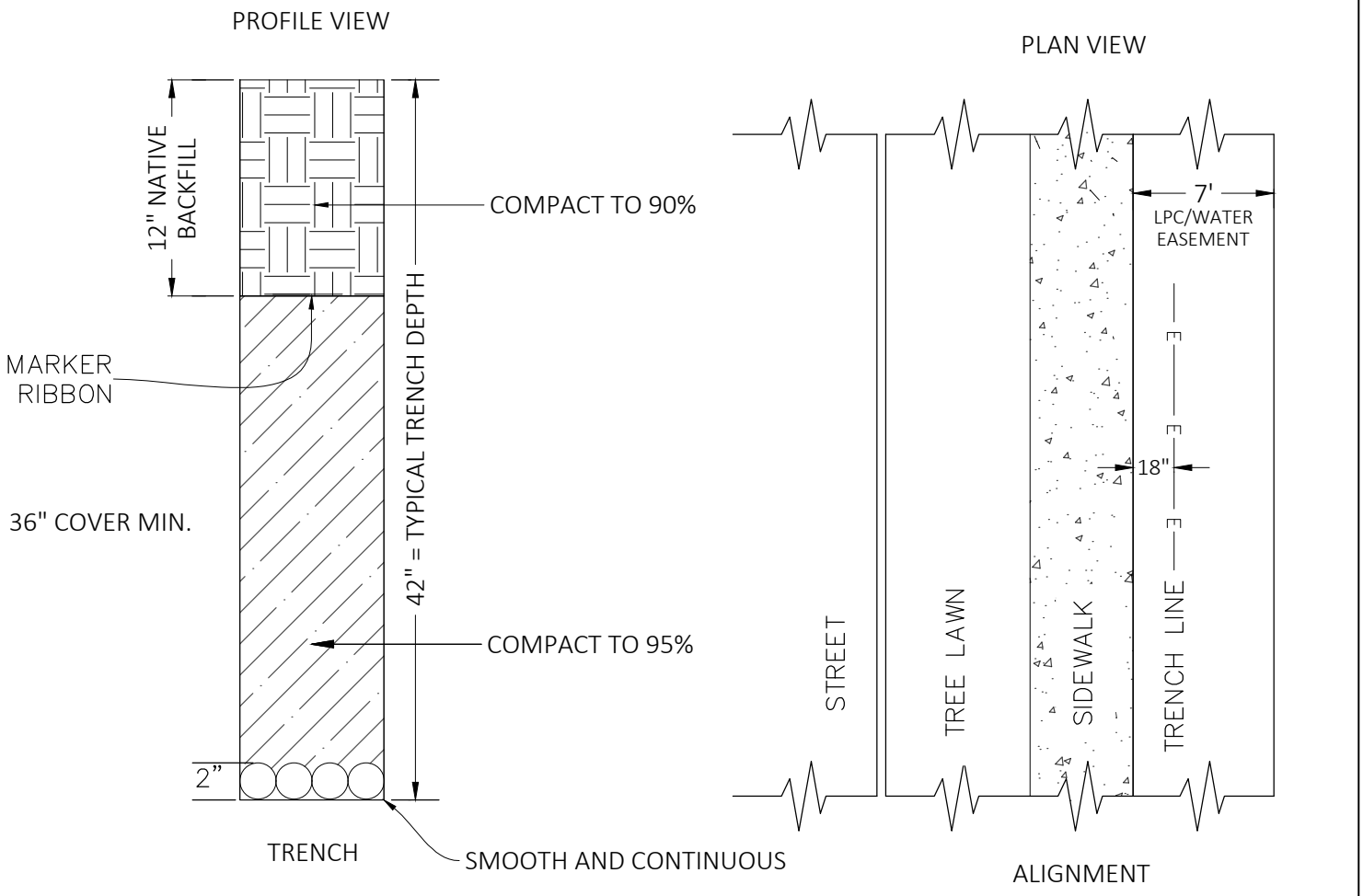
ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

CITY OF LONGMONT COLORADO

CUSTOMER INSTALLED SLEEVE

Revision #:	
Approved by:	
Date Approved:	
File: UG Drawings 2025	
DETAIL	
700-03	

1100 S SHERMAN ST
LONGMONT, CO 80501
PHONE: 303-651-8386
FAX: 303-651-8796



NOTES:

1. MINIMUM TRENCH WIDTH: 8"
2. MINIMUM COVER: 36"
3. MAXIMUM TRENCH DEPTH: 48"
4. THE BOTTOM OF THE TRENCH MUST BE SMOOTH AND CONTINUOUS.
5. ALL TRENCH MUST REMAIN OPEN UNTIL INSPECTED BY LPC.
6. MARKER RIBBON TO BE INSTALLED BEFORE FINAL 12".
7. 95% COMPACTION IS REQUIRED TO A POINT 12" BELOW FINAL GRADE AND 90% FOR THE LAST 12".
8. 95% COMPACTION IS REQUIRED ALL THE WAY TO THE TOP OF THE TRENCH WHEN LOCATED BELOW A HARD SURFACE.
9. THE TRENCH ALIGNMENT SHOWN ABOVE IS FOR SINGLE FAMILY DETACHED LOTS WITH A DETACHED SIDEWALK
10. THE TRENCH ALIGNMENTS FOR ALL OTHER TYPES OF DEVELOPMENTS ARE DETERMINED BY THEIR FINAL ELECTRIC DESIGN PROVIDED BY A LPC FIELD ENGINEER.

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

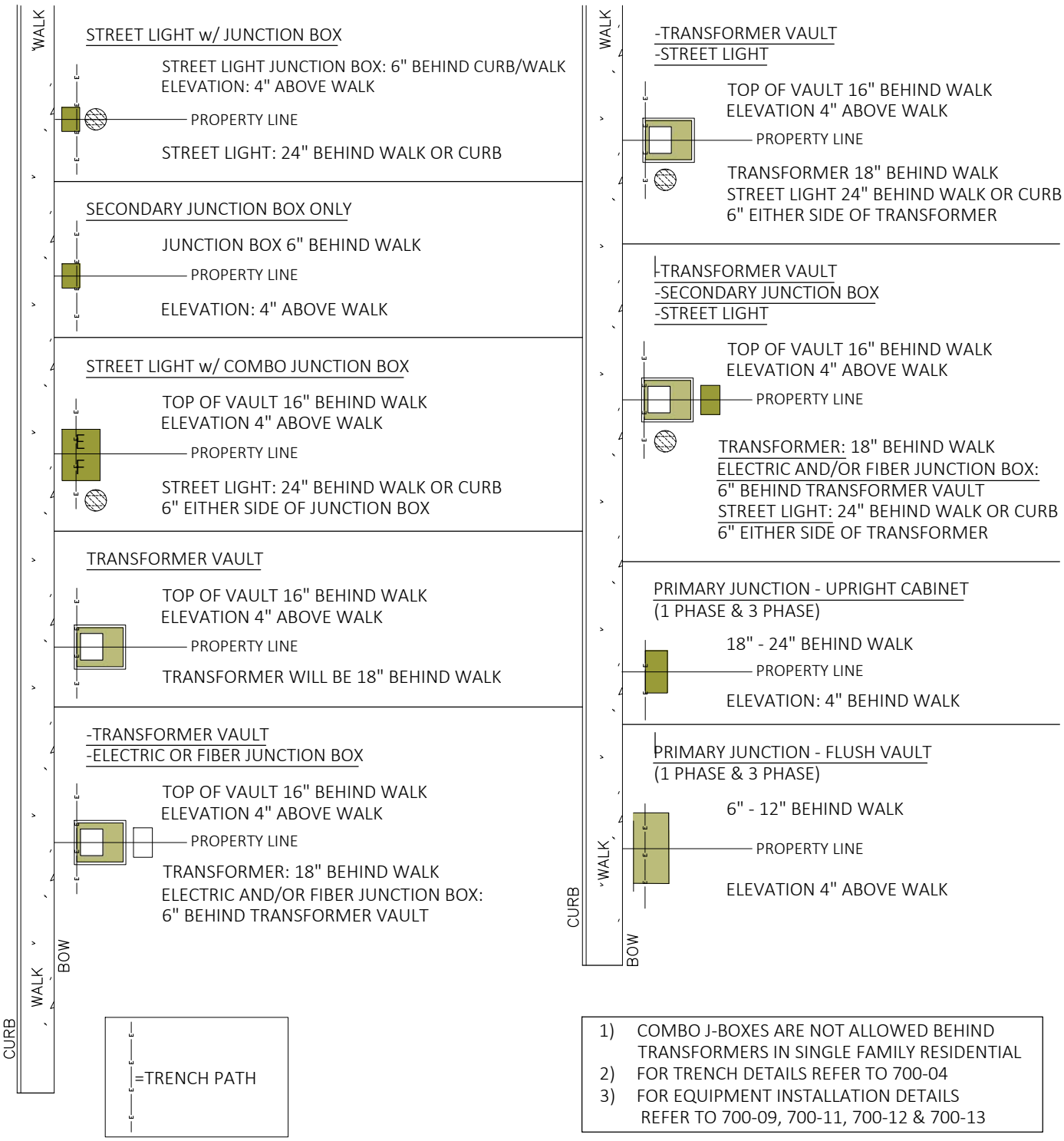
CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

TRENCH DETAIL

Revision #:	
Approved by:	
Date Approved:	
File: UG Drawings_2025	
DETAIL	
700-04	



1) COMBO J-BOXES ARE NOT ALLOWED BEHIND TRANSFORMERS IN SINGLE FAMILY RESIDENTIAL
2) FOR TRENCH DETAILS REFER TO 700-04
3) FOR EQUIPMENT INSTALLATION DETAILS REFER TO 700-09, 700-11, 700-12 & 700-13

ELECTRIC SERVICES

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

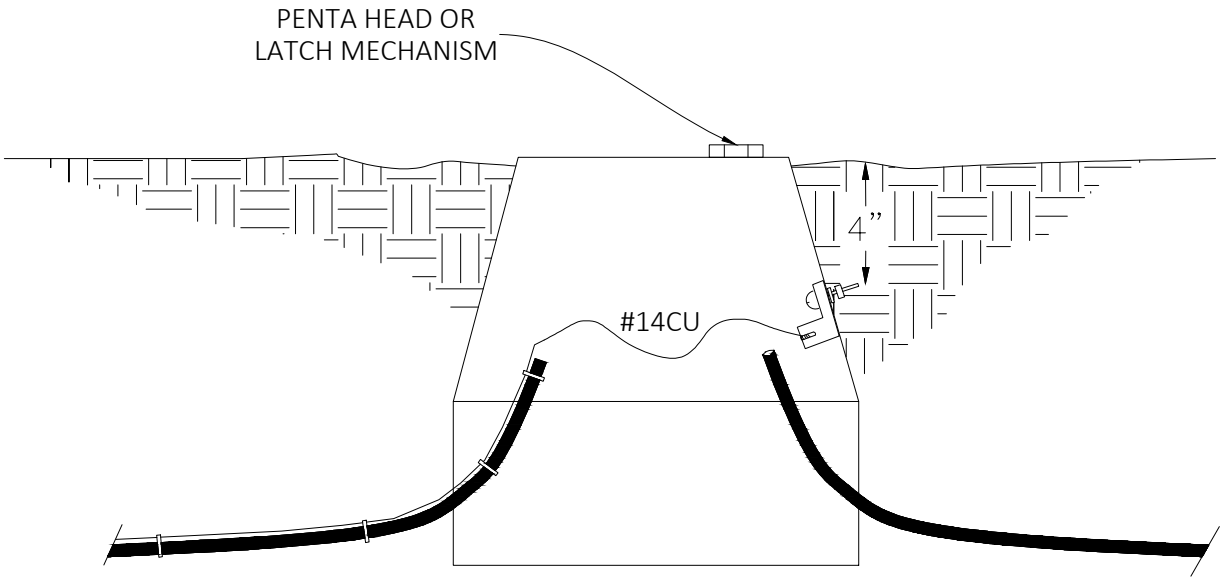
CITY OF LONGMONT COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

EQUIPMENT ALIGNMENT ON TRENCH

PHONE: 303-651-8386
FAX: 303-651-8796

Revision #:	
Approved by:	
Date Approved:	
File: UG Drawings_2025	
DETAIL	
700-05	



NOTES:

A. DEVELOPER / CONTRACTOR RESPONSIBILITIES:

1. TAPE #14 COPPER WIRE TO THE TOP OF THE EMPTY CONDUIT
2. COIL 3 FEET OF WIRE IN METAL AND FIBERGLASS VAULTS
3. COIL 10 FEET OF WIRE IN CONCRETE VAULTS
4. PROVIDE AS-BUILT DRAWINGS WITH THE LENGTH OF THE CONDUIT AND LOCATION OF THE TRENCH FROM THE BACK OF THE WALK, CURB OR SURFACE FEATURE WHERE THE END OF THE CONDUIT IS BURIED. THE TRACER WIRE SHALL EXTEND TO THE END OF THE CONDUIT.

B. LPC CREW RESPONSIBILITY:

1. METAL ENCLOSURES: CONNECT THE #14 TO THE GROUND BUSS
2. FIBERGLASS ENCLOSURES: DRILL A HOLE 4" BELOW THE PENTA HEAD OR LATCH MECHANISM TO INSTALL THE GROUND LUG ASSEMBLY
3. CONCRETE VAULT: ROUTE THE #14 COPPER WIRE OUT THE TOP OF THE VAULT IN THE DIRECTION OF THE EMPTY CONDUIT

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

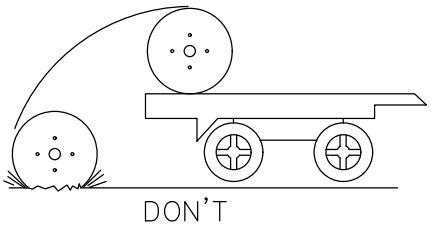
CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

TRACER WIRE INSTALLATION

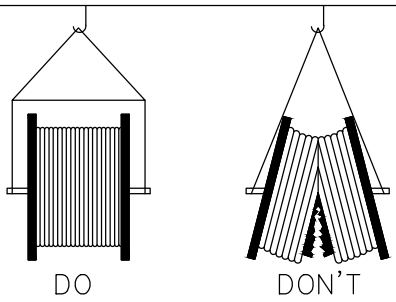
PHONE: 303-651-8386
FAX: 303-651-8796

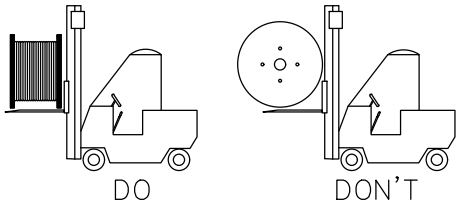
Revision #:	
Approved by:	
Date Approved:	
File: UG Drawings 2025	
DETAIL	
700-06	



When off loading reels from a truck, lower reels carefully using a hydraulic gate, hoist or fork lift truck. Never drop reels. If reels must be rolled, roll in opposite direction of the cable wraps to prevent cable from loosening or unraveling on the reel

When using a hoist, install a mandrel through the reel arbor holes and attach a sling. Use a spreader bar approximately 6 inches longer than the overall reel width placed between the sling ends just above the reel flanges. This will prevent bending the reel flanges and mashing the cable.

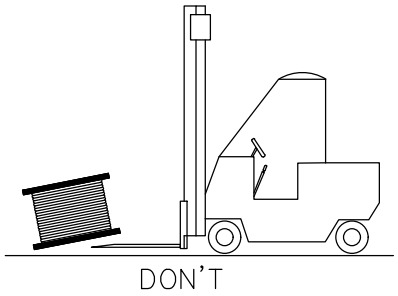




If a fork lift is used, approach the reel from the flange side. Position the forks such that the reel is lifted by both reel flanges. Do not allow the forks to contact the cable. Care must be taken by the Fork lift operator not to make sudden turns or stops.

Cable shipped on wooden or metal reels may be stored outdoors.
When selecting a storage site, consideration should be given to:

* Traffic patterns during off-loading
* Grade and condition of the soil or pavement
* Protection from vehicle damage during the time in storage.
* Environmental conditions such as exposure to heat, corrosive chemicals, etc.



Cable reels should be stored on hard surfaces resting on the flanges edge (flanges vertical). Align reels flange to flange and, if possible, arrange so that first in is first out. Multiple reels stacked on top of each other (Pancake storage), or storing reels flat (flanges horizontal) is not acceptable. The weight of the stack can total thousands of pounds creating an enormous load on the bottom reel. Also, damage to the reel and/or cable will likely occur when the reel is flipped for transit. A concentration of stress on the reel flange may cause it to break and subsequently damage the cable.

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

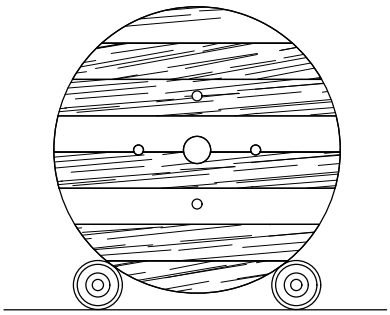
PHONE: 303-651-8386
FAX: 303-651-8796

CABLE HANDLING AND STORAGE PROCEDURES

Revision #:	
Approved by:	
Date Approved:	
File: UG Drawings 2025	
DETAIL	
700-07A	

FOR EXTENDED STORAGE:

REELS SHOULD BE STORED CRADLED BETWEEN RAILROAD TIES, POWER POLES OR CROSS ARMS. SIZE AND SPACING OF THE SUPPORTS SHOULD RAISE THE FLANGE ABOVE THE GROUND. THIS HELPS KEEP THE FLANGES FROM DECAYING AND PREVENTS THE REELS FROM ROLLING.



AT TEMPORARY STORAGE SITES WHERE SOIL MAY BE SOFT, PRESERVATIVE TREATED PLYWOOD SHEETS MAY BE USED TO KEEP REEL FLANGES FROM SINKING INTO THE GROUND.

TO PREVENT ENTRANCE OF WATER, CABLE ENDS SHOULD BE SEALED WITH PLASTIC END CAPS. ELECTRICAL TAPE DOES NOT OFFER A SUFFICIENT SEAL. WHEN LENGTHS ARE CUT, CABLE ENDS SHOULD BE IMMEDIATELY RESEALED AND SECURED.

REFER TO COLD SHRINK INSTALLATION DETAIL 700-08

ELECTRIC SERVICES

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

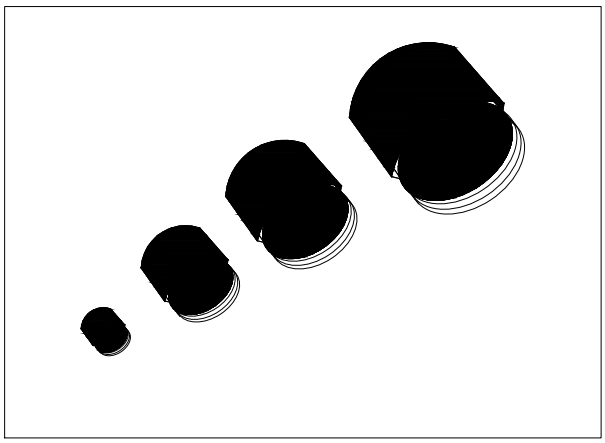
CITY OF LONGMONT COLORADO

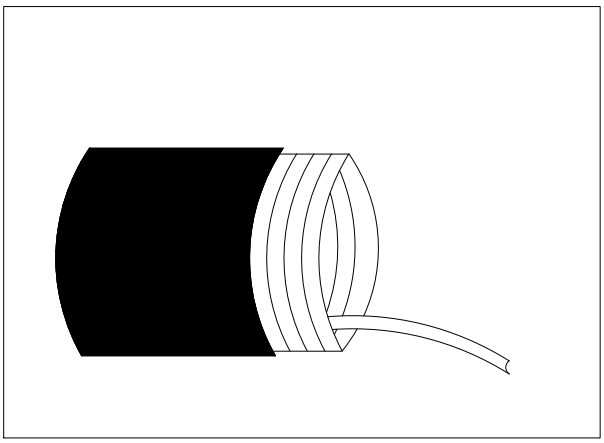
1100 S SHERMAN ST
LONGMONT, CO 80501

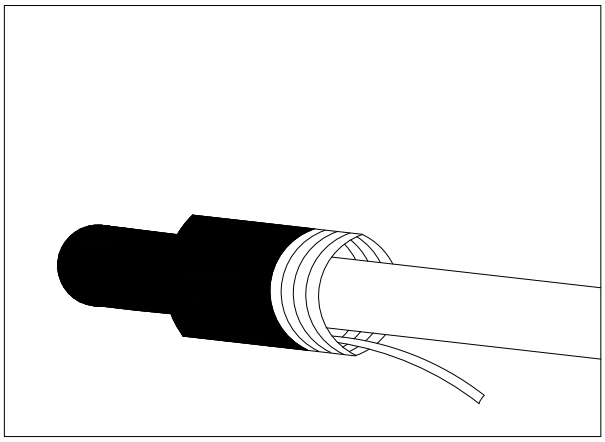
CABLE HANDLING AND STORAGE PROCEDURES (CONTINUED)

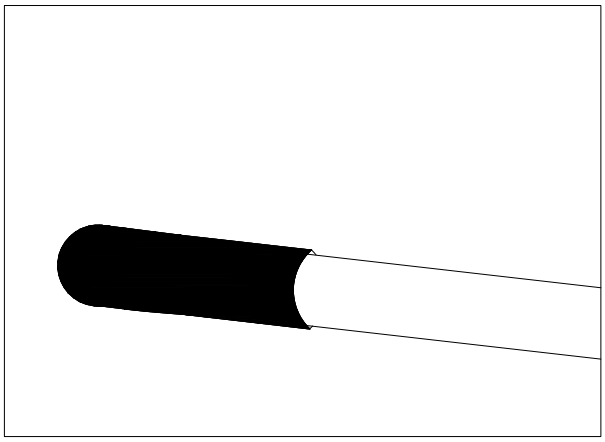
PHONE: 303-651-8386
FAX: 303-651-8796

Revision #:
Approved by:
Date Approved:
File: UG Drawings_2025
DETAIL
700-07B









* COLD SHRINK SHALL BE INSTALLED ON THE ENDS OF ALL PRIMARY CONDUCTORS IN ORDER TO PREVENT THE ENTRANCE OF WATER INTO THE CABLE.
* ELECTRICAL TAPE DOES NOT OFFER A SUFFICIENT SEAL.
* WHEN LENGTHS ARE CUT, CABLE ENDS SHOULD BE IMMEDIATELY RESEALED AND SECURED

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

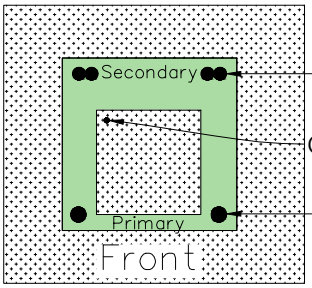
CITY OF
LONGMONT
COLORADO

COLD SHRINK INSTALLATION

Revision #:	
Approved by:	
Date Approved:	
File: UG Drawings 2025	
DETAIL	
700-08	

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

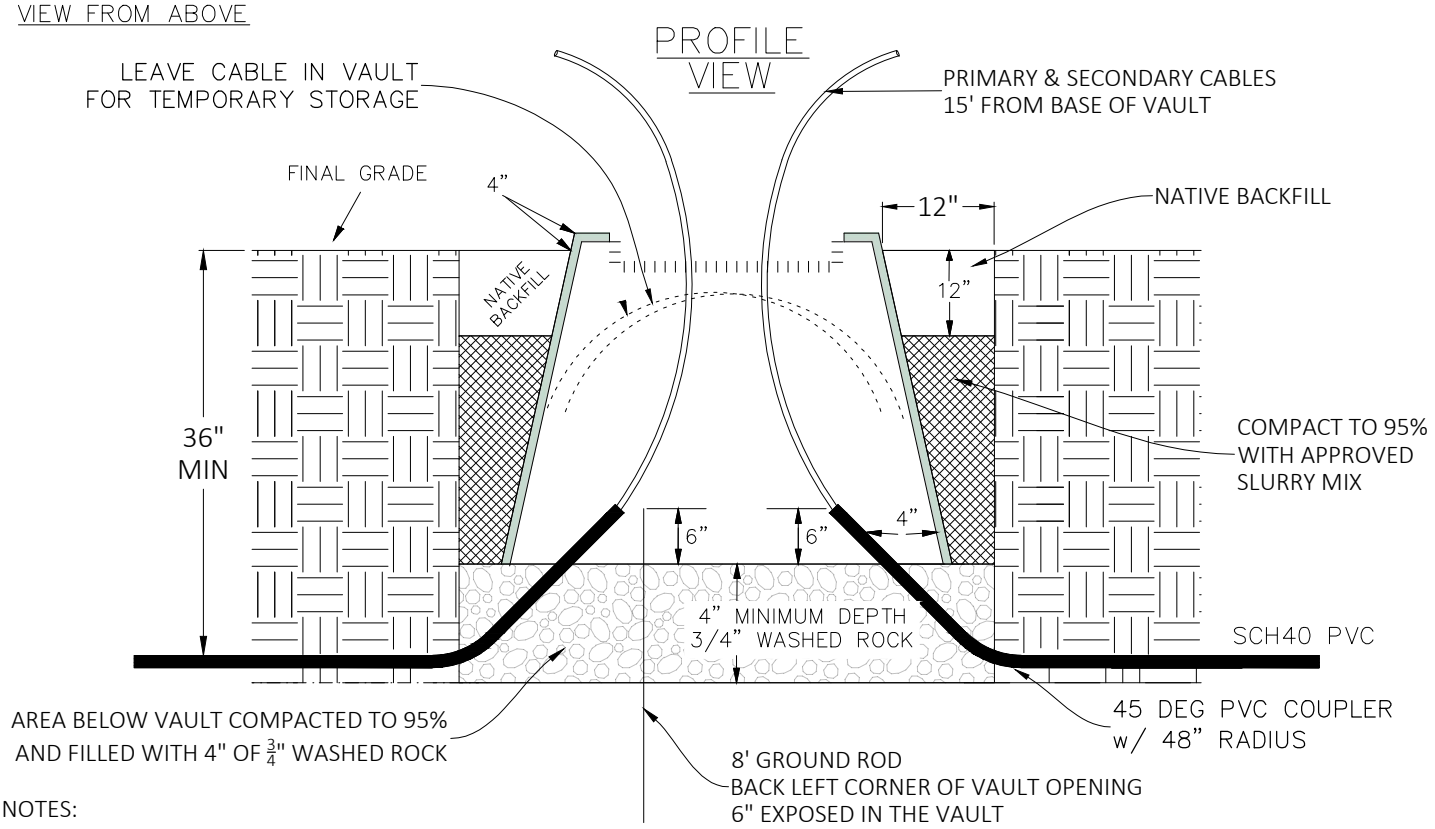


SECONDARY: 45 DEG PVC COUPLERS
4" FROM INSIDE EDGE

GRND ROD

PRIMARY: 45 DEG PVC COUPLERS
4" FROM INSIDE EDGE

VIEW FROM ABOVE



NOTES:

1. VAULT MUST BE LEVEL
2. SET 4" ABOVE FINAL GRADE
3. PROVIDE 95% COMPACTION UNDER AND AROUND THE VAULT
4. MINIMUM OF 4" WASHED ROCK TO BE INSTALLED UNDER THE VAULT
5. CABLE LENGTH SHALL BE 15' AND MEASURED FROM THE BASE OF THE VAULT
6. THE CABLE DUCT SHALL HAVE 6" EXPOSED IN THE VAULT
7. USE 45 DEG COUPLERS w/ 48 IN RADIUS TO SWEEP THE PRIMARY AND SECONDARY PVC CONDUITS INTO THE VAULT
8. AN 8' GROUND ROD SHALL BE PLACED IN THE BACK LEFT CORNER OF THE VAULT OPENING LEAVING 6" EXPOSED ABOVE THE ROCK
9. ORIENTATION OF THE VAULT/TRANSFORMER SHALL BE ESTABLISHED BY LPC
10. TRANSFORMER LOCATIONS REQUIRE THE FOLLOWING MINIMUM CLEARANCES
    - 10.1. 5' ON THE SIDES AND BACK FROM LANDSCAPING AND STRUCTURES - CONFIRM LOCAL CODES INCLUDING FIRE FOR GREATER CLEARANCE REQUIREMENTS
    - 10.2. 10' IN THE FRONT WHERE ACCESS DOORS ARE LOCATED
    - 10.3. 5' FROM A DRIVING SURFACE BEHIND A CURB OR PROTECTIVE FEATURE. RESIDENTIAL DRIVEWAY CLEARANCE MAY BE REDUCED TO 3'
    - 10.4. 3' MINIMUM FROM A DRIVING SURFACE WITH THE USE OF BOLLARDS
    - 10.5. 10' FROM A DRIVING SURFACE WHERE NO PROTECTIVE FEATURE IS PROPOSED
    - 10.6. 15' MAXIMUM SETBACK FROM A DRIVABLE SURFACE, MEASURED FROM THE CENTER, FOR LPC TRUCK/LIFTING ACCESS
    - 10.7. FOR MORE EQUIPMENT CLEARANCE DETAILS REFERENCE 700-02
11. FOR BOLLARD PROTECTION REFERENCE DETAIL 700-18
12. THE MAX NUMBER AND SIZE OF SECONDARY CONDUCTORS CAN BE FOUND IN DETAIL 700-19 - SECONDARY CABINETS

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

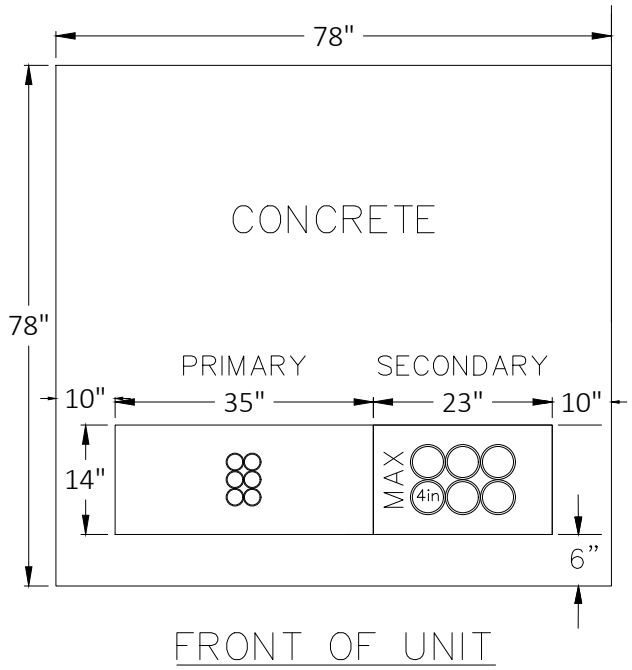
SINGLE PHASE TRANSFORMER VAULT

Revision #:	
Approved by:	
Date Approved:	
File: UG Drawings 2025	
DETAIL	
700-09	

(SCC) SECONDARY CONNECTION CABINET
(CCR) CONCRETE CABLE RACEWAY
(LPC) LONGMONT POWER AND COMMUNICATIONS

3PH TRANSFORMER
75 - 225Kva
MAX# OF 4 INCH SECONDARY PVC = 6
MAX# OF SECONDARY CONNECTIONS = 6
MAX SIZE OF SECONDARY CABLE = 500cu
CCR & SCC REQUIRED FOR 7+ CONNECTIONS
REFER TO CCR DETAIL 700-20 & SCC DETAIL 700-21

3PH TRANSFORMER
300 - 2500Kva
MAX# OF 4 INCH SECONDARY PVC = 6
MAX# SECONDARY CONNECTIONS = 10
MAX SIZE SECONDARY CABLE = 750cu
CCR REQUIRED FOR 7 - 10 CONNECTIONS
CCR & SCC REQUIRED FOR 11+ CONNECTIONS
REFER TO CCR DETAIL 700-20 & SCC DETAIL 700-21



THE CUSTOMER SHALL FURNISH A LEVEL CONCRETE PAD IN ACCORDANCE WITH THE SPECIFICATIONS OUTLINED BELOW. THE PAD REMAINS THE PROPERTY OF THE CUSTOMER AND ANY DEFICIENCY IN THE PAD IS THE SOLE RESPONSIBILITY OF THE CUSTOMER TO REPAIR.

1. THE PAD AND ELECTRIC CONDUCTOR BLOCK OUT DIMENSIONS ARE INDICATED ON THE DRAWING.
2. THE PAD SHALL BE A MINIMUM OF 6" THICK, REINFORCED WITH WIRE MESH OR REBAR THROUGHOUT AND ABLE TO SUPPORT UP TO 17,000 LBS.
3. THE ELEVATION OF THE TOP OF THE PAD SHALL BE 4" ABOVE THE SURROUNDING FINISHED GRADE.
4. THE PAD SHALL BE INSTALLED LEVEL
5. COMPACTION BENEATH THE PAD MUST BE 95% OF STANDARD PROCTOR, ASTM D698, AT A PLUS OR MINUS 2% OPTIMUM MOISTURE CONTENT. TEST RESULTS SHALL BE PROVIDED TO THE LPC INSPECTOR.
6. TRANSFORMER LOCATIONS SHALL BE SURVEYED BY THE OWNER
7. ORIENTATION OF THE PAD/TRANSFORMER SHALL BE ESTABLISHED BY LPC
8. MINIMUM CLEARANCE REQUIREMENTS:
   - 8.1. 5' ON THE SIDES AND BACK OF THE PAD FROM SURROUNDING STRUCTURES;
   - 8.2. 5' ON THE SIDES AND BACK FROM LANDSCAPING, FENCES, ETC.
   - 8.3. 10' IN THE FRONT WHERE ACCESS DOORS ARE LOCATED
   - 8.4. 3' MINIMUM FROM A DRIVING SURFACE WITH THE USE OF BOLLARDS
   - 8.5. 5' FROM A DRIVING SURFACE BEHIND A CURB OR PROTECTIVE FEATURE
   - 8.6. 10' FROM A DRIVING SURFACE WHERE NO PROTECTIVE FEATURE IS PROPOSED
   - 8.7. MAXIMUM 15' MEASURED FROM THE CENTER OF THE UNIT TO A TRUCK RATED DRIVING SURFACE FOR LPC TRUCK/LIFTING ACCESS
9. FOR ADDITIONAL EQUIPMENT CLEARANCES REFERENCE DETAIL 700-02
10. FOR BOLLARD PROTECTION REFERENCE DETAIL 700-18

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

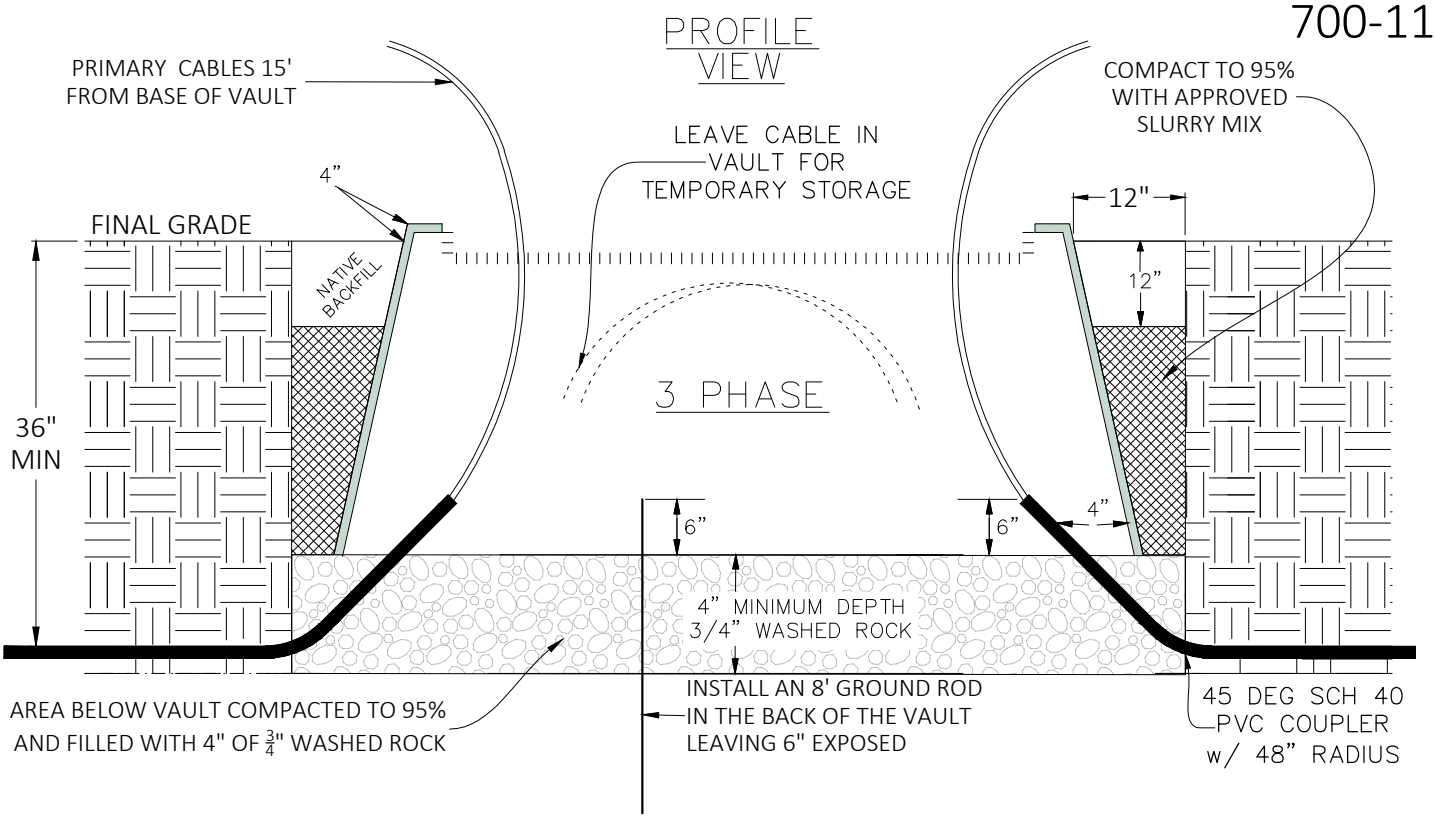
CITY OF
LONGMONT
COLORADO

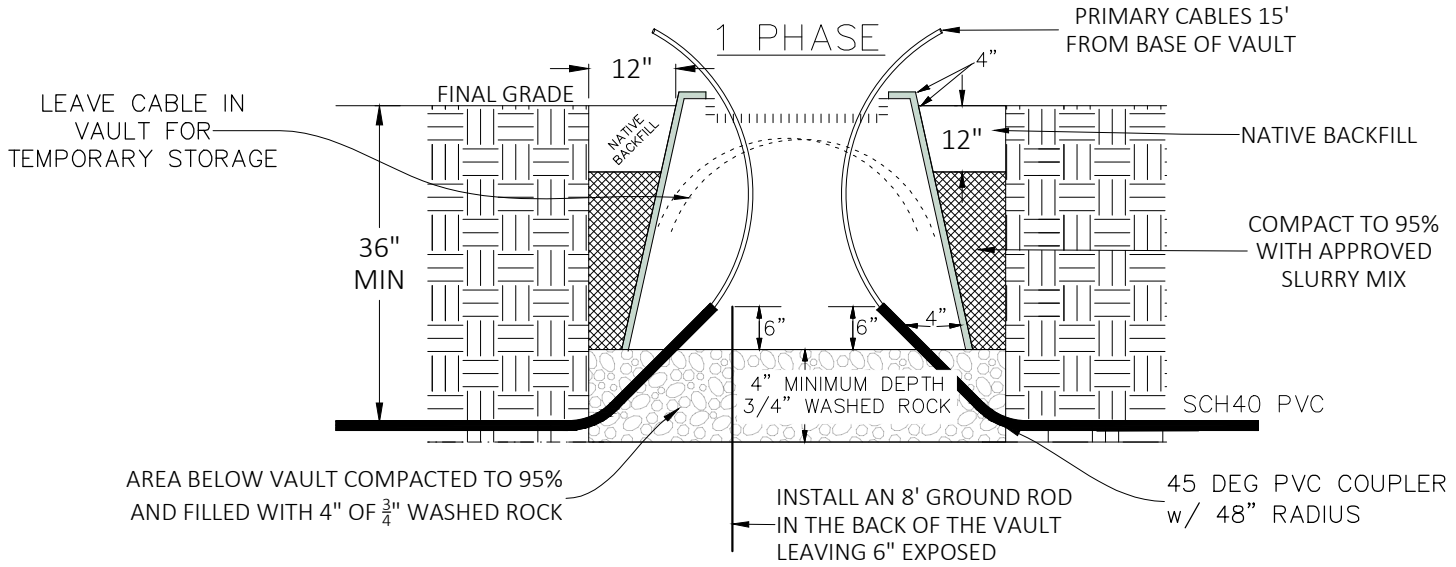
1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

THREE PHASE TRANSFORMER PAD

Revision #:	
Approved by:	
Date Approved:	
File: UG Drawings 2025	
DETAIL	
700-10	





NOTES:

1. VAULT MUST BE LEVEL AND SET 4" ABOVE FINAL GRADE
2. PROVIDE 95% COMPACTION UNDER AND AROUND THE VAULT
3. MINIMUM OF 4" WASHED ROCK TO BE INSTALLED UNDER THE VAULT
4. CABLE LENGTH SHALL BE 15' AND MEASURED FROM THE BASE OF THE VAULT
5. THE CABLE DUCT SHALL HAVE 6" EXPOSED IN THE VAULT
6. USE 45 DEG COUPLERS w/ 48 IN RADIUS TO SWEEP THE PRIMARY PVC CONDUITS INTO THE VAULT
7. AN 8' GROUND ROD SHALL BE PLACED IN THE BACK OF THE VAULT OPENING LEAVING 6" EXPOSED ABOVE THE ROCK
8. REFER TO DETAIL 700-02 FOR MINIMUM CLEARANCE REQUIREMENTS

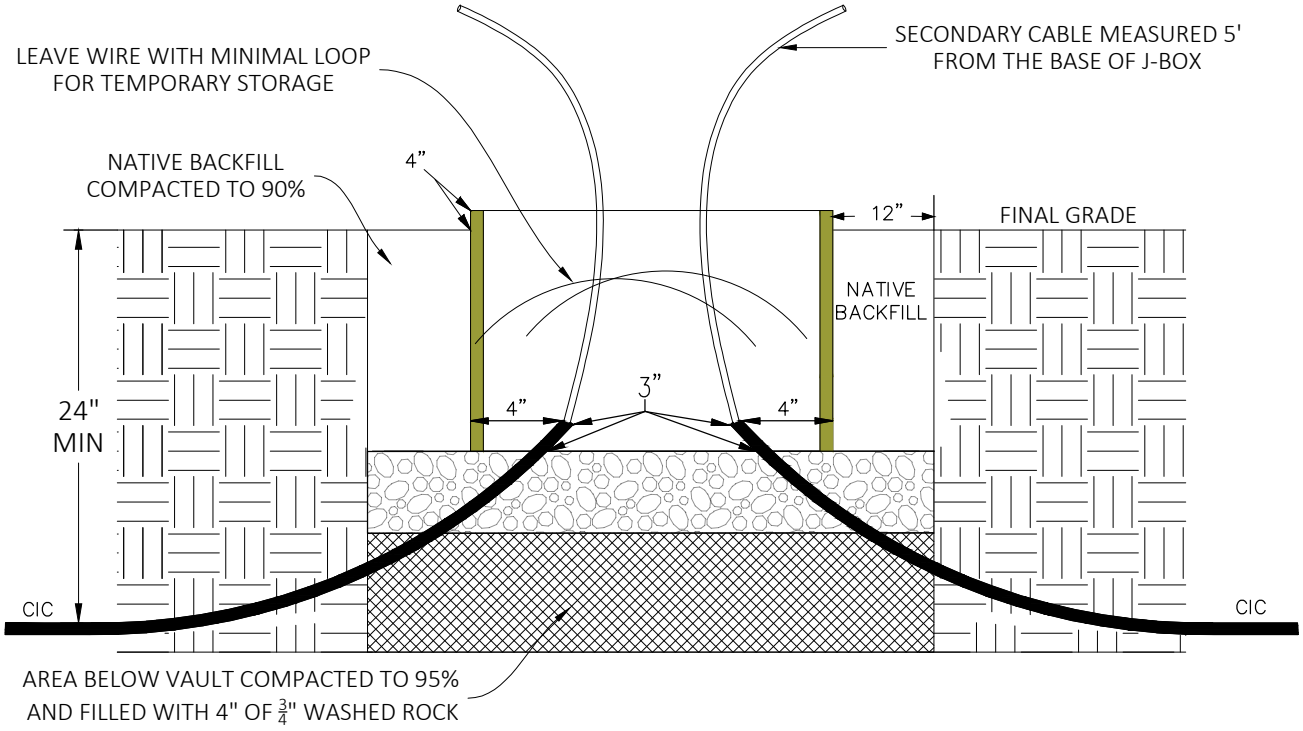
ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

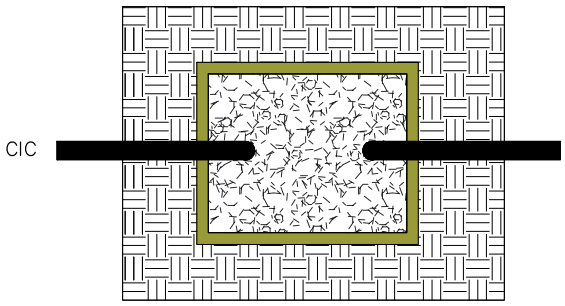
CITY OF LONGMONT COLORADO

PRIMARY JUNCTION VAULT

Revision #:	
Approved by:	
Date Approved:	
File: UG Drawings 2025	
DETAIL	
700-11	

1100 S SHERMAN ST
LONGMONT, CO 80501
PHONE: 303-651-8386
FAX: 303-651-8796





TOP
VIEW

NOTES:

1. J-BOX MUST BE LEVEL AND SET 4" ABOVE FINAL GRADE
2. PROVIDE 95% COMPACTION UNDER AND AROUND THE J-BOX
3. CABLE LENGTH SHALL BE 5' AND MEASURED FROM THE BASE OF THE J-BOX
4. THE CABLE DUCT SHALL HAVE 3" EXPOSED IN THE J-BOX
5. CABLE SWEEPS INTO J-BOX MUST BE GRADUAL AND HAVE A MINIMUM 48" RADIUS
6. TRAFFIC RATED J-BOXES ARE TO BE USED WHEN THE MINIMUM CLEARANCES CANNOT BE MET FROM VEHICLES
7. FOR EQUIPMENT CLEARANCES REFERENCE DETAIL 700-02
8. FOR EQUIPMENT ALIGNMENT ON TRENCH REFERENCE DETAIL 700-05

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

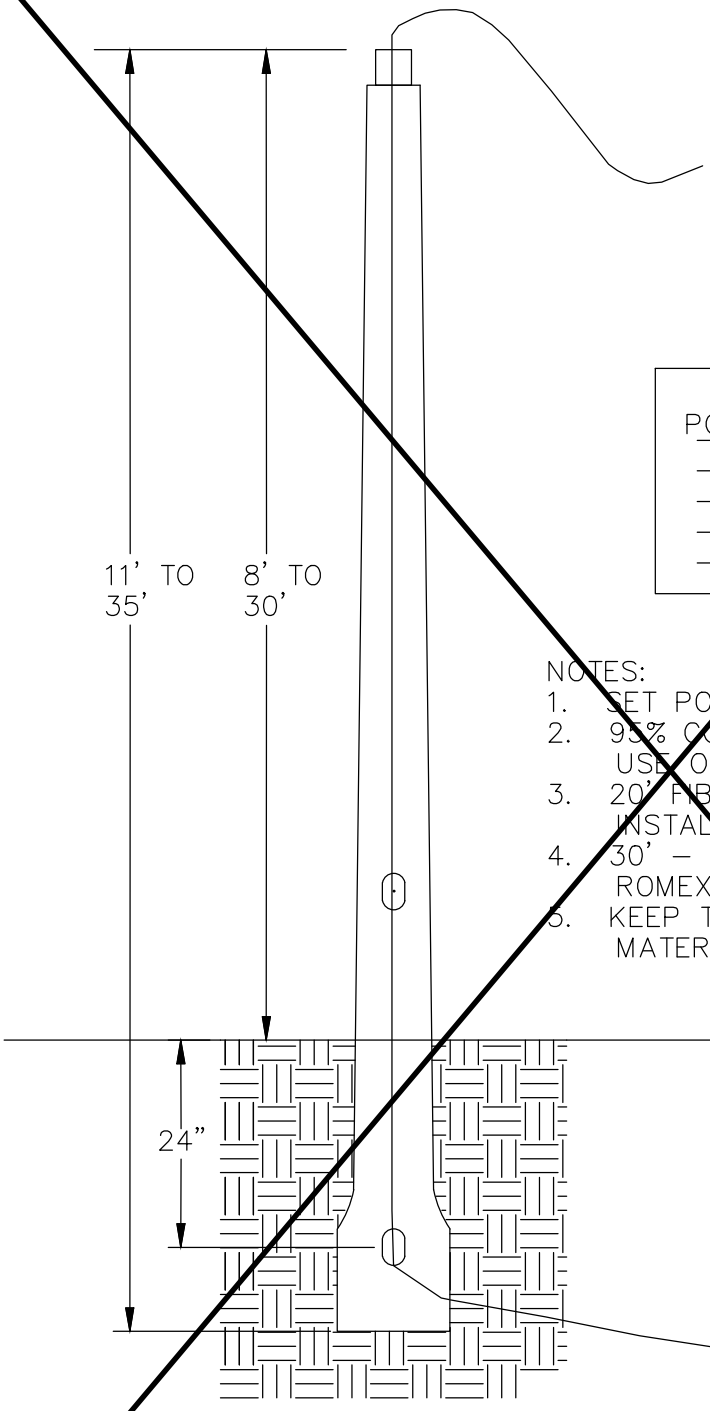
CITY OF
LONGMONT
COLORADO

SECONDARY JUNCTION BOX (J-BOX)

Revision #:	
Approved by:	
Date Approved:	2024
File:	UG Drawings 2024.dwg
	DETAIL
	700-12

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796



POLE HEIGHT	MOUNT HEIGHT	BURY DEPTH
14' PT	11' PT	3.0' PT
20' PT	16' PT	4.0' PT
34.5'	30'	4.5'
39.5'	35'	4.5'

NOTES:
1. SET POLE STRAIGHT
2. 95% COMPACTION IS REQUIRED AROUND THE POLE BY USE OF FLOWABLE FILL (LPC SPEC: FLOW FILL)
3. 20' FIBERGLASS POLES SHALL HAVE 12/2 IN DUCT INSTALLED TO THE TOP OF THE POLE
4. 30' – 35' FIBERGLASS POLES SHALL HAVE #12 ROMEX FROM THE SECONDARY J–BOX
5. KEEP THE INSIDE OF THE POLE FREE OF BACKFILL MATERIAL BY TAPING THE OPENINGS CLOSED

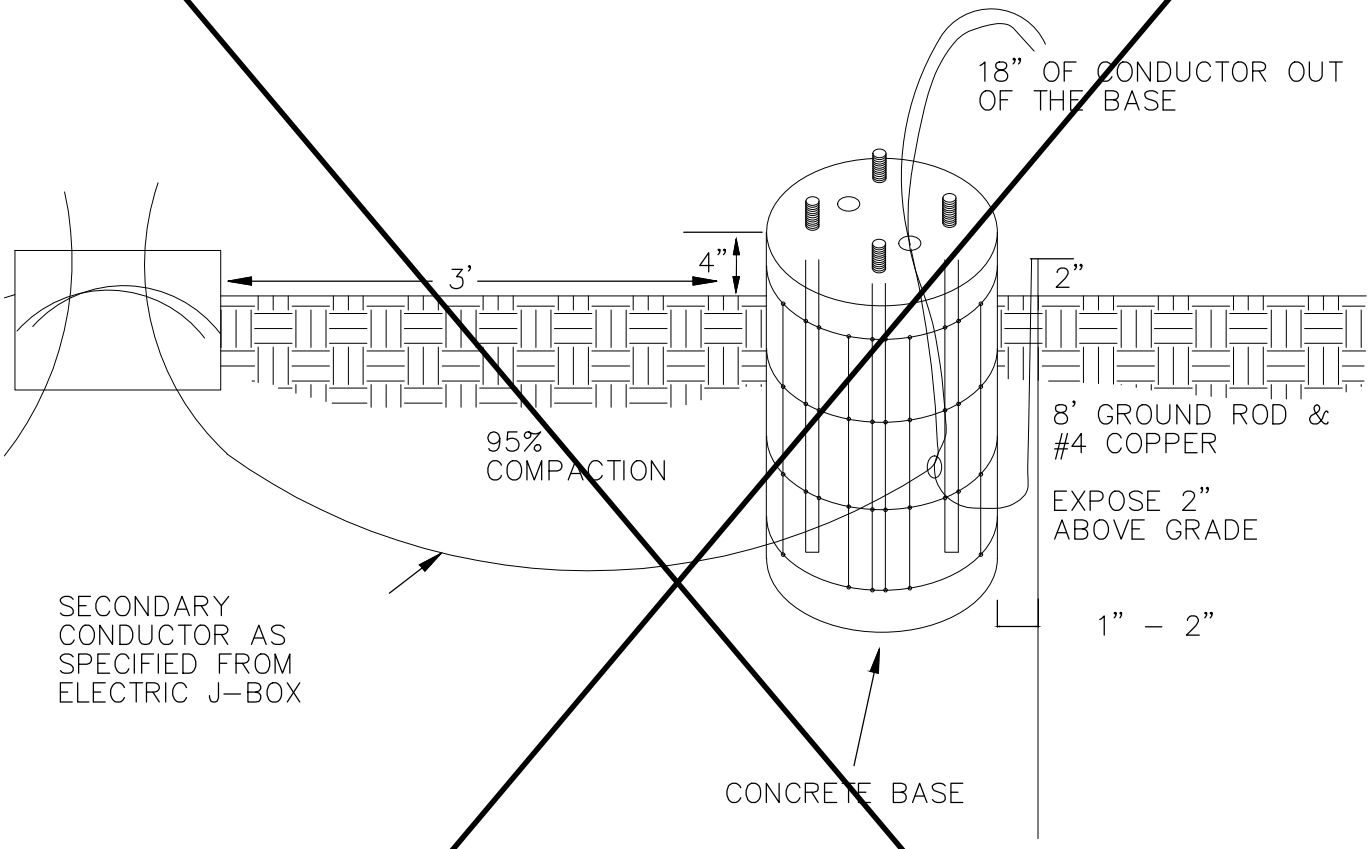
ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

CITY OF LONGMONT COLORADO

STREET LIGHT POLE

Revision #:	
Approved by:	
Date Approved:	2024
File:	UG Drawings_2024.dwg
	DETAIL
	700-13

1100 S SHERMAN ST
LONGMONT, CO 80501
PHONE: 303-651-8386
FAX: 303-651-8796



1. CONCRETE BASE MUST BE LEVEL
2. SET 4" ABOVE FINAL GRADE
3. INSTALL AN 8' GROUND ROD & #4 COPPER
4. PROVIDE 95% COMPACTION UNDER AND AROUND THE CONCRETE BASE
5. FOR STREET LIGHT POLE DETAIL REFERENCE 700–13
6. FOR SECONDARY J–BOX DETAIL REFERENCE 700–12

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

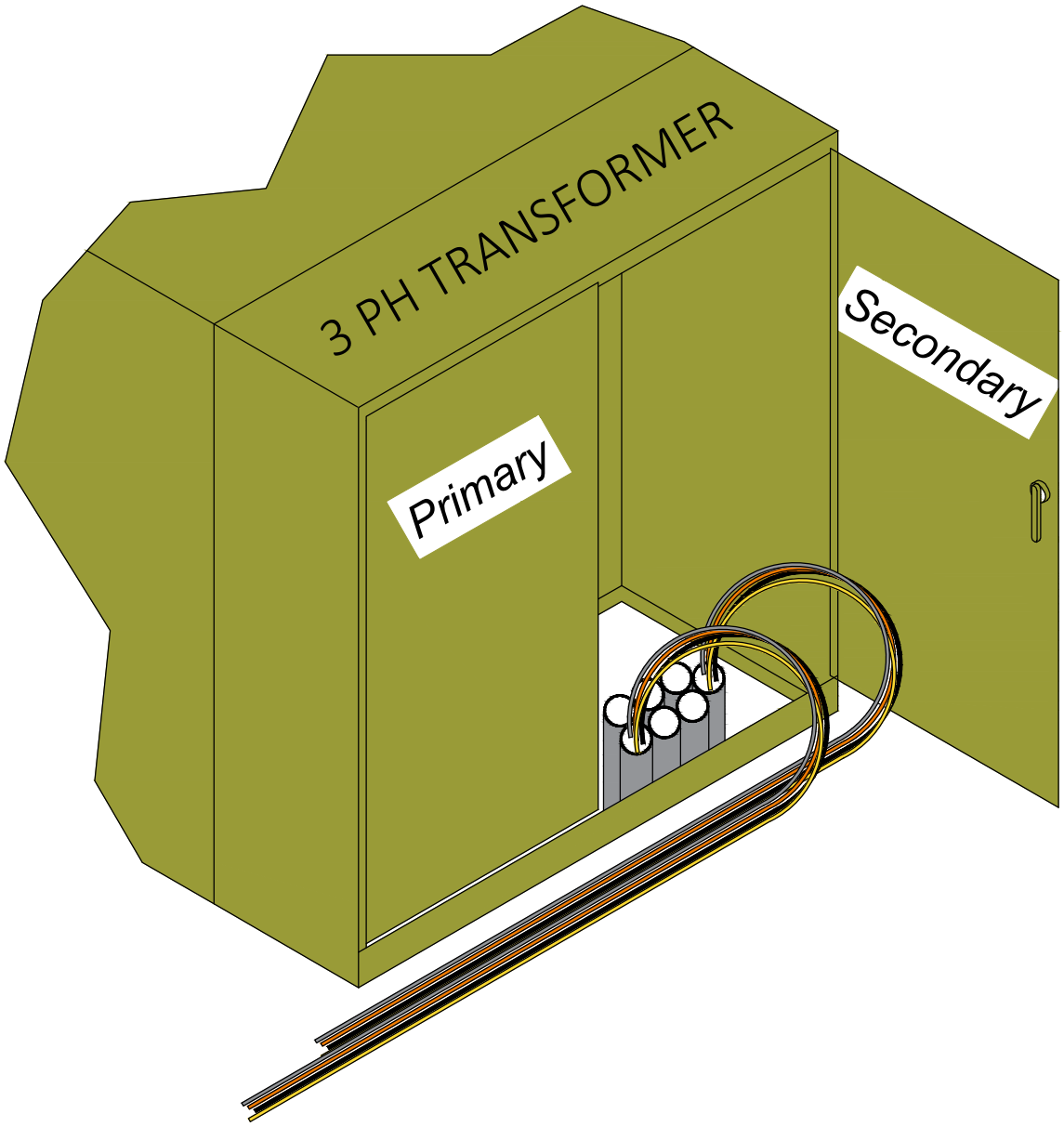
CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

STREET LIGHT BASE

Revision #:	
Approved by:	
Date Approved: 2024	
File: UG Drawings_2024.dwg	
DETAIL	
700-14	



NOTES:

1. MULTI-FAMILY AND COMMERCIAL DEVELOPMENT SERVICE CONDUCTORS AND CONDUITS ARE INSTALLED, OWNED AND MAINTAINED BY THE CUSTOMER. THEY MUST MEET THE NATIONAL ELECTRIC CODE AND BE APPROVED BY THE BUILDING INSPECTION & PERMITS DIVISION. THE CUSTOMER WILL INSTALL CABLE OF SUFFICIENT LENGTH FOR TERMINATION.
2. IN MULTI-FAMILY OR COMMERCIAL DEVELOPMENTS WHERE THREE PHASE SERVICE IS REQUIRED, THE USE OF SECONDARY CONDUCTORS WITH CONTINUOUS JACKET COLORS MUST BE USED TO DELINEATE EACH PHASE AND THE NEUTRAL SEPERATELY.

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

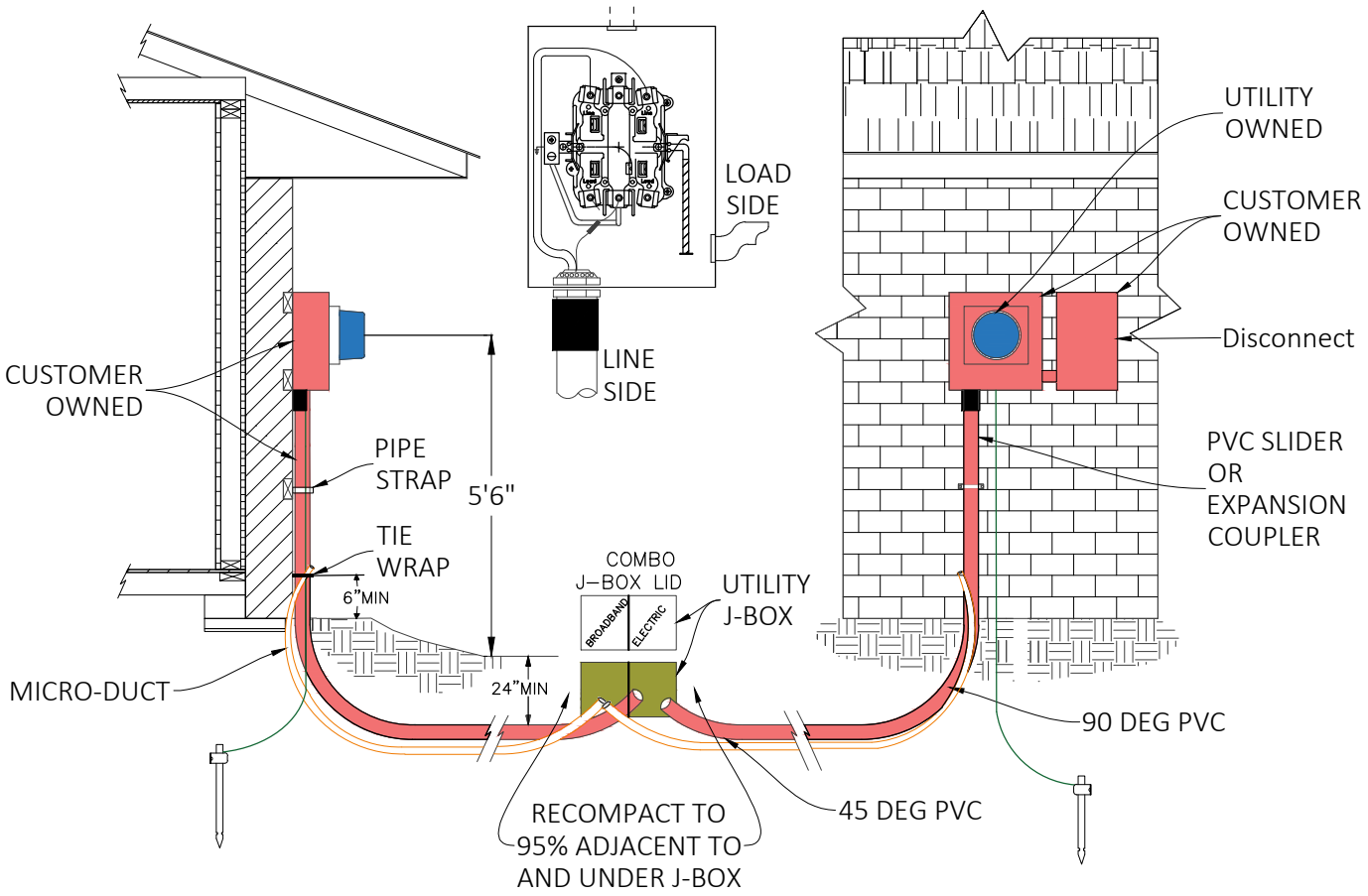
CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

3 PHASE SERVICE LINE IDENTIFICATION

Revision #:	
Approved by:	
Date Approved:	2024
File:	UG Drawings_2024.dwg
DETAIL	
700-15	



NOTES:

1. METER SHALL BE LOCATED IN THE NEAREST 1/4 OF THE STRUCTURE TO THE SOURCE AND NOT FENCED IN.
2. ALL SERVICES 400 AMP OR LESS REQUIRE A LEVER BYPASS METER BASE
3. ALL ELECTRIC CONDUIT TO BE 2" SCH 40 PVC WITH 24" RADIUS SWEEPS
4. MICRODUCT CONDUIT (PROVIDED BY LPC) SHALL BE INSTALLED IN THE ELECTRIC TRENCH BY THE BUILDER
5. THE MICRODUCT SHALL EXTEND 6" ABOVE GRADE AT THE SERVICE ENTRANCE, BE TIE WRAPPED TO THE ELECTRIC SERVICE CONDUIT, AND LAND INSIDE OF THE UTILITY J-BOX LABELED "BROADBAND" ON THE LID. YOU MAY SEE 2 SEPARATE J-BOXES, ONE FOR FIBER AND ONE FOR ELECTRIC, OR A SINGLE COMBO J-BOX. THE LIDS IN BOTH SCENARIOS ARE LABELED AS "ELECTRIC" OR "BROADBAND".
6. METER HOUSING AND ONE PIPE STRAP SHALL BE ATTACHED WITH AN APPROPRIATE ANCHORING METHOD SO AS NOT TO BECOME DETACHED OVER TIME.
7. USE PVC SLIDER OR EXPANSION COUPLING AT THE ENTRANCE TO THE METER HOUSING
8. SERVICE LATERAL CONDUCTORS SHALL BE CUT TO A LENGTH THAT ALLOWS THEM TO EXTEND 30" ABOVE THE J-BOX LID OR 48" ABOVE THE TRANSFORMER VAULT AND COILED WITHIN

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

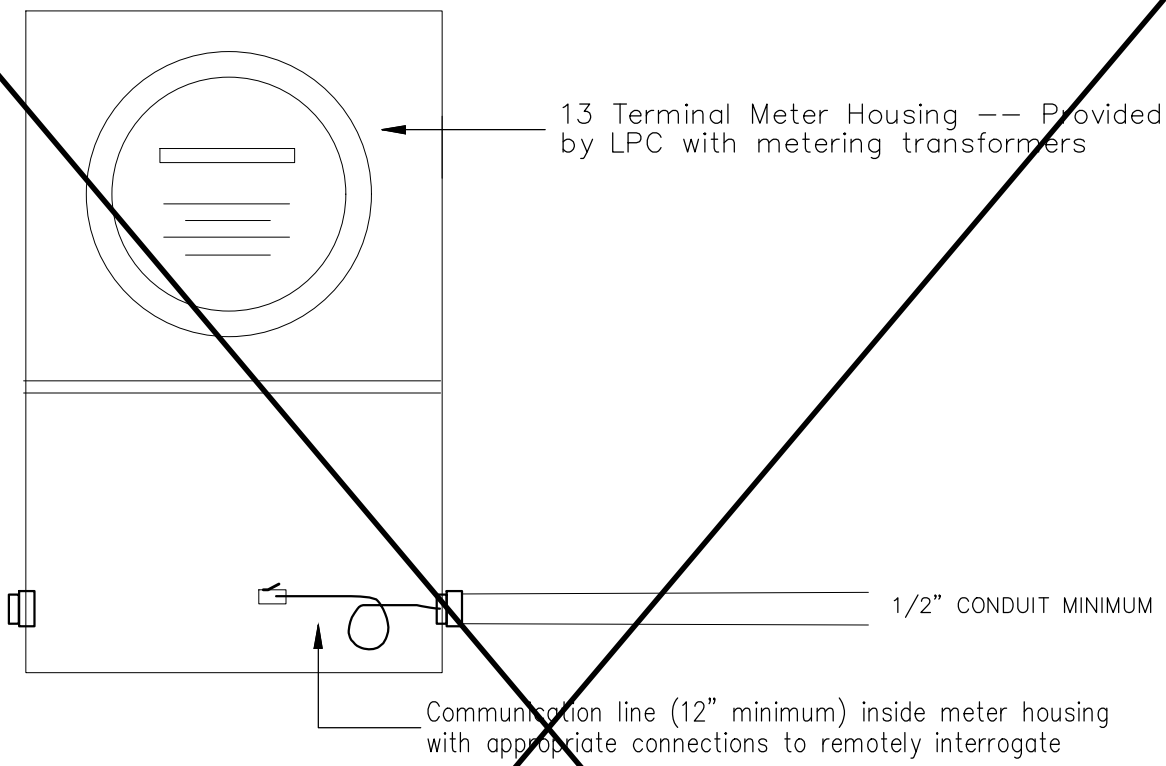
CITY OF LONGMONT COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

METERING SINGLE FAMILY

PHONE: 303-651-8386
FAX: 303-651-8796

Revision #:
Approved by:
Date Approved: 2024
File: UG Drawings_2024.dwg
DETAIL
700-16



LOAD SURVEY METERING / COMMUNICATION LINE SPECIFICATION

1. Services at 1000 amp 277/480 volt or 2000 amp 120/208 volts and greater require the customer to provide a dedicated CAT5E or equivalent communication line, for remote interrogation of each electric meter, providing minimum of 12" in length for connections inside the meter housing.
2. Conduit for communication line(s) must be installed in accordance with NEC and be a minimum of 1/2". The conduit is required to link the communication room directly to each electric meter and connected into the lower portion of the meter housing.
3. The communication line is activated when energy peak demand for two (2) consecutive months reaches 800 kW per LPC's requirements.
4. This specification has been approved by the City of Longmont's Electrical Inspector and no additional City Inspection is required.
5. LPC Metering Staff are available to open energized services that require the addition of a communication line and will confirm the specification has been followed. If this requirement has not been followed, then LPC, at its discretion, may disconnect the electric service.
6. Call (303) 651-8386 to schedule an appointment with LPC Metering Staff.

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

METERING COMMUNICATION LINE

Revision #:	
Approved by:	
Date Approved: 2024	
File: UG Drawings_2024.dwg	
DETAIL	
700-17	

BOLARD PROTECTION MEASURES

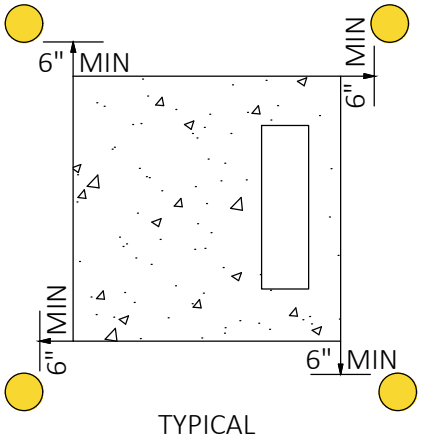
ELECTRICAL EQUIPMENT REQUIRES CLEARANCES OR SETBACKS ON ALL SIDES FROM VEHICULAR TRAFFIC. THIS INCLUDES DRIVEWAYS, ALLEYS, PARKING LOTS, ETC. BOLLARDS WILL BE INSTALLED BY THE DEVELOPER WHEN ELECTRICAL EQUIPMENT IS LOCATED IN AREAS WHERE LESS THAN THE RECOMMENDED CLEARANCES EXIST OR IS AT RISK TO VEHICULAR DAMAGE.

BOLLARD POSITIONS AND CRITERIA

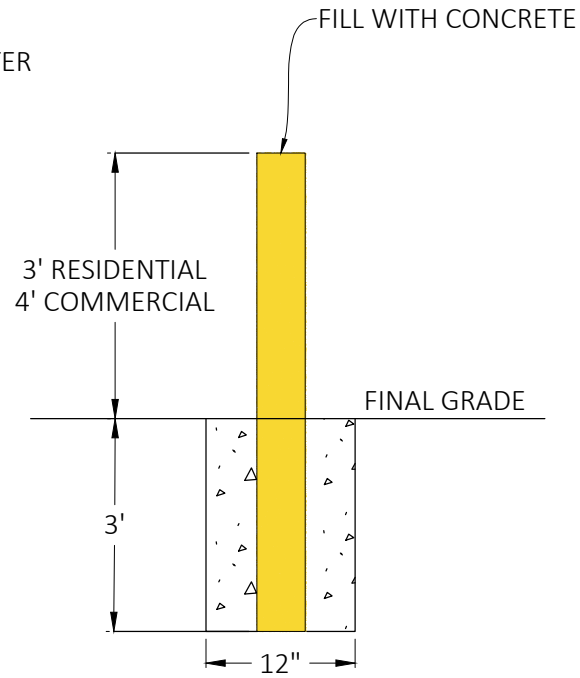
10' CLEAR ZONE IN FRONT OF ALL EQUIPMENT DOORS
6" MINIMUM DISTANCE FROM THE CONCRETE PAD
3' MINIMUM DEPTH

RESIDENTIAL:
4" MINIMUM DIAMETER
3' MINIMUM HEIGHT

COMMERCIAL:
6" MINIMUM DIAMETER
4' MINIMUM HEIGHT



TYPICAL LAYOUT



BACKFILL WITH CONCRETE

NOTES:
1) QUANTITY AND LOCATION OF BOLLARDS REQUIRED IS SUBJECT TO SITE CONDITIONS. LPC OPERATIONS WILL SPECIFY PLACEMENT.
2) FOR EQUIPMENT CLEARANCES REFER TO DETAIL 700-02

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

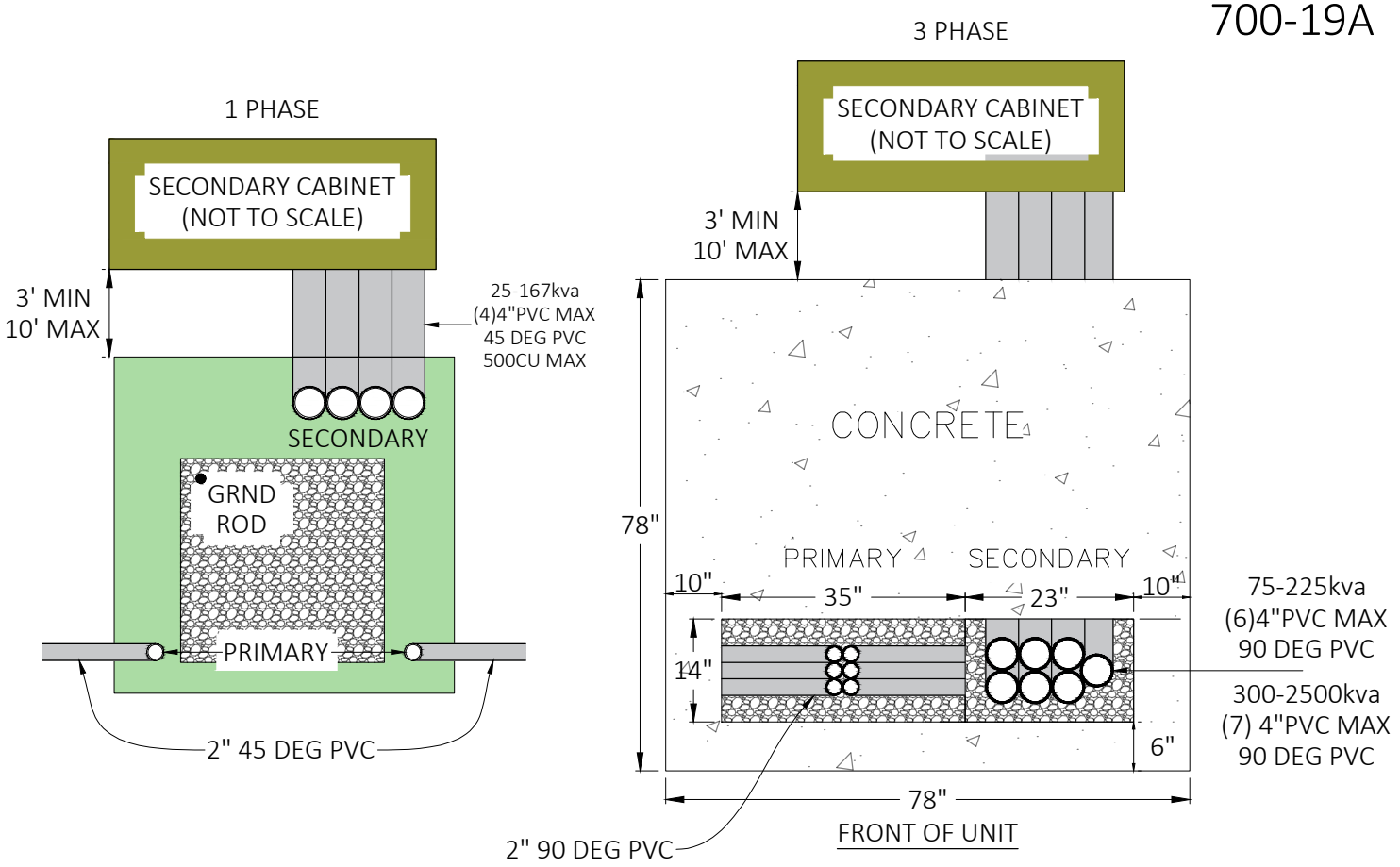
CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

BOLLARD INSTALLATION

Revision #:
Approved by:
Date Approved: 2024
File: UG Drawings_2024.dwg
DETAIL
700-18



NOTES:

1. SECONDARY CABINETS ARE REQUIRED WHEN THE NUMBER OF SECONDARY CABLE RUNS NEEDED, PER THE ONE-LINE, EXCEEDS THE NUMBER OF CABLES ALLOWED WITHIN A TRANSFORMER TYPE DESCRIBED BELOW
2. SECONDARY CABINETS ARE SUPPLIED, INSTALLED , OWNED, AND MAINTAINED BY THE DEVELOPER
3. SECONDARY CABINETS CAN BE INSTALLED A MINIMUM OF 3 FT AND A MAXIMUM OF 10 FT FROM THE SERVICING UTILITY TRANSFORMER
4. THE DEVELOPER / CONTRACTOR IS RESPONSIBLE FOR INSTALLING (X) 4 INCH PVC CONDUITS INTO THE SECONDARY WINDOW OF THE TRANSFORMER PAD.
   - 4.1. (X) IS DETERMINED BY THE SIZE AND PHASE OF THE TRANSFORMER
   - 4.2. USE 45 DEG ELBOWS WHEN ENTERING A 1PH TRANSFORMER
   - 4.3. USE 90 DEG ELBOWS OR A CONCRETE CABLE TRAY WHEN ENTERING A 3PH TRANSFORMER
5. MAXIMUM NUMBER OF 4 INCH SECONDARY CONDUITS ALLOWED ACCORDING TO TRANSFORMER TYPE:
   - 5.1. 4 - 4 INCH: ALL 1PH TRANSFORMERS
   - 5.2. 6 - 4 INCH: 25 KVA - 225 KVA 3PH TRANSFORMERS
   - 5.3. 7 - 4 INCH: 300 KVA - 2500 KVA 3PH TRANSFORMERS
6. MAXIMUM NUMBER AND SIZE OF SECONDARY CABLES ACCORDING TO TRANSFORMER TYPE:
   - 6.1. 4 RUNS OF 500CU: ALL 1 PHASE TRANSFORMERS
   - 6.2. 6 RUNS OF 750CU: 25 KVA - 225 KVA TRANSFORMERS
   - 6.3. 7 RUNS OF 750CU: 300 KVA - 2500 KVA TRANSFORMERS
7. LPC WILL BE RESPONSIBLE FOR INSTALLING THE CABLES BETWEEN THE TRANSFORMER AND THE SECONDARY CABINET
8. LPC WILL BE RESPONSIBLE FOR TERMINATING THE CABLES WITHIN THE TRANSFORMER
9. THE CONTRACTOR IS RESPONSIBLE FOR TERMINATING THE CABLES WITHIN THE SECONDARY CABINET
10. FOR EQUIPMENT CLEARANCE DETAILS REFERENCE 700-02
11. FOR THREE PHASE TRANSFORMER PAD DETAILS REFERENCE 700-10

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

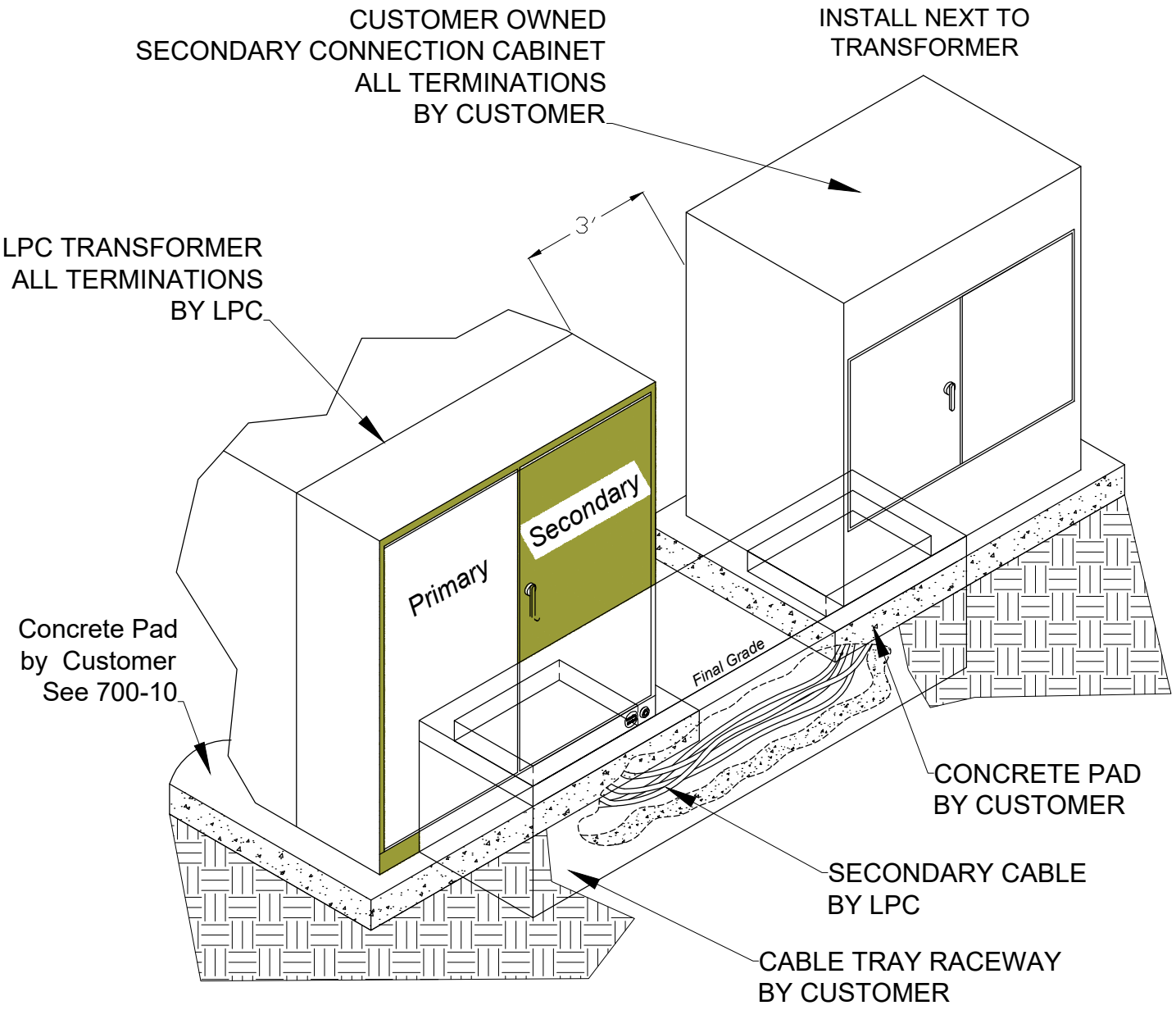
CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

SECONDARY CONNECTION CABINET (SCC) PART 1

Revision #:	
Approved by:	
Date Approved: 2024	
File: UG Drawings_2024.dwg	
DETAIL	
700-19A	



NOTES:

1. INSTALL NEXT TO TRANSFORMER WITH THREE FEET MINIMUM CLEARANCE.
2. CUSTOMER SHALL FURNISH, INSTALL, OWN, AND MAINTAIN CONCRETE TRANSFORMER PAD, SECONDARY CONNECTION TRAY, SECONDARY CONNECTION PAD, AND SECONDARY CONNECTION CABINET INCLUDING ALL INTERNAL COMPONENTS WITHIN THE SECONDARY CONNECTION CABINET.

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

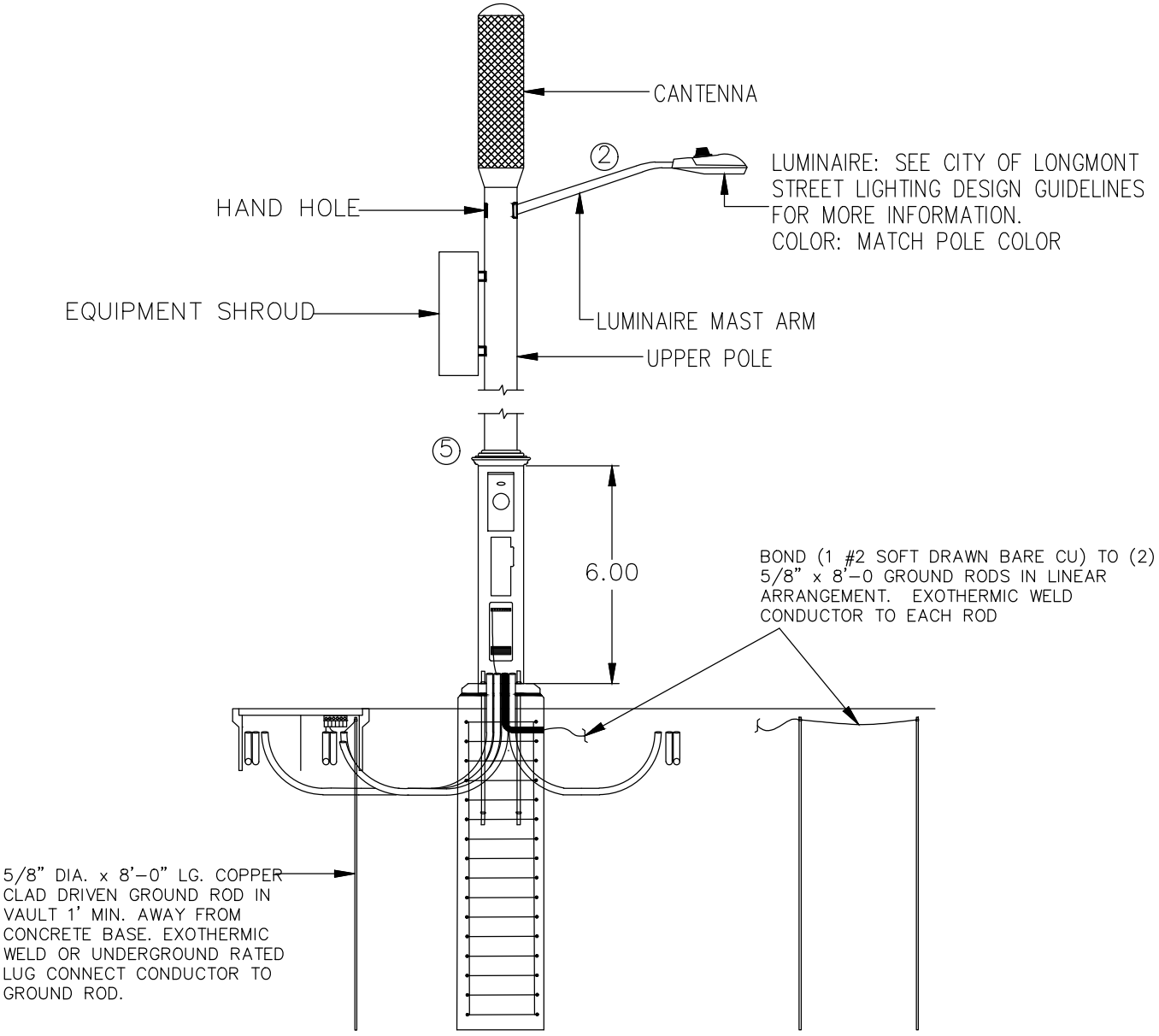
CITY OF
LONGMONT
COLORADO

SECONDARY CONNECTION CABINET (SCC) PART 2

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

Revision #:	
Approved by:	
Date Approved: 2024	
File: UG Drawings_2024.dwg	
DETAIL	
700-19B	



ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

CITY OF LONGMONT COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

SMALL CELL FACILITIES
LPC STREET LIGHT POLES

PHONE: 303-651-8386
FAX: 303-651-8796

Revision #:	
Approved by:	
Date Approved: 2024	
File: UG Drawings_2024.dwg	
DETAIL	
700-20A	

DETAIL NOTES

1. POLE SHALL BE ROUND, STRAIGHT, GALVANIZED STEEL WITH A 12.75–INCH (MAX.) OUTER DIAMETER. POLE SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111. POLE SHALL EITHER MATCH SURROUNDING STREET LIGHT POLE COLORS (IF APPLICABLE) OR BE DARK BROWN. OTHER COLORS MAY BE APPROVED BY LPC. PAINT SHALL BE POWDER COATED OVER ZINC PAINT. POLE SHALL BE DESIGNED TO WITHSTAND A MINIMUM WIND VELOCITY OF 110 MPH PER TIA–222 REVISION G AND IBS 2012 WITH ASCE/SEI 7–10. A MINIMUM OF 15% OF THE POLE STRUCTURAL CAPACITY SHALL BE RESERVED FOR FUTURE CITY OF LONGMONT INTERNET–OF–THINGS INSTALLATIONS. WEATHERPROOF GROMMETS SHALL BE INTEGRATED INTO THE POLE DESIGN TO ALLOW FOR CABLE TO EXIT. A HANDHOLE SHALL BE PROVIDED TO MAINTAIN CURRENT AND FUTURE LPC/CITY OF LONGMONT FACILITIES. AN OPTIONAL HANDHOLE MAY BE PROVIDED ABOVE THE BASE. POLE SHALL BE ARCHITECTURALLY COMPATIBLE WITH THE EQUIPMENT CABINET.

2. LUMINAIRE MAST ARMS SHALL BE GALVANIZED STEEL AND PAINTED TO MATCH THE POLE. THE LUMINAIRE MAST ARM LENGTH SHALL MATCH THAT OF THE EXISTING POLE UNLESS OTHERWISE DIRECTED BY LPC. ALL LUMINAIRES SHALL BE MOUNTED AT THE SAME HEIGHT AS SURROUNDING STREETLIGHTS UNLESS OTHERWISE DIRECTED BY LPC. ALL LUMINAIRES SHALL BE PROVIDED BY LPC.

3. CANTENNA SHALL BE 16–INCH MAXIMUM OUTER DIAMETER WITH SHROUD. THE HEIGHT OF THE CANTENNA – INCLUDING ALL ASSOCIATED EQUIPMENT AND HARDWARE REQUIRED FOR INSTALLATION – FROM THE TOP OF THE MAST ARM CONNECTION TO THE TOP OF THE CANTENNA SHALL NOT EXCEED 8–FEET. A TAPERED TRANSITION BETWEEN THE UPPER POLE AND CANTENNA SHALL BE INCLUDED.

4. ANTENNAS LOCATED ON THE SIDE OF THE POLE, ALONG WITH ALL OTHER HARDWARE REQUIRED FOR COMPLETE INSTALLATION, SHALL FIT WITHIN A 38"H X 16"W X 12'D (MAXIMUM) SHROUD AND SECURELY STRAPPED TO THE POLE. THE SHROUD SHALL BE COLORED TO MATCH THE POLE.

5. RADIO FREQUENCY WARNING LABELS SHALL BE MOUNTED EXTERIOR TO THE POLE. A 4" X 6" (MAXIMUM) PLATE WITH CARRIER'S NAME, LOCATION IDENTIFYING INFORMATION, AND EMERGENCY TELEPHONE NUMBER SHALL BE PERMANENTLY FIXED TO THE POLE.

6. EQUIPMENT CABINET SHALL BE ROUND, GALVANIZED STEEL WITH A PREFERRED 16" DIAMETER (20" DIAMETER MAXIMUM) AND A 5'–8" MAXIMUM HEIGHT. EQUIPMENT CABINET AND POLE SHALL MATCH COLOR. ALL EQUIPMENT SHALL BE LOCATED INTERNAL TO THE EQUIPMENT CABINET OR RECESSED AS MUCH AS POSSIBLE. A 100 AMP METER HOUSING (WITH LEVER BYPASS) FOR CARRIER ELECTRIC SERVICE SHALL BE RECESSED INTO THE EQUIPMENT CABINET. METER DISCONNECT SHALL BE RECESSED INTO THE CABINET. METER SHALL BE PROPERLY GROUNDED PER NEC. A HANDHOLE FOR STREETLIGHT ELECTRICAL SERVICE SHALL BE PROVIDED. AT EACH EQUIPMENT CABINET HANDHOLE, PROVIDE A SUBMERSIBLE, WATERPROOF, IN–LINE FUSE HOLDER WITH FNQ–15a FUSE FOR EACH HOT AND A SUBMERSIBLE, WATERPROOF CONNECTOR ON NEUTRAL (IF REQUIRED). A PASSIVE VENTILATION SYSTEM SHALL BE PROVIDED FOR TEMPERATURE CONTROL. POLE AND EQUIPMENT SHALL BE GROUNDED TO MEET APPLICABLE NEC SECTIONS INCLUDING (BUT NOT LIMITED TO) 410.30(B)(5), 250.118, AND 250.122. ALL HARDWARE ATTACHMENTS SHALL BE HIDDEN.

7. PRECAST CONCRETE FOUNDATIONS DESIGNED TO MEET ACI 318–14 ARE PREFERRED AND SHOULD BE INSTALLED WHENEVER POSSIBLE. A MINIMUM OF FOUR (4) 2" PVC SCHEDULE 40 CONDUIT SWEEPS SHALL BE INSTALLED. CONDUIT SHALL ACCOMMODATE LPC ELECTRICAL, CARRIER ELECTRICAL, AND FIBER. ANY ADDITIONAL CONDUIT SWEEPS ARE FOR FUTURE LPC USE. ANCHOR BOLTS SHALL BE HIDDEN FROM VIEW. TOP OF FOUNDATION SHALL BE 4 INCHES ABOVE FINAL GRADE. FOUNDATION DEPTH, EMBEDMENT DEPTH, DIMENSIONS AND REINFORCEMENT SHALL BE DESIGNED BY A STRUCTURAL ENGINEER LICENSED IN THE STATE OF COLORADO.

8. FIBERGLASS PULL/SPLICE BOXES ARE REQUIRED FOR SEPARATE ELECTRICAL AND FIBER SERVICES. REFER TO NEC ARTICLE "PULL AND JUNCTION BOXES AND CONDUIT BODIES MINIMUM SIZE" FOR BOX SIZE REQUIREMENTS BASED ON CONDUIT AND WIRE SIZES. FIBERGLASS PULL/SPLICE BOXES SHALL BE SET 1' – 3' FROM THE CONCRETE FOUNDATION. THE WIRE TERMINATIONS IN THIS BOX SHALL BE MADE USING SUBMERSIBLE INSULATED PEDESTAL LUG CONNECTIONS. PROVIDE ONE MULTI–LUG CONNECTOR FOR EACH PHASE, NEUTRAL, AND GROUND CONNECTOR TO BE SPLICED IN THIS IN–GRADE SPLICE BOX.

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

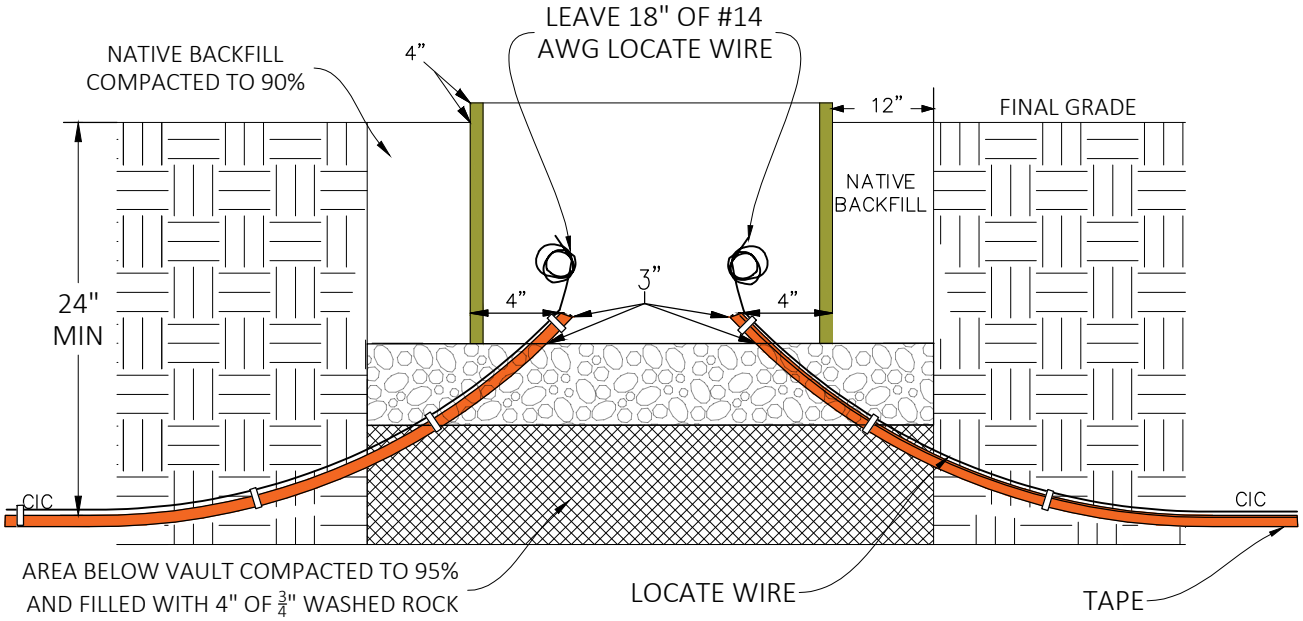
CITY OF
LONGMONT
COLORADO

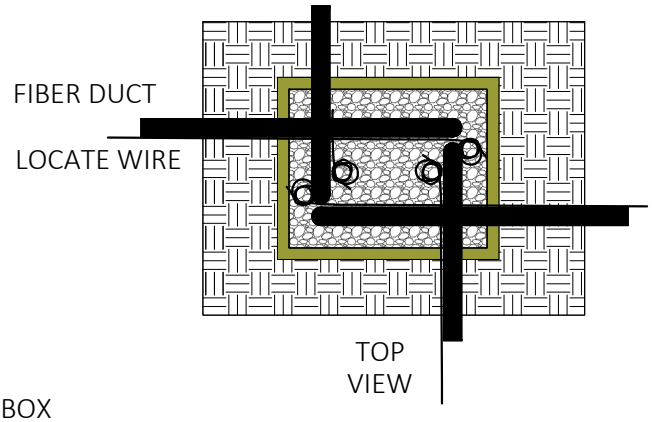
1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

SMALL CELL FACILITIES
LPC STREET LIGHT POLES
(CONTINUED)

Revision #:	
Approved by:	
Date Approved: 2024	
File: UG Drawings_2024.dwg	
DETAIL	
700-20B	





NOTES:

1. J-BOX MUST BE LEVEL AND SET 4" ABOVE FINAL GRADE
2. PROVIDE 95% COMPACTION UNDER AND AROUND THE J-BOX
3. THE CONDUIT SHALL HAVE 3" EXPOSED IN THE J-BOX
4. CABLE SWEEPS INTO J-BOX MUST BE GRADUAL AND HAVE A MINIMUM 48" RADIUS
5. #14 AWG LOCATE WIRE SHALL BE TAPED TO EVERY BROADBAND CONDUIT
6. LEAVE 18 INCHES OF LOCATE WIRE AT EACH END OF THE BROADBAND CONDUIT.
7. TRAFFIC RATED J-BOXES ARE TO BE USED WHEN THE MINIMUM CLEARANCES CANNOT BE MET FROM VEHICLES
8. FOR EQUIPMENT CLEARANCES REFERENCE DETAIL 700-02
9. FOR EQUIPMENT ALIGNMENT ON TRENCH REFERENCE DETAIL 700-05

ELECTRIC SERVICES

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

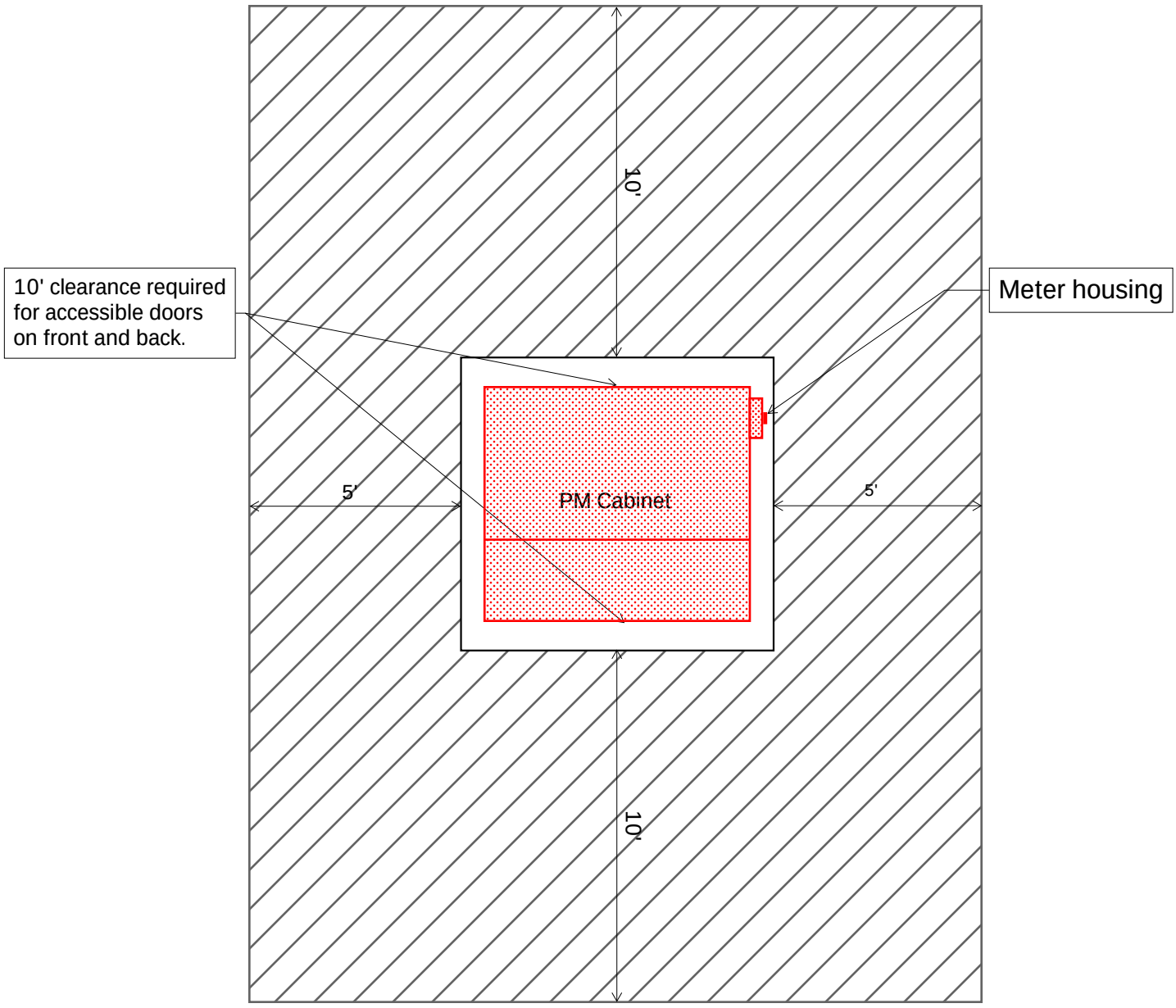
CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

BROADBAND J-BOX WITH LOCATE WIRE

PHONE: 303-651-8386
FAX: 303-651-8796

Revision #:	
Approved by:	
Date Approved: 2024	
File: UG Drawings_2024.dwg	
DETAIL	
700-21	



ELECTRIC SERVICES

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

CITY OF
LONGMONT
COLORADO

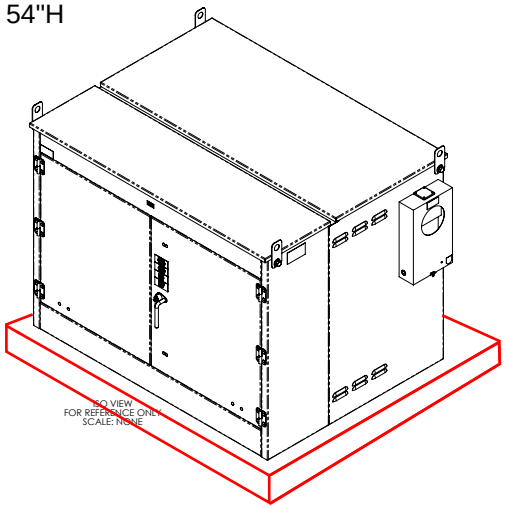
PM Cabinet Clearances (use notes from updated detail 700-02)

Revision #:	
Approved by:	
Date Approved:	
File:	
DETAIL	
700-22	

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

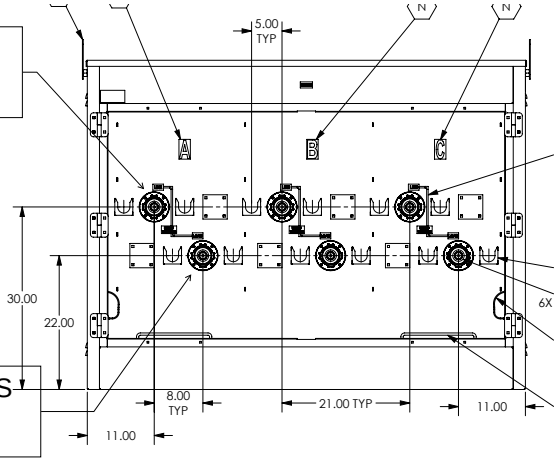
PM CABINET DIMS: 72"W x 54"D x 54"H



PM CABINET ISO VIEW. SHOWN ON 3 PHS XFMR PAD.

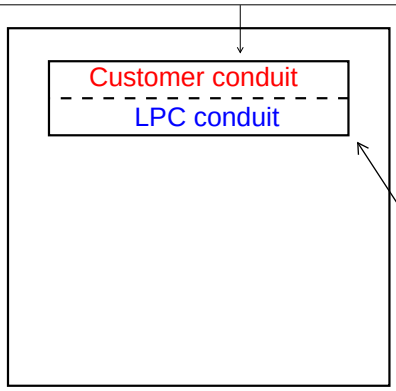
LINE SIDE BUSHINGS (200A OR 600A)

LOAD SIDE BUSHINGS (200A OR 600A)



PM CABINET TERMINATION COMPARTMENT FRONT VIEW, DOORS OPEN. TYPICAL - SINGLE BUSHING LINE AND LOAD.

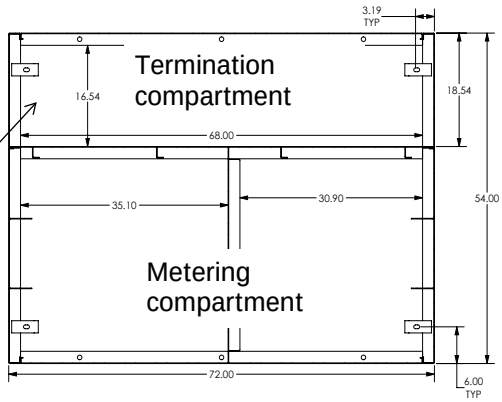
CONDUIT BLOCK-OUT - 58"W X 14"D DIVIDED HORIZONTALLY DUE TO BUSHING LAYOUT.



LPC std 3phs xfmr pad - 78"x78"

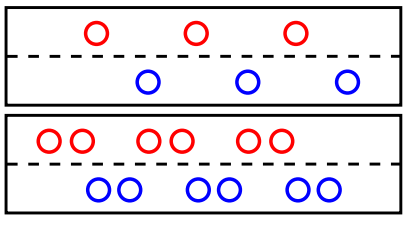
68"W x 16"D PM CABINET CONDUIT WINDOW.

CABINET CAN MOUNT ON STOCK 3 PHASE TRANSFORMER PAD.



PM CABINET TOP DOWN INTERIOR SECTION VIEW.TYPICAL DIMENSIONS.

Conduit Configuration - LPC, Customer



1 BUSHING/PHASE

2 BUSHING/PHASE

ELECTRIC SERVICES

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

CITY OF LONGMONT COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

PRIMARY METERING CABINET CONSTRUCTION DETAIL

Revision #:	
Approved by:	
Date Approved:	
File:	
DETAIL	
700-22B	

Primary Metering Installation

700-22C

Responsibility Table

Item, Material, or Work Description	Party to Furnish & Own	Party to Install & Maintain
Permits & Inspections	Customer	N/A
Primary Metering Cabinet	LPC Specified / Customer Purchased	LPC
Concrete Equipment Pad	Customer	Customer
Line Side Conduit & 15kV Cable	LPC	LPC
Line Side Terminations	LPC	LPC
Load Side Conduit & 15kV Cable	Customer	Customer
Load Side Terminations[1]	LPC	LPC
Instrument Transformers	LPC	LPC
Meter Socket & Revenue Meter	LPC	LPC
Meter Circuit Wiring	LPC	LPC
Ground Rod, Ground Conductor	LPC	LPC

Point of Demarcation - Primary metering point of demarcation is the load side terminations. The customer is responsible for the purchase, installation, and maintenance of material and equipment after the point of demarcation.

Primary Metering Installations – Primary metering installations must be approved in writing by the LPC Director of Electrical Engineering. The customer is responsible for all costs associated with the primary metering installation.

Primary Metering Materials – LPC will specify the primary metering cabinet, instrument transformers, meter socket, and revenue meter. The customer will purchase and have the primary metering cabinet delivered to LPC. Contact the LPC Electric Meter Shop Supervisor for the latest specification prior to purchasing.

Primary Metering Testing & Certification – LPC will test and certify the primary meter installation when energizing the service.

Primary Metering Cabinet Access – The customer must coordinate access to the primary metering cabinet with the LPC Electric Meter Shop Supervisor.

Replacement of Primary Metering Equipment – Any replacement of the primary metering cabinet and equipment must be coordinated with LPC. Replacement of the instrument transformers will be performed by LPC. The customer is responsible for the cost of the primary metering cabinet, exclusive of LPC owned equipment, and is responsible for all labor costs associated with the replacement.

---

[1] Customer supplied cable must fit standard LPC termination kits. Contact LPC Field Engineering for compatible cable insulation dimensions.

ELECTRIC SERVICES | CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES | NOT TO SCALE

CITY OF LONGMONT COLORADO

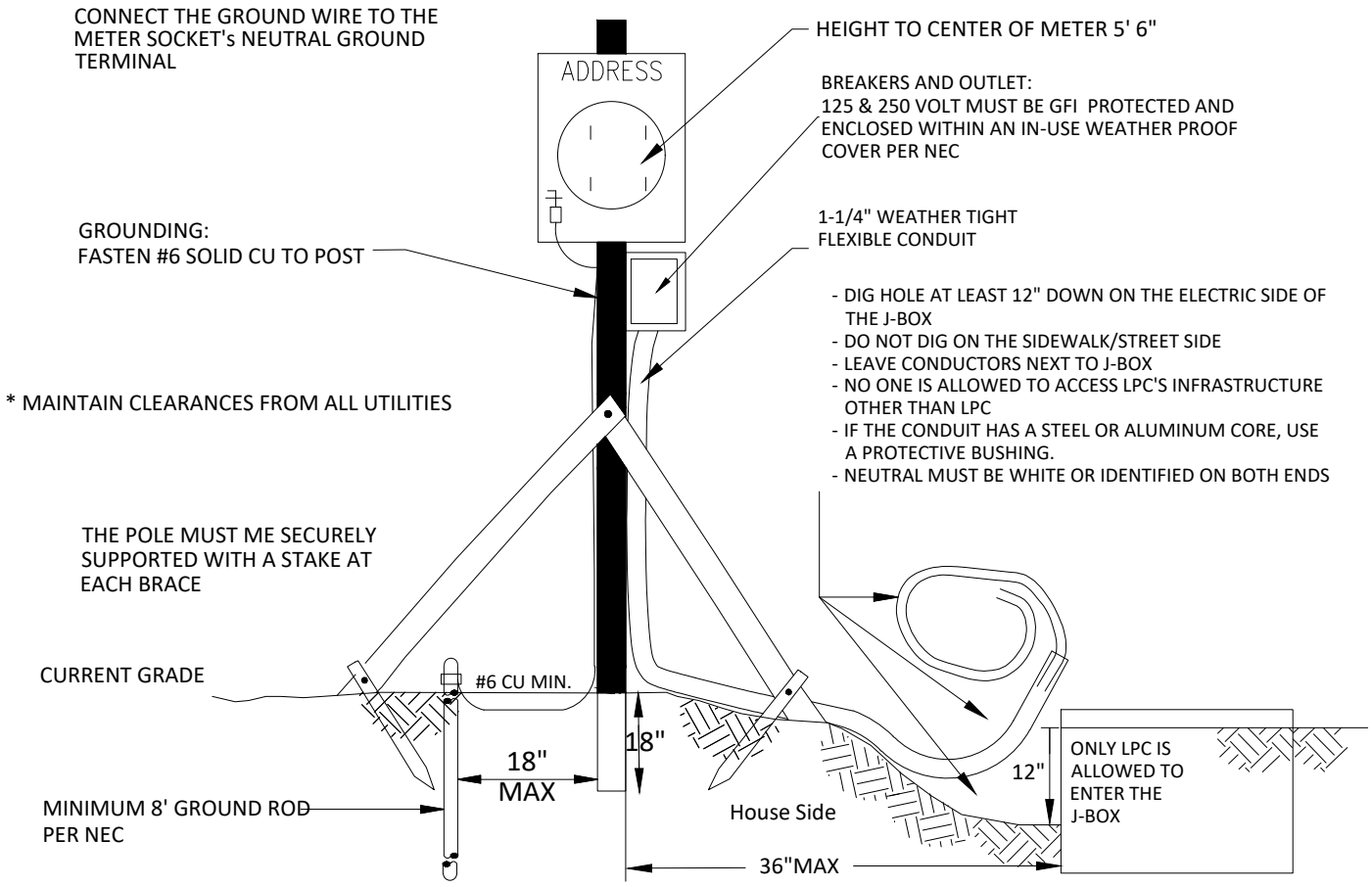
1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

PRIMARY METERING RESPONSIBILTY TABLE

Revision #:	
Approved by:	
Date Approved:	
File:	
DETAIL	
700-22C	

ALL NON-CURRENT CARRYING METALLIC PARTS TO BE BONDED TO NEUTRAL AND EFFECTIVELY GROUNDED PER NEC.



NOTES:

1. ALL CONNECTIONS TO CITY-OWNED FACILITIES MUST BE MADE BY CITY PERSONNEL
2. A 3 WIRE, 240 VOLT, METER SOCKET AND BREAKER IS REQUIRED AND SHALL MEET NEC REQUIREMENTS
3. ALL EQUIPMENT SHALL BE FURNISHED AND INSTALLED BY THE CUSTOMER
4. TEMPORARY METERING SHALL FOLLOW THE NEC DISCONNECT GUIDELINES.
5. ALL SERVICES 400 AMPS OR LESS, REQUIRE A LEVER OPERATED BYPASS.
   REFER TO BYPASS DETAILS WITHIN MTR-14, MTR-16 AND MTR-17
6. SINGLE PHASE 120/208v TEMP POWER REQUIRES 5TH JAW AT 9 O'CLOCK POSITION IN METER HOUSING SOCKET
7. THE ADDRESS FOR TEMPORARY SERVICES MUST BE PROMINENTLY POSTED FOR SINGLE FAMILY RESIDENTIAL AND A PHENOLIC BADGE FOR COMMERCIAL.
8. REFER TO SECTION 703.01 FOR LABELING REQUIREMENTS
9. THE CONTRACTOR IS REQUIRED TO EXPOSE THE SIDE OF THE TRANSFORMER GROUND VAULT TO A DEPTH OF 12" BELOW GRADE AND LEAVE THE FOLLOWING LENGTHS OF CONDUCTOR FOR LPC TO CONNECT TO
   9.1. 24" OF CONDUCTOR SHALL STICK OUT OF THE FLEX DUCT WHEN CONNECTING TO A J-BOX
   9.2. 48" OF CONDUCTOR SHALL STICK OUT OF THE FLEX DUCT WHEN CONNECTING TO A TRANSFORMER
10. THIS METER WILL BE RELOCATED TO THE BUILDING STRUCTURE UPON FINAL RELEASE.
11. REFER TO SECTION 700 FOR ALL OTHER DETAILS

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

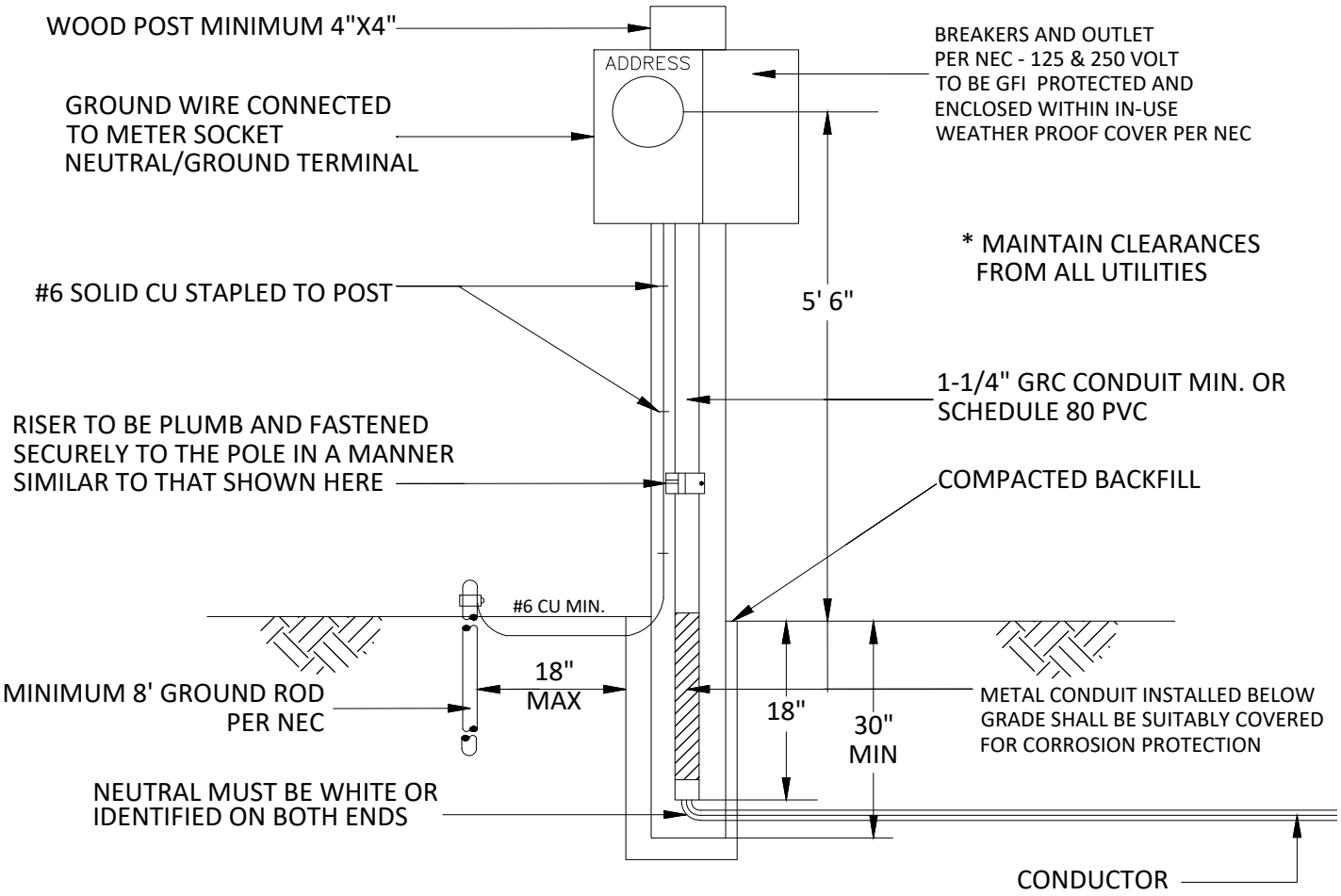
CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

TEMPORARY POWER
1 - 6 MONTHS USE

Revision #:	
Approved by:	
DATE APPROVED:	2025
File:	MTR DRAWINGS_2025.dwg
	DETAIL
	MTR-1



NOTES:

1. ALL CONNECTIONS TO CITY-OWNED FACILITIES MUST BE MADE BY CITY PERSONNEL
2. METER SOCKET AND BREAKER IS REQUIRED AND SHALL MEET NEC REQUIREMENTS PER SIZING OF SERVICE.
3. ALL EQUIPMENT SHALL BE FURNISHED AND INSTALLED BY THE CUSTOMER.
4. TEMPORARY METERING SHALL FOLLOW THE NEC DISCONNECT GUIDELINES.
5. ALL SERVICES 400 AMPS OR LESS, REQUIRE A LEVER OPERATED BYPASS.
6. REFER TO BYPASS DETAILS WITHIN MTR-14, MTR-16 AND MTR-17
7. THE ADDRESS FOR TEMPORARY SERVICES MUST BE PROMINENTLY POSTED FOR SINGLE FAMILY RESIDENTIAL AND A PHENOLIC BADGE FOR COMMERCIAL.
8. REFER TO SECTION 703.01 FOR LABELING REQUIREMENTS
9. REFER TO MTR-1 FOR CONNECTIONS TO J-BOX/TRANSFORMERS
10. REFER TO SECTION 700 FOR ALL OTHER DETAILS

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

CITY OF
LONGMONT
COLORADO

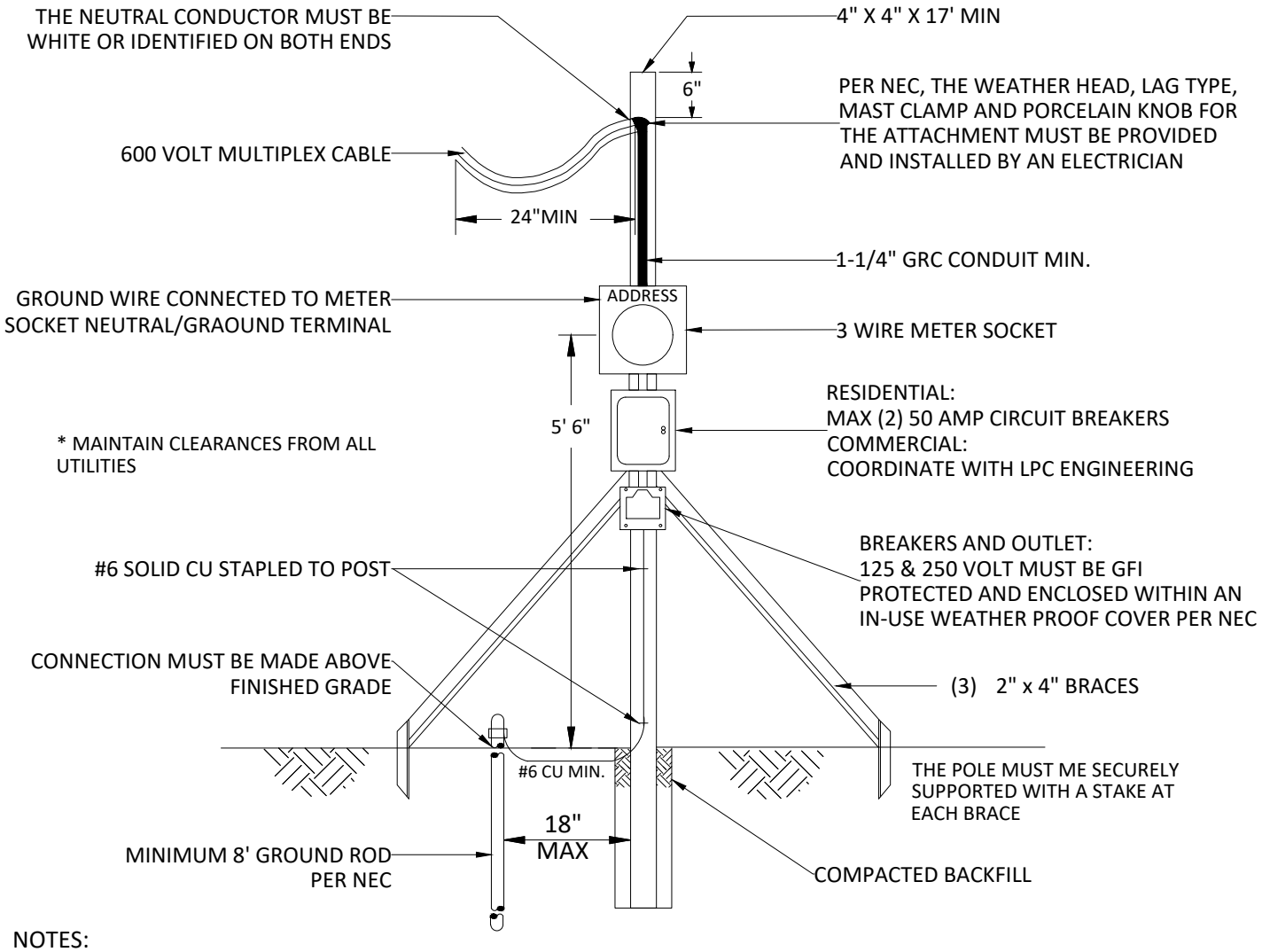
1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

TEMPORARY POWER
1 - 12 MONTHS USE

Revision #:	
Approved by:	
DATE APPROVED:	2025
File:	MTR DRAWINGS_2025.dwg
	DETAIL
	MTR-2

ALL NON-CURRENT CARRYING METALLIC PARTS TO BE BONDED TO
NEUTRAL AND EFFECTIVELY GROUNDED
PER NEC



NOTES:

1. ALL CONNECTIONS TO CITY-OWNED FACILITIES MUST BE MADE BY CITY PERSONNEL
2. METER SOCKET AND BREAKER IS REQUIRED AND SHALL MEET NEC REQUIREMENTS PER SIZING OF SERVICE.
3. ALL EQUIPMENT SHALL BE FURNISHED AND INSTALLED BY THE CUSTOMER
4. COMMERCIAL TEMPORARY METERING SHALL FOLLOW THE NEC DISCONNECT GUIDELINES.
5. ALL SERVICES 400 AMPS OR LESS, REQUIRE A LEVER OPERATED BYPASS. REFER TO BYPASS DETAILS WITHIN MTR-14, MTR-16 AND MTR-17
6. SINGLE PHASE 120/208v TEMP POWER REQUIRES 5TH JAW AT 9 O'CLOCK POSITION IN METER HOUSING SOCKET
7. THE ADDRESS FOR TEMPORARY SERVICES MUST BE PROMINENTLY POSTED FOR SINGLE FAMILY RESIDENTIAL AND A PHENOLIC BADGE FOR COMMERCIAL.
8. REFER TO SECTION 703.01 FOR LABELING REQUIREMENTS
9. THIS METER WILL BE RELOCATED TO THE BUILDING STRUCTURE UPON FINAL RELEASE.
10. REFER TO SECTION 700 FOR ALL OTHER DETAILS

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

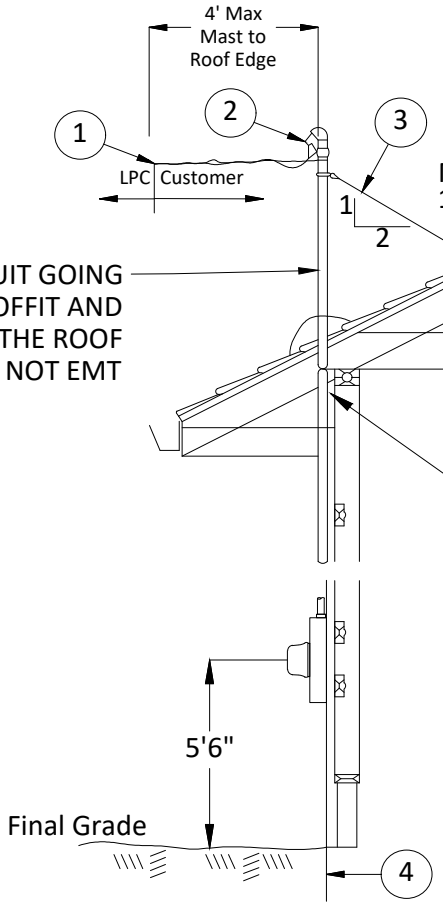
CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

TEMPORARY POWER OVERHEAD

Revision #:	
Approved by:	
DATE APPROVED:	2025
File:	MTR DRAWINGS_2025.dwg
	DETAIL
	MTR-3



REFERENCES:

1. ALLOW 24" CONDUCTOR LEADS FOR CONNECTION TO SERVICE DROPS.
2. WEATHER-HEAD AND MAST CLAMP WITH PORCELAIN KNOB MUST BE PROVIDED AND INSTALLED BY AN ELECTRICAL CONTRACTOR TO MEET NEC CLEARANCE REQUIREMENTS
3. GUYING SHALL BE 1/4" COMMON GALVANIZED STEEL STRAND OR EQUAL (OVER 5' TWO GUYS REQUIRED)
4. NEUTRAL MUST BE IDENTIFIED ON BOTH ENDS
5. CONSTRUCT PER NEC

CONDUIT SIZE GUYING RECOMMENDATIONS FOR
THROUGH ROOF APPLICATIONS ONLY

SERVICE MAST GRC	SERVICE SIZE	UTILITY SERVICE LENGTH	LENGTH OF UNSUPPORTED MAST
2"	200 AMP OR LESS	LESS THAN 100'	24"
2 1/2"	201-400 AMP SERVICE	LESS THAN 60'	24"

NOTES:

1. MOUNT SERVICE MAST ON SIDE NEAREST DISTRIBUTION POLE. AVOID SERVICE WIRE OVERHANG OR PROVIDE CLEARANCE REQUIRED OVER ROOF.
2. FOR BRICK VENEER OR CONCRETE BLOCK, USE 1/4" X 3 1/4" LEAD SLEEVE EXPANSION BOLT IN JOINT PLACE OF LAG SCREWS ON ANCHOR STRAPS.
3. IF NOT GOING THROUGH ROOF LINE EMT CONDUIT IS ACCEPTABLE & A LAG TYPE PORCELAIN KNOB WILL BE SECURLY ATTACHED TO THE STRUCTURE

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

CITY OF
LONGMONT
COLORADO

OVERHEAD BUILDING ATTACHMENT

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

Revision #:	
Approved by:	
DATE APPROVED:	2025
File:	MTR DRAWINGS_2025.dwg
DETAIL	
MTR-4	

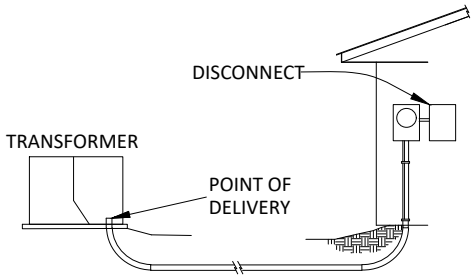
EFFECTIVE JANUARY 1, 2019 LONGMONT POWER & COMMUNICATIONS
ACCEPTED 320 CLASS METERING FOR 201-400 AMP 120/240v, 120/208v
SINGLE-PHASE AND 120/208v THREE-PHASE SERVICES

1. REFERENCE LPC'S APPROVED MATERIALS; SPECIFICATION FOR 320 AMP, METER HOUSING.
2. MUST BE IN ACCORDANCE TO NESC AND NEC REGULATIONS.
3. THE CUSTOMER INSTALLS, OWNS AND MAINTAINS THE CONDUIT, CONDUCTOR AND EQUIPMENT BEYOND THE POINT OF DELIVERY.
4. LPC INFRASTRUCTURE WILL BE INSTALLED TO ACCOMMODATE THE ELECTRIC SERVICE AT THE CUSTOMER'S EXPENSE.
5. ALL 1PH, STAND ALONE RESIDENTIAL SERVICES REQUIRE A HOT SEQUENCE NEXT TO THE METER.

LPC'S POINT OF DELIVERY:

SINGLE UNDERGROUND CUSTOMER;

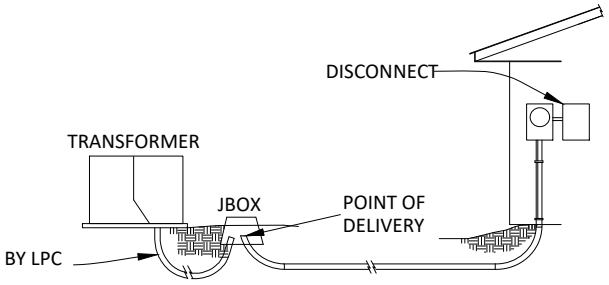
POINT OF DELIVERY IS AT THE SECONDARY CONNECTIONS WITHIN THE TRANSFORMER



TRANSFORMERS SERVING MULTIPLE CUSTOMERS;

LPC WILL INSTALL THE CONDUCTORS FROM THE TRANSFORMER TO AND INCLUDING THE VAULT/JBOX.
-INSTALL OR BORE IN A NEW 3" CONDUIT
-FOR (1)200A SVC & (1)400A SVC USE 350AL
-FOR (2)400A SVC's USE 500CU
*UPGRADE TO 5WAYS IN JBOX

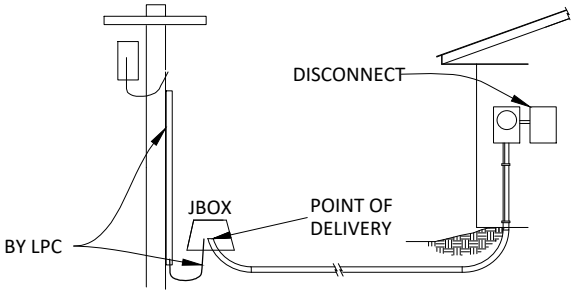
POINT OF DELIVERY IS THE CONNECTION WITHIN THE GROUND VAULT/J-BOX



OVERHEAD LPC TO UNDERGROUND CUSTOMER;

LPC WILL INSTALL THE CONDUCTORS FROM THE TRANSFORMER TO AND INCLUDING THE VAULT/JBOX.
-INSTALL OR BORE IN A NEW 3" CONDUIT
-FOR (1)200A SVC & (1)400A SVC USE 350AL
-FOR (2)400A SVC'S USE 500CU
*UPGRADE TO 5WAYS IN JBOX

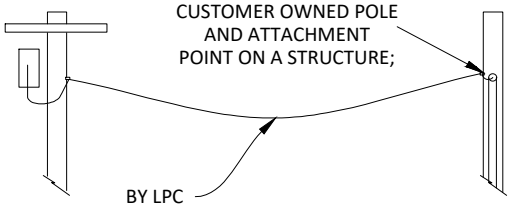
POINT OF DELIVERY IS THE CONNECTION WITHIN THE GROUND VAULT/J-BOX



OVERHEAD INSTALLATIONS;

POINT OF DELIVERY WILL BE AT THE CUSTOMER OWNED POLE OR BUILDING ATTACHMENT.

REFER TO MTR-4 FOR OVERHEAD BUILDING ATTACHMENTS



* MAINTAIN CLEARANCES FROM ALL UTILITIES

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

CITY OF LONGMONT COLORADO

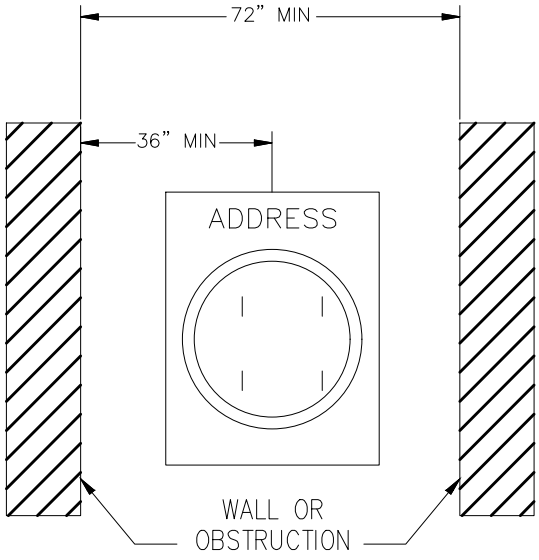
POINT OF DELIVERY FOR RESIDENTIAL SERVICES 201 - 400 AMPS

1100 S SHERMAN ST
LONGMONT, CO 80501

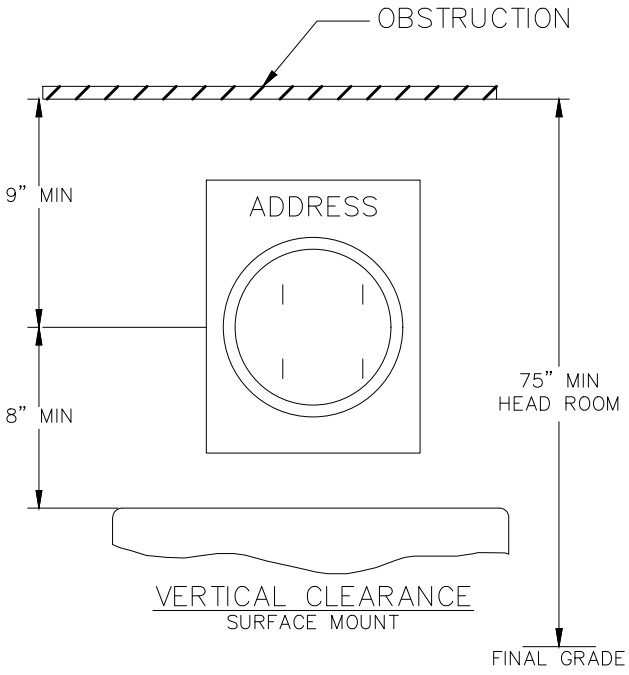
PHONE: 303-651-8386
FAX: 303-651-8796

Revision #:	
Approved by:	
DATE APPROVED:	2025
File:	MTR DRAWINGS_2025.dwg
	DETAIL
	MTR-5

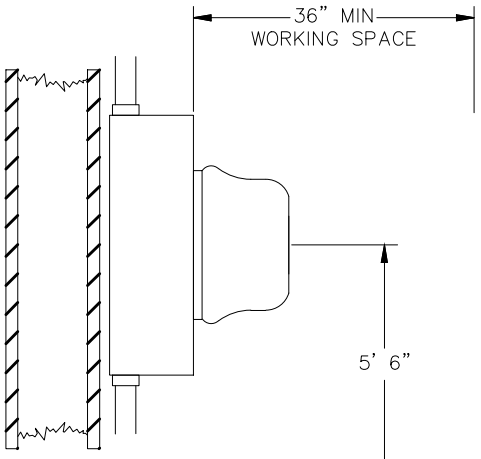
METER HOUSING CLEARANCE REQUIREMENTS



HORIZONTAL CLEARANCE
SURFACE MOUNT



VERTICAL CLEARANCE
SURFACE MOUNT



SIDE VIEW
SURFACE MOUNT

** A 36" CLEAR ZONE MUST BE MAINTAINED AROUND AND IN FRONT OF THE METER FOR SAFETY
** A CLEAR PATH TO THE METER MUST BE MAINTAINED AT ALL TIMES AS WELL.

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

CITY OF
LONGMONT
COLORADO

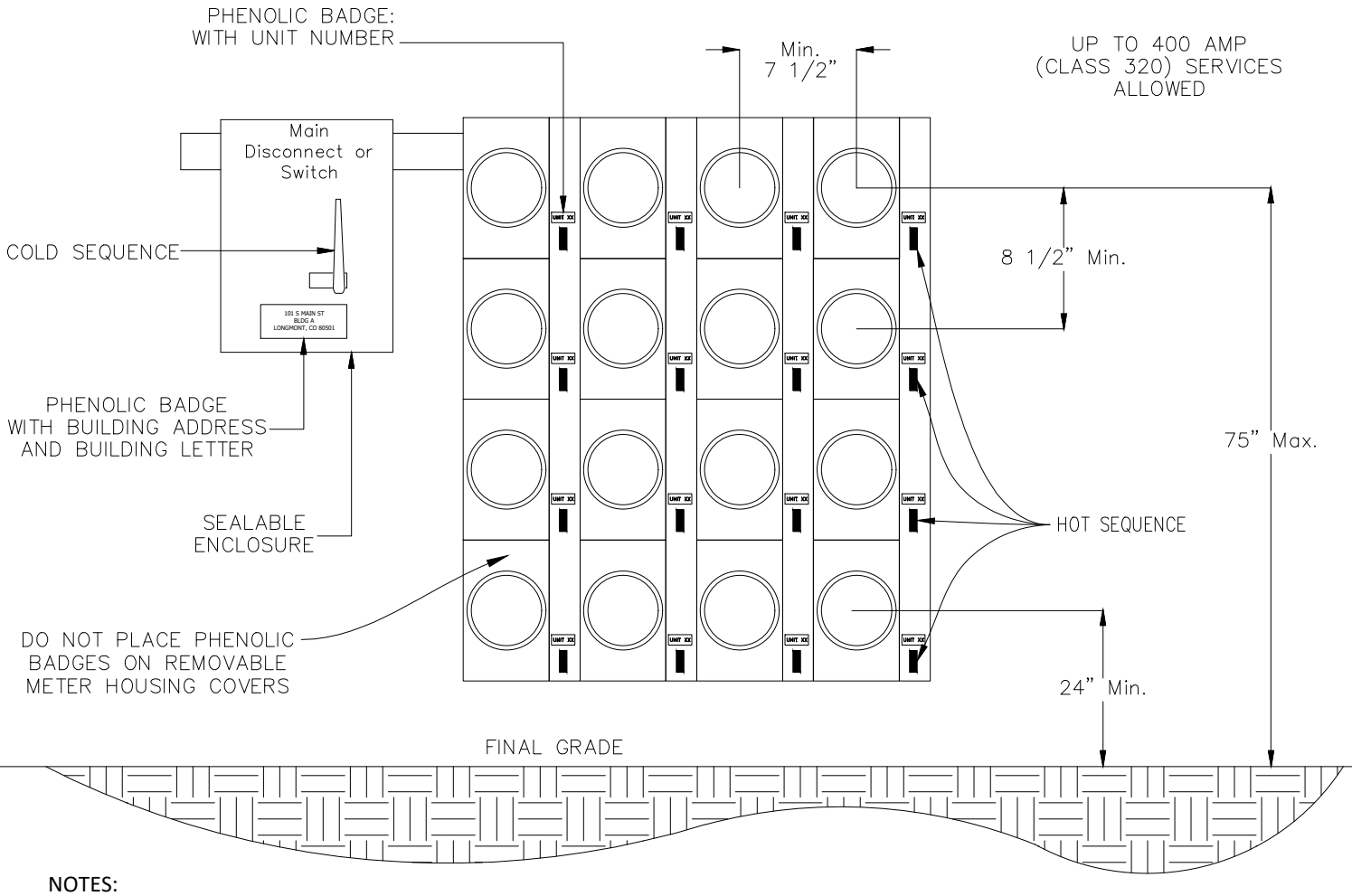
1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

METER HOUSING CLEARANCES

Revision #:	
Approved by:	
DATE APPROVED:	2025
File:	MTR DRAWINGS_2025.dwg
DETAIL	
MTR-8	

TYPICAL COMBINATION SERVICE TERMINATION ENCLOSURE AND METER SOCKET PANELS FOR MULTI-METER APPLICATIONS (GREATER THAN 1)



NOTES:

1. THE LINE SIDE OF THE METER BANK WILL BE COLD SEQUENCED AND SHALL INCLUDE PROVISIONS FOR AN LPC SEAL.
2. SEALS WILL BE USED BY LPC TO SECURE THE ENCLOSURE FROM UNAUTHORIZED ENTRY BUT ALLOW THE CUSTOMER EMERGENCY ACCESS FOR FUSE REPLACEMENT.
3. THE MAIN DISCONNECT SHALL BE COLD SEQUENCED AND LABELED WITH THE BUILDING ADDRESS AND BUILDING LETTER.
4. ALL METERED SERVICES, EXCLUDING CT RATED SERVICES, SHALL BE EQUIPPED WITH A LEVER OPERATED BYPASS.
5. REFER TO MTR-14 FOR SINGLE PHASE METER HOUSING 400 AMP OR LESS DETAILS
6. EACH INDIVIDUAL METER WILL HAVE AN APPROPRIATELY SIZED LOAD SIDE DISCONNECT BREAKER. EACH METER AND IT'S ASSOCIATED DISCONNECT MUST BE PERMANENTLY LABELED TO IDENTIFY THE CUSTOMER UNIT NUMBER.
7. ALL LABELS MUST BE CONSTRUCTED OF ENGRAVED PHENOLIC BADGES AND PERMANENTLY RIVETED TO THE ELECTRIC EQUIPMENT. NOTE: THEY SHOULD NOT BE ATTACHED TO REMOVABLE METER HOUSING COVERS.
8. PHENOLIC BADGES SHALL BE A MINIMUM OF 1" BY 2" WITH TEXT A MINIMUM OF 3/8" IN HEIGHT.
9. METERS WILL NOT BE INSTALLED UNTIL A RING OUT INSPECTION HAS BEEN APPROVED VIA THE METERING DEPT.
10. INSURE ITEMS 1-9 ABOVE ARE COMPLETED AND THE DOOR OF THE PHYSICAL UNIT IS LABELED PRIOR TO SCHEDULING THE RING OUT INSPECTION.
11. A SWITCHED LIGHT OR TEMP OUTLET MUST BE PRESENT AT THE TIME OF THE RING OUT INSPECTION TO VERIFY THE ELECTRICAL FEEDER GOES FROM THE METER TO THE INTENDED UNIT.
12. REFER TO METERING REQUIREMENTS SECTION 703.00
13. NO GUTTER OR TROUGHS WILL BE ALLOWED ON THE LINE SIDE OF THE METER(S)

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

CITY OF LONGMONT COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

MULTIPLE METER SOCKET INSTALLATIONS FOR INDIVIDUAL SERVICE SIZES 400 AMPS (CLASS 320) OR LESS

PHONE: 303-651-8386
FAX: 303-651-8796

Revision #:	
Approved by:	
DATE APPROVED:	2025
File:	MTR DRAWINGS_2025.dwg
	DETAIL
	MTR-9

Minimum Dimensions for CT Cabinets

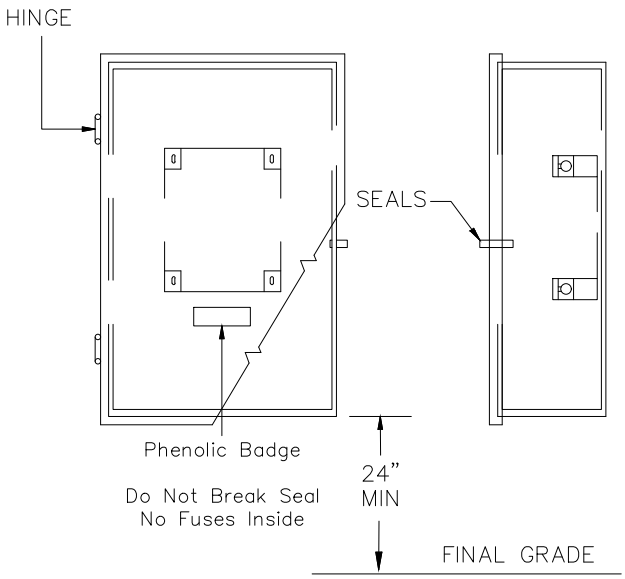
3–Phase 4–Wire 120/208V or 240V

Amps	Height	Width	Depth
400	N/A	N/A	N/A
600	40	30	8-1/4
800	48	30	11
1200	48	33	11
1600	60	33	11
2000	60	39	15
3000	75	39	24

DIFFERENT VARIATIONS EXIST BETWEEN MANUFACTURERS

3–Phase 4–Wire 277/480V with dedicated PT mounting provisions

Amps	Height	Width	Depth
400	48	36	15
600	48	36	15
800	48	36	15
1200	60	51	24
1600	75	63	24
2000	75	63	24
3000	75	63	24



NOTES:

1. 277/480 VOLT SERVICES 401 AMPS OR MORE, REQUIRE PTS, A CABINET WITH MANUFACTURED FACTORY-INSTALLED PROVISIONS FOR UNOBSTRUCTED MOUNTING OF THE PT's INSIDE THE SAME COMPARTMENT AS THE CT's.
2. HOT SEQUENCE SERVICE DISCONNECT MUST BE OUTSIDE OF THE BUILDING AND CONTINUOUSLY ACCESSIBLE. AN EXCEPTION IS ALLOWED FOR INTERNAL MOUNTING OF DISCONNECTS FOR FIRE PUMPS AS REQUIRED BY NFPA 20, APPENDIX A.3.
3. INSTRUMENT TRANSFORMERS (CT's/PT's) SHALL ONLY BE INSTALLED IN APPROVED NEMA TYPE 3R CT CABINETS WITH A HINGED DOOR, LOCKABLE HASP (KEYED DOORS ARE NOT ALLOWED) AND FASTENERS THAT CANNOT BE REMOVED FROM THE EXTERIOR AND SHALL BE OF SUFFICIENT SIZE FOR LOAD AND VOLTAGE CONDITIONS.
4. THE METER SOCKET SHALL BE MOUNTED SO THAT IT IS NOT OBSTRUCTED WITH THE CABINET DOOR IN THE FULLY OPEN POSITION AND IF POSSIBLE, ATTACHED TO THE CT CABINET.
5. METERS WILL NOT BE INSTALLED UNTIL ALL SOCKETS AND INSTRUMENT TRANSFORMER CABINETS ARE BADGED AS SHOWN ON THE ONE-LINE DIAGRAM WITH PHENOLIC BADGES AND RIVETED PERMANENTLY TO THE ASSOCIATED ELECTRIC EQUIPMENT.
6. REFER TO MTR-11 FOR CT & PT METERING SPECIFICATIONS
7. REFER TO MTR-13 FOR COMMERCIAL SWITCHGEAR SPECIFICATIONS
8. REFER TO SECTION 703.00 FOR METERING REQUIREMENTS

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

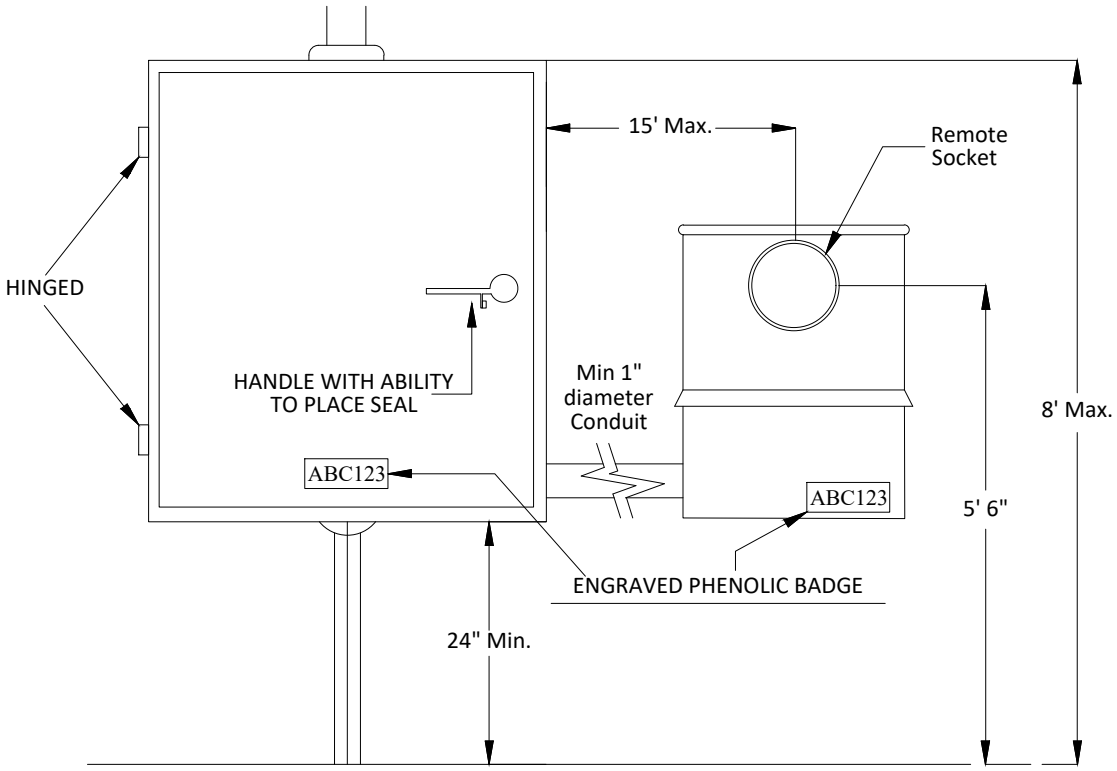
CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

CT CABINET SPECIFICATIONS

Revision #:	
Approved by:	
DATE APPROVED:	2025
File:	MTR DRAWINGS_2025.dwg
DETAIL	
MTR-10	



CT RATED

SINGLE AND THREE PHASE
120/208v (wye) OR 240v (delta)
401 AMPS OR MORE

CT & PT RATED

THREE PHASE
277/480v OR 240/480v
401 AMPS OR MORE

NOTES:

1. TRANSFORMERS AND TRANSFORMER RATED METER HOUSINGS MUST BE PURCHASED FROM LPC, AT 1100 S. SHERMAN STREET, DURING NORMAL BUSINESS HOURS. PLEASE CALL 303-651-8386 BEFORE COMING IN. THIS WILL ENSURE PERSONNEL IS AVAILABLE TO ISSUE THE EQUIPMENT.
2. TRANSFORMERS AND HOUSINGS SHALL BE MOUNTED BY THE CUSTOMER. ASSOCIATED WIRING WILL BE DONE BY LPC. A MINIMUM 24 HOUR NOTICE MUST BE GIVEN TO LPC 303-651-8386 BEFORE A SERVICE CAN BE ENERGIZED.
3. THE METER HOUSING, CT CABINET AND IT'S ASSOCIATED DISCONNECT SHALL BE LOCATED OUTSIDE OF THE BUILDING, ACCESSIBLE TO LPC, AND HAVE AN ENGRAVED PHENOLIC BADGE WITH ADDRESS, A MINIMUM BADGE SIZE = 1"x 2" WITH A MINIMUM TEXT SIZE OF 3/8" IN HEIGHT.
4. METER HOUSING AND CT CABINET SHALL BE NO MORE THAN 15 FT APART FROM EACH OTHER. LPC's PREFERENCE IS TO HAVE THEM ATTACHED TO EACH OTHER.
5. THE CONDUIT BETWEEN THE CT CABINET AND THE METER HOUSING SHALL BE EMT. THERE SHALL BE A BONDING BUSHING ON THE CONDUIT IN THE CT CABINET AND A PLASTIC OR METAL BUSHING IN THE METER HOUSING SIDE.
6. REFER TO MTR-10 FOR CT CABINET DETAILS
7. REFER TO MTR-13 FOR COMMERCIAL/MIXED USE SWITCHGEAR SPECIFICATIONS
8. REFER TO SECTION 703.1 FOR METERING REQUIREMENTS

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

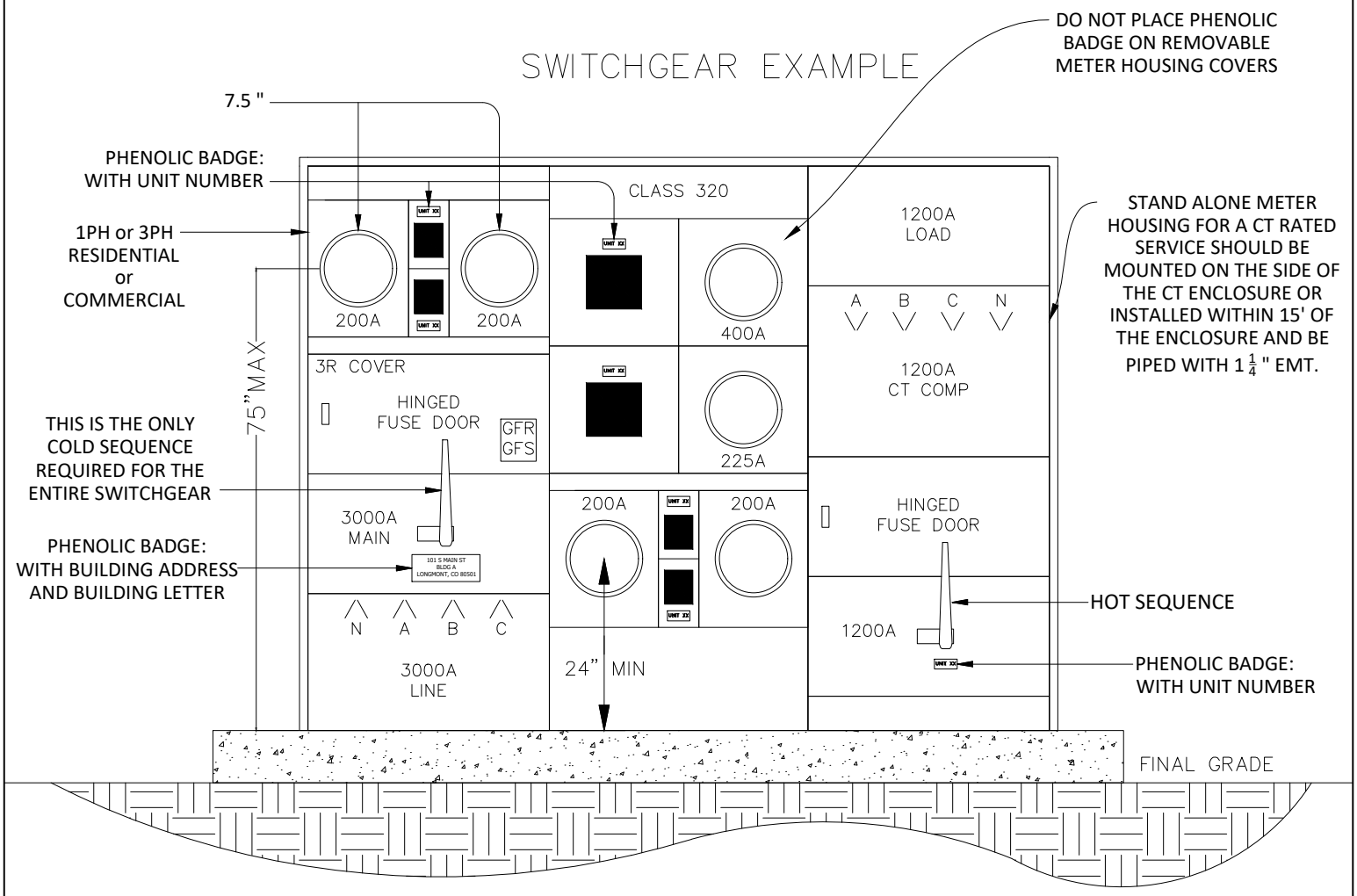
CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

CT & PT METERING SPECIFICATIONS

Revision #:	
Approved by:	
DATE APPROVED:	2025
File:	MTR DRAWINGS_2025.dwg
	DETAIL
	MTR-11



1. WHENEVER SWITCHGEAR METERING IS DESIRED, CUT SHEETS MUST BE SUBMITTED TO LPC FOR THE METER DEPARTMENTS REVIEW, PRIOR TO PURCHASE. UNAPPROVED SWITCHGEAR WILL NOT BE ACCEPTED.
2. THE MAIN DISCONNECT REQUIRES A FAULT LIMITING CURRENT DEVICE AND SHALL INCLUDE PROVISIONS FOR A LPC SEAL.
3. ALL METERING POINTS, SELF CONTAINED AND/OR CT RATED, WITHIN A SWITCHGEAR, MUST HAVE AN INDIVIDUAL, FUSED, HOT SEQUENCED DISCONNECT.
4. SWITCHGEAR CT COMPARTMENTS MUST HAVE BARRIERS ON ALL 4 SIDES OF COMPARTMENT AND A HINGED SEALABLE DOOR. ALL PANELS PROVIDING ACCESS TO UN-METERED CONDUCTORS SHALL HAVE FASTENERS THAT CANNOT BE REMOVED FROM THE EXTERIOR.
5. NOTE: WHEN ORDERING A CABINET THAT REQUIRES WINDOW-TYPE CTs, THE CUSTOMER IS REQUIRED TO SUPPLY BARS AND MOUNTING BRACKETS.
6. LABELING OF SINGLE, COMMERCIAL AND MULTIPLE METER SOCKETS ARE THE CUSTOMER'S RESPONSIBILITY. EACH METER OF A MULTIPLE METER SOCKET AND ALL INDIVIDUAL METER SOCKETS WILL HAVE A PERMANENT PHENOLIC BADGE SHOWING WHICH APARTMENT, OFFICE, OR ROOM IS METERED BY EACH METER. REFERENCE 703.1.5 FOR ADDITIONAL INFORMATION.
7. METERS WILL NOT BE INSTALLED UNTIL A RING OUT INSPECTION HAS BEEN APPROVED VIA THE METERING DEPT.
8. INSURE ITEMS 1-9 ABOVE ARE COMPLETED AND THE DOOR OF THE PHYSICAL UNIT IS LABELED PRIOR TO SCHEDULING THE RING OUT INSPECTION.
9. A SWITCHED LIGHT OR TEMP OUTLET MUST BE PRESENT AT THE TIME OF THE RING OUT INSPECTION TO VERIFY THE ELECTRICAL FEEDER GOES FROM THE METER TO THE INTENDED UNIT.
10. REFER TO METERING REQUIREMENTS SECTION 703.00

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

COMMERCIAL / MIXED USE SWITCHGEAR SPECIFICATIONS

Revision #:	
Approved by:	
DATE APPROVED:	2025
File:	MTR DRAWINGS_2025.dwg
DETAIL	
MTR-13	

METER SOCKET DESCRIPTION

5 TERMINAL, NON-CT RATED, LEVER BYPASS, SOCKETS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ANSI PUBLICATIONS. THE NEUTRAL TERMINAL SHALL BE ELECTRICALLY BONDED TO THE ENCLOSURE. A BONDING JUMPER IN THE FORM OF A SEPARATE SCREW, STRAP OR OTHER MEANS SHALL BOND THE ENCLOSURE TO THE GROUNDED NEUTRAL USING #4 AWG COPPER JUMPER.

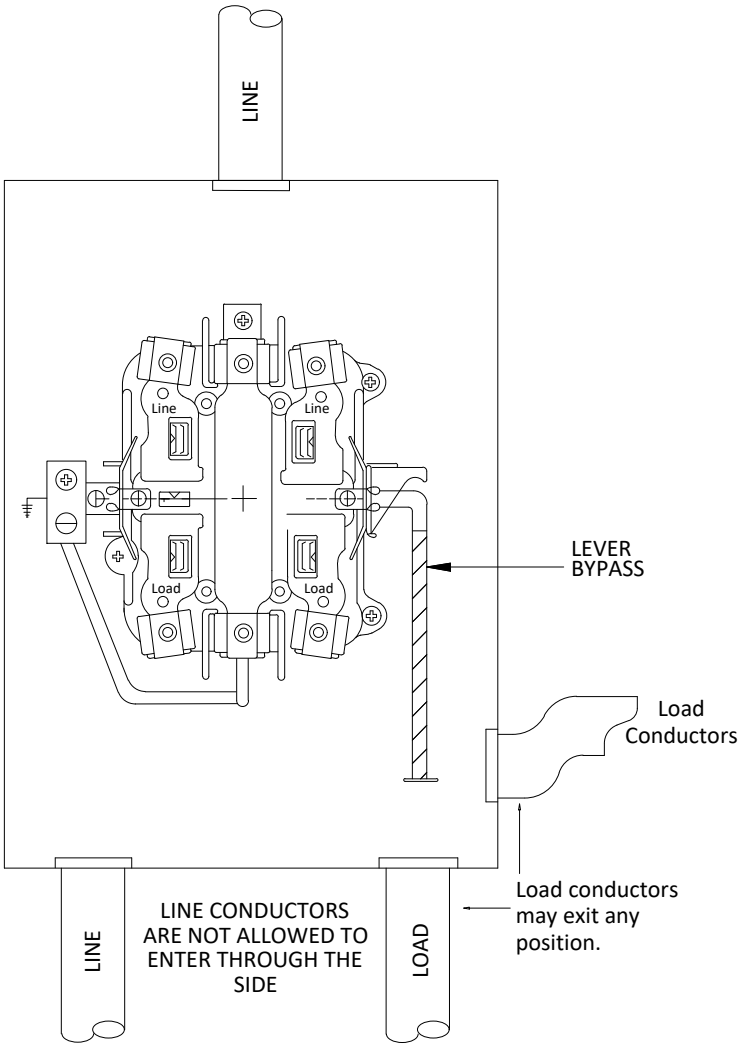
*CT RATED SERVICES ARE NOT ALLOWED IN SINGLE PHASE SERVICES 400 AMPS OR LESS

*ALL NEW METERING INSTALLATIONS 226 - 400 AMPS, REQUIRE A CLASS 320 METER.
REFER TO MTR-17

*A LEVER OPERATED BYPASS IS REQUIRED ON ALL SERVICES 400 AMPS OR LESS,

*THE COVER SHALL BE A ONE PIECE, RINGLESS DESIGN WITH A SUITABLE DEVISE FOR CLOSING AND SEALING

*REFER TO SECTION 703.01 FOR BADGING DETAILS



ALL NEW COMMERCIAL METERING INSTALLATIONS, REQUIRE THE INSTALLATION OF FAULT LIMITING DISCONNECTS ON THE LOAD SIDE OF THE METER. THE FUSED DISCONNECT SHALL BE PURCHASED, INSTALLED AND OWNED BY THE CUSTOMER.

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

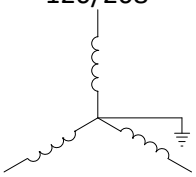
PHONE: 303-651-8386
FAX: 303-651-8796

SINGLE PHASE METER HOUSING 400 AMPS (CL320) OR LESS

Revision #:	
Approved by:	
DATE APPROVED:	2025
File:	MTR DRAWINGS_2025.dwg
DETAIL	
MTR-14	

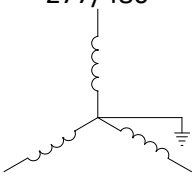
* ALL COMMERCIAL METERING INSTALLATIONS ARE REQUIRED TO HAVE A HOT SEQUENCED DISCONNECT SWITCH

WYE
120/208



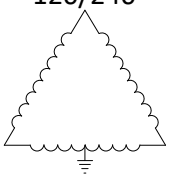
* 400 AMPS OR LESS

WYE
277/480



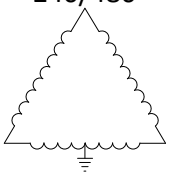
* 400 AMPS OR LESS

DELTA
120/240



* 400 AMPS OR LESS

DELTA
240/480



* 400 AMPS OR LESS

DELTA IS FOR EXISTING SERVICES ONLY

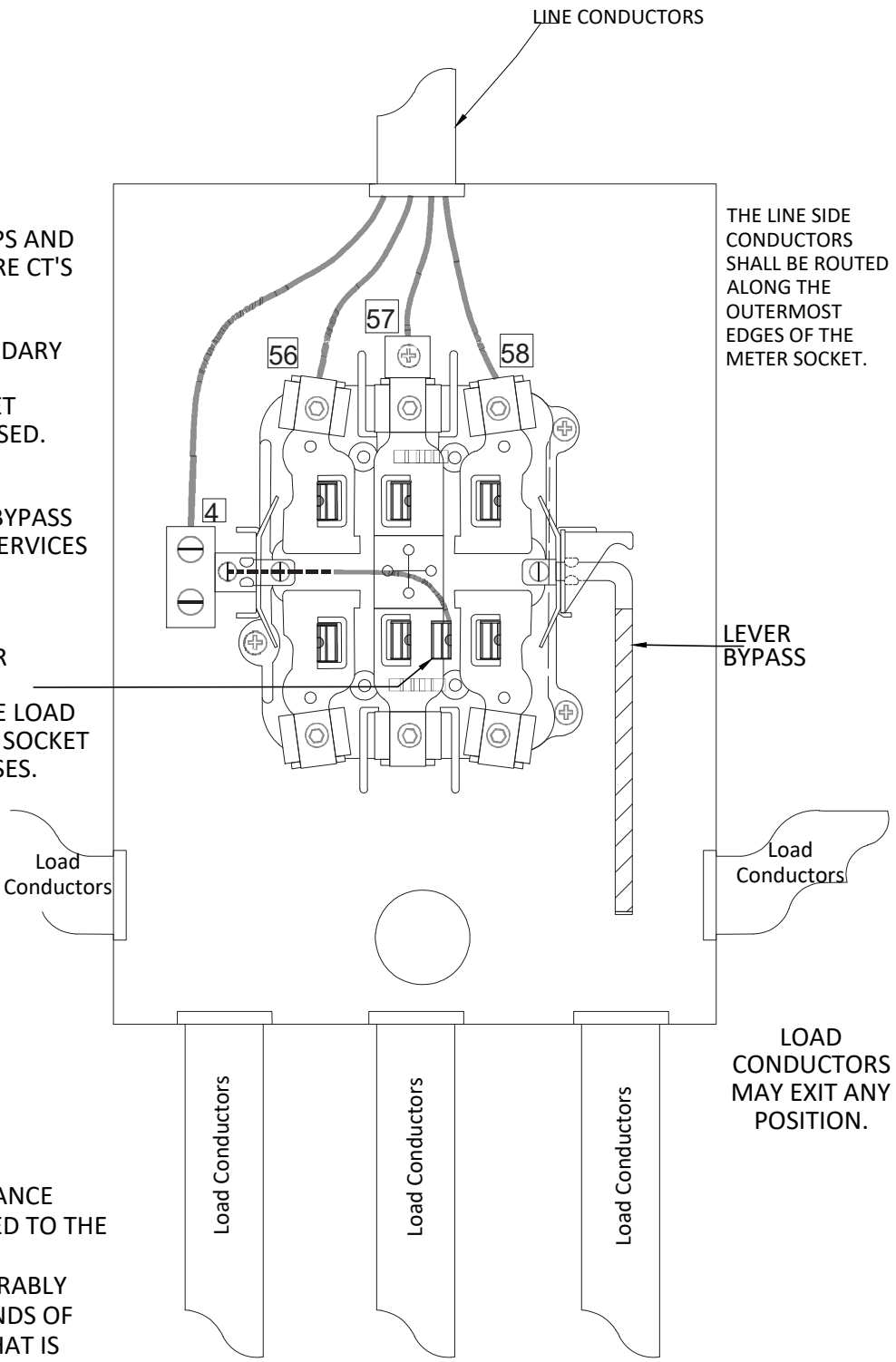
*277/480V 401 AMPS AND ABOVE WILL REQUIRE CT'S AND PT'S

*THE USE OF SECONDARY CONDUCTORS WITH CONTINUOUS JACKET COLORS MUST BE USED.

*LEVER OPERATED BYPASS REQUIRED ON ALL SERVICES 400 AMPS OR LESS,

*7TH TERMINAL FOR NEUTRAL SHALL BE CONNECTED ON THE LOAD SIDE OF THE METER SOCKET BETWEEN B&C PHASES.

*HIGH-LEG MARKING. THE SERVICE ENTRANCE CONDUCTOR INTENDED TO BE CONNECTED TO THE HIGH-LEG OF A 3-PHASE, 4 WIRE DELTA-CONNECTED SYSTEM SHALL BE DURABLY AND PERMANENTLY MARKED AT BOTH ENDS OF THE CONDUCTOR BY AN OUTER FINISH THAT IS ORANGE IN COLOR AND SHALL BE INSTALLED IN THE FAR RIGHT HAND C PHASE POSITION OF THE METER MOUNTING BLOCK.



CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

WIRING CONFIGURATION FOR 3 PHASE NON-CT RATED

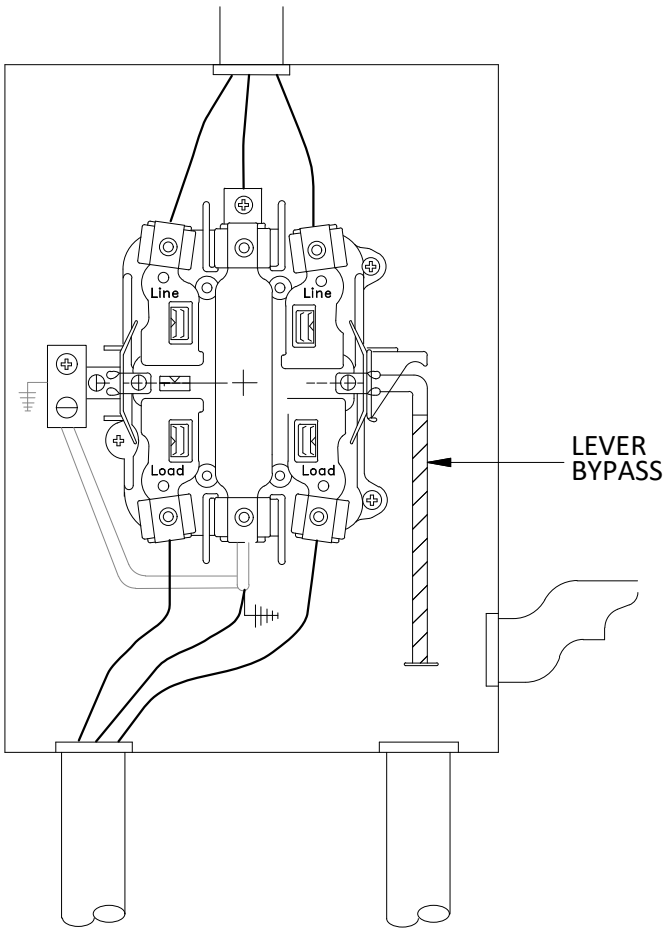
PHONE: 303-651-8386
FAX: 303-651-8796

Revision #:	
Approved by:	
DATE APPROVED:	2025
File:	MTR DRAWINGS_2025.dwg
DETAIL	
MTR-16	

METER SOCKET DESCRIPTION

5 TERMINAL, CLASS 320 METER, LEVER OPERATED BYPASS, SOCKETS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ANSI PUBLICATIONS AND RATED NEMA TYPE 3R. THE NEUTRAL TERMINAL SHALL BE ELECTRICALLY BONDED TO THE ENCLOSURE. A BONDING JUMPER IN THE FORM OF A SEPARATE SCREW, STRAP OR OTHER MEANS SHALL BOND THE ENCLOSURE TO THE GROUNDED NEUTRAL USING #4 AWG COPPER JUMPER.

- CT RATED SERVICES ARE NOT ALLOWED IN SINGLE PHASE SERVICES 400 AMPS OR LESS
- SOCKETS SHALL BE CONSTRUCTED TO CURRENT UL STANDARD.
- LEVER OPERATED BYPASS REQUIRED ON ALL SERVICES 400 AMPS OR LESS
- ALL NEW METERING INSTALLATIONS 226 - 400 AMPS, REQUIRE A CLASS 320 METER
- THE METER HOUSING MUST BE RATED AT 400 AMPS



ALL NEW COMMERCIAL METERING INSTALLATIONS, REQUIRE THE INSTALLATION OF FAULT LIMITING DISCONNECTS ON THE LOAD SIDE OF THE METER. THE FUSED DISCONNECT SHALL BE PURCHASED, INSTALLED AND OWNED BY THE CUSTOMER.

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

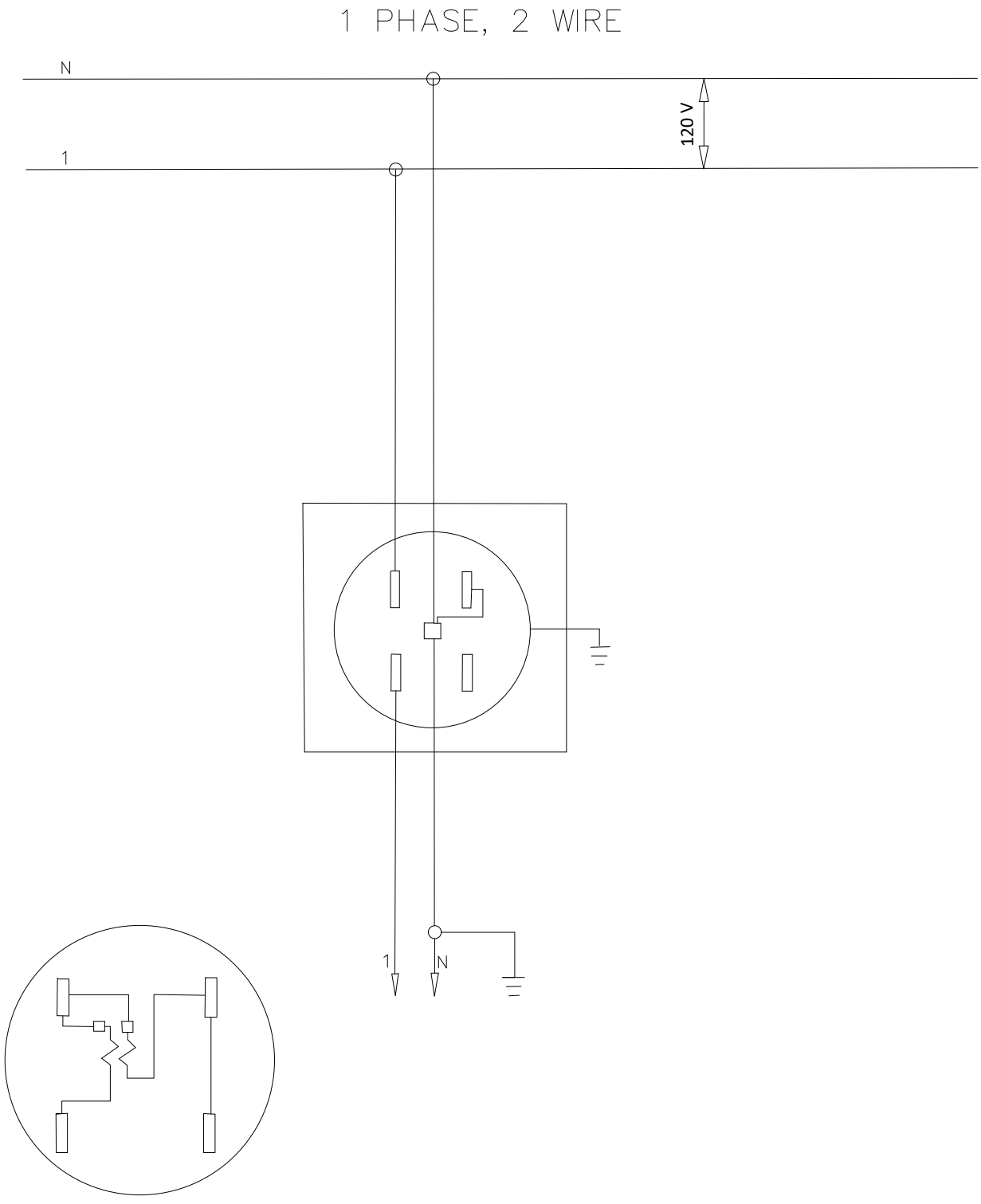
CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

WIRING CONFIGURATION FOR 1 PHASE 120/240 OR 208 VOLT SERVICES 400 AMP (CLASS 320 METER)

PHONE: 303-651-8386
FAX: 303-651-8796

Revision #:
Approved by:
DATE APPROVED: 2025
File: MTR DRAWINGS_2025.dwg
DETAIL
MTR-17



CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

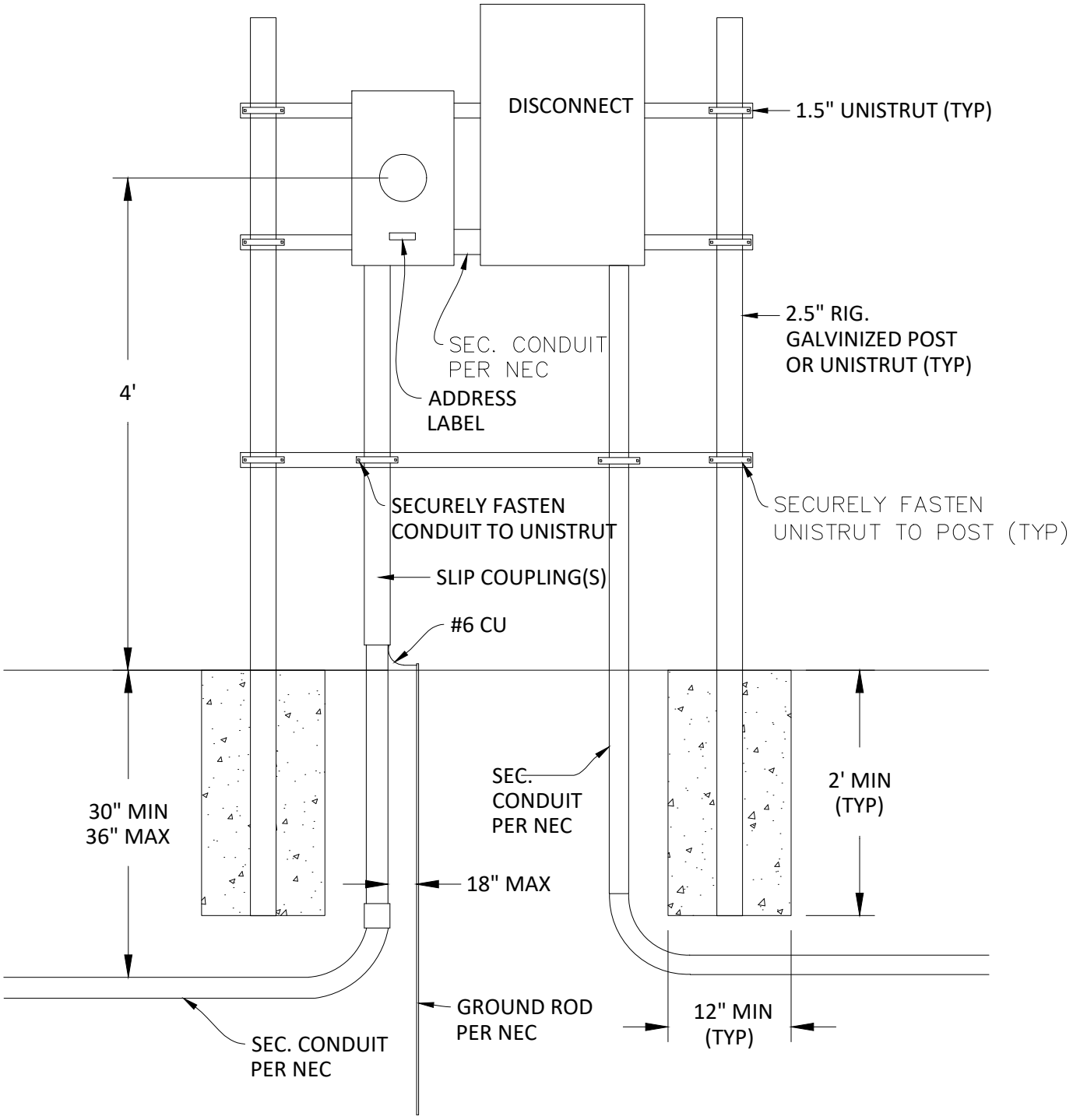
CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

FORM 1S DIAGRAM, 2-WIRE, 120 VOLTS

Revision #:	
Approved by:	
DATE APPROVED:	2025
File:	MTR DRAWINGS_2025.dwg
DETAIL	
MTR-18	



CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

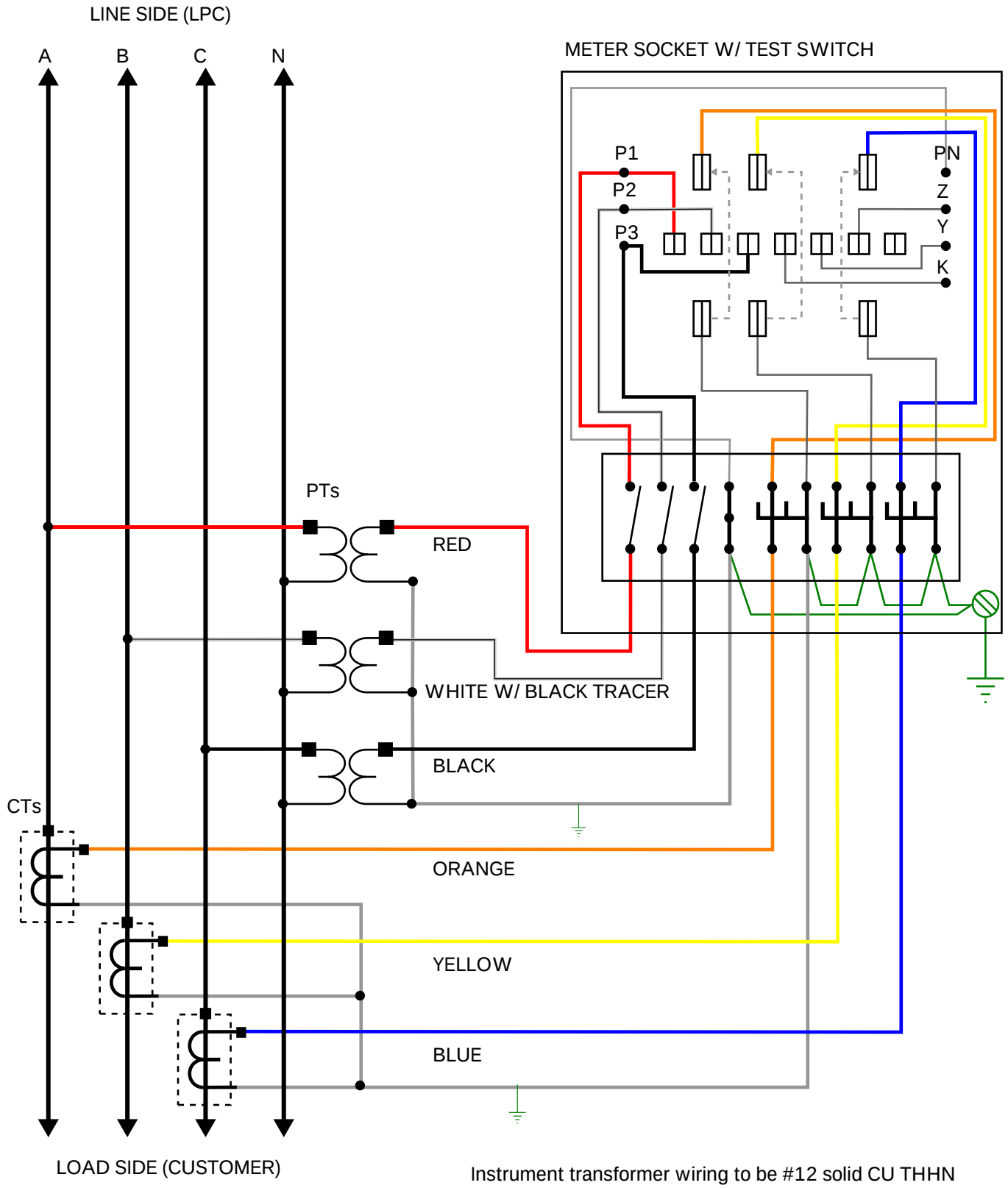
CITY OF
LONGMONT
COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

UNISTRUT METER STAND

PHONE: 303-651-8386
FAX: 303-651-8796

Revision #:	
Approved by:	
DATE APPROVED:	2025
File:	MTR DRAWINGS_2025.dwg
DETAIL	
MTR-19	



Instrument transformer wiring to be #12 solid CU THHN

ELECTRIC SERVICES

CALL 1-800-922-1987 TO OBTAIN UTILITY LOCATES

NOT TO SCALE

CITY OF LONGMONT COLORADO

1100 S SHERMAN ST
LONGMONT, CO 80501

PHONE: 303-651-8386
FAX: 303-651-8796

9S METER WITH INSTRUMENT TRANSFORMER WIRING

Revision #:	
Approved by:	
Date Approved:	
File: MTR Drawings 2025	
DETAIL	
MTR-20	

CITY OF LONGMONT
SECTION 800 – URBAN NEIGHBORHOOD DESIGN
TABLE OF CONTENTS

SECTION	PG #	SECTION TITLE
800.00	**3**	**GENERAL**
800.01	3	PURPOSE
800.02	3	RELATION TO DESIGN STANDARDS
800.03	3	REQUIREMENTS
800.04	3	NATURAL GAS SERVICE
801.00	**4**	**TRANSPORTATION AND STREET DESIGN**
801.01	4	GENERAL
801.02	4	STREET DESIGN
801.03	5	STREET SECTIONS
801.04	6	SIDEWALKS AND TREE LAWNS
801.05	6	ALLEYS
801.06	7	INTERSECTIONS
801.07	8	PARKING
801.08	8	OTHER STREET DESIGN REQUIREMENTS
802.00	**9**	**STORM DRAINAGE**
802.01	9	GENERAL
802.02	9	STORM HYDROLOGY CALCULATIONS – IMPERVIOUS CALCULATIONS
802.03	9	DETENTION
802.04	10	LOW IMPACT DEVELOPMENT (LID) CONSIDERATIONS
802.05	10	STREETS AND STORM SEWER SYSTEMS
803.00	**11**	**WATER AND WASTEWATER UTILITIES**
803.01	11	GENERAL
803.02	11	HORIZONTAL LOCATION
803.03	11	VETICAL LOCATION
804.04	11	EASEMENTS
804.05	12	WATER METERS AND CURB STOPS
804.00	**13**	**LONGMONT POWER AND COMMUNICATIONS (LPC) AND NEXTLIGHT**
804.01	13	GENERAL
804.02	13	LPC/NEXTLIGHT INFRASTRUCTURE AND UTILITY LOCATIONS
804.03	14	LPC EASEMENT REQUIREMENTS
804.04	14	METER LOCATIONS
805.00	**15**	**PUBLIC SAFETY**
805.01	15	GENERAL
805.02	15	STREET DESIGN

SECTION 800 – URBAN NEIGHBORHOOD DESIGN
INDEX OF TABLES

SECTION	PG #	SECTION TITLE
TABLES 8-1	5	POSSIBLE STREET SECTIONS

800.00 GENERAL

800.01 PURPOSE

A. This Section, which shall be known as the Urban Neighborhood Design Standards, applies to properties zoned Residential (R) or Mixed Use (MU) generally with residential densities of eight (8) units or greater per acre as outlined in Section 15.03.080, City Code.

B. The Urban Neighborhood Design Standards minimize public transportation and utility corridors within the properties governed by this Section. These standards facilitate development to increase affordable and attainable housing opportunities within these neighborhoods supporting the broader housing needs of the Longmont community.

C. These standards establish a connected pattern of development where the area of lots and/or building envelopes are maximized while providing construction of infrastructure, walkable neighborhoods with a high level of accessible pedestrian connectivity, alternative parking and drainage design options, and optimized utility corridors without detriment to City of Longmont services, emergency access and response.

800.02 RELATION TO DESIGN STANDARDS

A. Section 800 outlines approved exceptions to the Public Improvement Design Standards and Construction Specifications (Design Standards), Sections 200, 300, 400, 500 and 700, when applied in full compliance with this section. Non-compliance or other deviations from this standard may require a formal exception as provided in Section 100.

B. The general Design Standards shall apply for any design elements not addressed in Section 800.

800.03 REQUIREMENTS

A. All neighborhood design shall meet the requirements of Title 15, City Code. The intent of Section 800 is to demonstrate how Title 15 can be implemented to efficiently provide public infrastructure supporting Urban Neighborhood design densities.

B. The location of public utilities and drainage structures as modified from the Design Standards require consideration of access, maintenance, and operation. The modifications shown herein may require certain street cross sections and neighborhood design elements be incorporated to allow the utility placements demonstrated in this Section.

C. All design elements in these standards are meant to be fully incorporated into the design. The intent of the design of each element relies upon the other to act in unison for the development layout to function. of Individual design elements cannot be considered alone but must be considered in the context of the design of the entire development.

800.04 NATURAL GAS SERVICE

A. The utility corridor and layouts in this Section do not include specific easements, setbacks, or other elements as may be required to provide natural gas service. If a development chooses to include natural gas in the subdivision, the Developer shall coordinate easements, corridors and utility placement with the natural gas provider. All proposed easements and utility placement shall be depicted on the submittal documents for development review as outlined in Title 15, City Code.

801.00 TRANSPORTATION AND STREET DESIGN

801.01 GENERAL

A. The street system design shall have a high level of connectivity to adjacent street systems, either existing or proposed. The proposed higher density development necessitates the dispersion of traffic by providing numerous opportunities for ingress, egress, and internal circulation within the development.

B. Use of these Section 800 design criteria are intended for Local Street design and construction in mixed use and residential zoning. Any construction or design of Collector or Arterial Streets shall conform to Section 200 of the Design Standards.

801.02 STREET DESIGN

A. The street network design shall conform to a connected system approach and shall consider a street pattern that provides the most advantageous configuration to serve adjoining areas and the entire neighborhood. Streets and pedestrian ways shall be interconnected so that vehicular, bicycle, and pedestrian access throughout the community is direct and convenient while providing multiple access routes to properties.

B. For a connected transportation system, dead end streets and cul-de-sacs shall not be designed or constructed in the Urban Neighborhood. Circulation shall be provided by connecting public rights-of-way to the adjacent public rights-of-way. Temporary turn arounds may be approved by the City Engineer where a connection will be made to future improvements. The turn around shall be designed and constructed within public right-of-way, or an easement granted to the city and shall be paved in accordance with the standard street design as provided in Section 200.

C. Local street geometry shall be designed such that it will encourage low operational traffic speeds of 25 mph or less.

D. Maximum curb return radii of 20 feet shall be used at intersections of local streets. Additional concrete and reinforcement design may be required for curb returns subject to large vehicles overrunning the curb. Areas of overrunning vehicles shall be designed with roll over curb (not vertical curb).

E. Adequate sight distance triangles meeting criteria in Section 200 shall be provided at all intersections.

F. Two- way streets of 28 feet of pavement or less shall provide emergency access and staging areas of no less than 60 feet in length and shall be provided for block lengths greater than 300 feet. The staging area shall be placed at midblock for emergency vehicle purposes and be designated as fire lanes with no parking.

G. No above ground obstructions, except for streetlights, traffic signals or required traffic signage, are permitted within 15 feet of an intersection of two-way streets. Above ground obstructions include but are not limited to fire hydrants, trees or other landscaping greater than 30 inches above the centerline street grade.

H. Streets or alleys intended to serve emergency service vehicles or trash collection vehicles, shall be designed to 75,000 pound carrying capacity and provide adequate turning radii. A geotechnical engineering report shall be submitted to the DRC outlining the pavement section design for each street in accordance with Section 200.

I. Additional traffic signs, type and placement, may be required depending upon site configuration and constraints. Final sign requirements will be determined by the City Engineer on a case-by-case basis. The need for local street pavement markings or special pavement treatments may be allowed on a case-by-case basis as determined by the City Engineer.

801.03 STREET SECTIONS

A. Streets shall have, at a minimum, two (2) 10-foot-wide drive lanes when parking, bike lanes, or other buffers are provided for a total of 20 feet in drivable width to accommodate vehicular and emergency traffic flow in two directions.

B. Streets with no parking, bike lanes or other buffer, shall have minimum 12 feet wide drive lanes exclusive of the curb and gutter for a minimum two-lane width of 24 feet.

C. Reduced travel lane widths may be considered with approval of the City Engineer and the Fire Marshal. Additional emergency response mitigation will be required, and all transportation design elements and utility corridors will need to meet the minimum requirements of this section.

D. Vertical curbs shall be used on all streets, except alleys. City Standard six (6) inch vertical curb is required except where roll over curb is needed to meet emergency vehicle access requirements and where private driveways are provided in the front of lots and alley access is not available.

E. Right-of-Way Section Requirements

(1) Local Street Layout – The following is table 8-1: Possible Street Sections. See details for graphical representations.

Section	Alley	Lane Width (ft)	Sidewalk Width (ft)	Parking Width* (ft)	C&G (ft)	Tree Lawn (ft)	Total ROW (ft)
Detached Sidewalk Roadway Sections							
Standard Local Parking 2 Sides	Optional	10	5	7	2	8	61
Local-Reduced TL / Parking 2 Sides	Optional	10	5	7	2	5	55
Attached Sidewalk Roadway Sections							
Attached Walk Parking 2 Sides	Optional	10	5	7	2	0	45
Attached Walk Parking 1 Side	Required	12 min	5	7	2	0	39.5
Attached Walk No Parking	Required	12 min	5	0	2	0	38
Urban Section No Parking	Required	12 min	8	0	2	5 (tree grate)	54
Alleyway Sections (2 lanes)							
Standard Alley	NA	20	NA	NA	NA	NA	22
Reduced Alley	NA	18	NA	NA	NA	NA	20
Narrow Alley	NA	12*	NA	NA	NA	NA	18

* Parking includes 1.5 ft of gutter ** with 3 ft gravel shoulder each side

(2) Alley access is recommended for all site designs to provide additional connectivity and emergency access. Proposed street right-of-way with less than 34 feet of pavement (two (2) 10-foot-wide travel lanes and seven (7) foot wide parking), shall require alley access to accommodate traffic, emergency response and utility corridors. Where street pavement is 34 feet wide or greater, alleys may be required to provide adequate utility corridors as determined by the City Engineer or additional emergency access as determined by the Fire Marshal.

801.04 SIDEWALKS AND TREE LAWNS

A. All streets shall have sidewalks provided on both sides of the street unless one side of a street does not serve pedestrian traffic then the sidewalk may be omitted as approved by the City Engineer.

B. Tree lawns with detached sidewalks are required for all street sections in accordance with Title 15, City Code, except as otherwise provided for herein. The tree lawn will be a minimum five (5) feet wide utilizing appropriate vegetation and columnar type trees. For the use of standard canopy trees, the tree lawn will be a minimum of eight (8) feet wide. Tree canopies should not impede the walking area in any manner, in compliance with City Code.

C. Detached sidewalks are recommended to be five (5) feet wide but shall not be less than four (4) feet wide. Sidewalks attached to curb and gutter shall be a minimum of five (5) feet wide exclusive of the top of curb width.

D. In instances where the surrounding area is served by attached walks and transitions to detached walks are difficult or unsafe, attached sidewalks may be considered as approved by the City Engineer.

E. If attached sidewalks are proposed, an area beyond the back of walk within the adjacent property shall be reserved for planting of trees. The trees shall be placed within 8 feet of the back of walk, but no closer than four (4) feet, to provide a canopy similar to a tree lawn. Tree placement along with type and species shall be shown in the approved Site Plan for the development.

801.05 ALLEYS

A. Alleys shall be public right-of-way dedicated to the city. Alleys generally provide secondary vehicular and pedestrian access to residents. Alleys shall be designed to accommodate waste services and maintenance vehicles.

B. Minimum alley right-of-way shall be 18 feet wide with 12 feet of pavement centered within the right-of-way and gravel or other acceptable material to the City Engineer within the three (3) feet of shoulder. Alleys of this width cannot be the primary access to a residential or commercial unit and must connect from one local street to another without intersecting with other alleys (i.e. a “T” intersection).

C. Minimum alley right-of-way for uses without frontage onto a local street (i.e. front on a green space) shall be 20 feet wide with eighteen (18) feet of pavement centered within the right-of-way. Depending upon utility and emergency access requirements, the City Engineer may require 22 feet for alley right-of-way width with 20 feet of pavement centered within the right-of-way or larger as needed to meet pedestrian, vehicular, emergency or maintenance access.

D. Alleys shall be graded with an inverted crown at two (2) percent (50:1 slope) fall from the edge of pavement to the center flowline. Alleys may be paved either in full width concrete or in asphalt. Asphalt alleys shall be constructed with a minimum 24-inch-wide concrete pan. A concrete pan in the center of an asphalt alley shall have one (1) inch of fall from the edge of pan to the center and be a minimum of 10-inches deep and graded with a minimum 0.7% fall longitudinally. Where the alley intersects the local roadway, the inverted crown shall be transitioned over a minimum of 20 feet to meet the cross slope of the adjacent right-of-way.

E. Property having vehicular access from the alley will provide a paved driveway or ramp from the edge of the alley pavement into the property. The access ramp shall be maximum twenty-four (24) feet wide and minimum 10 feet wide and have a minimum transverse slope of one-and-one-half (1.5) percent (66:1 slope) but not exceed 10 percent (10:1 slope). Paving the entire frontage of a lot between the alley and the property will not be allowed.

F. A five (5) foot wide utility easement shall be provided immediately adjacent to the alley right-of-way on both sides.

G. There shall be a minimum of 28 feet of distance between building faces on opposite sides of an alley to accommodate vehicular movements and utility corridors.

H. Garages and accessory dwelling units accessed from an alley shall display addresses that are clearly visible from the alley.

I. No dead-end alleys will be allowed. Any alley right-of-way shall extend to another public street at each end. Shared private driveways from the public alley may be considered if they serve no more than six (6) residential units and do not extend more than 100 feet from the right-of-way. Shared drives shall be placed in a private outlot owned by the HOA or other common entity. If shared driveways are utilized, a common trash collection area shall be provided adjacent to the public right-of-way.

J. Tee intersections of alleys are generally discouraged but if utilized, the design shall provide adequate turning radii and paved surface to accommodate maintenance as well as waste services and relevant emergency vehicles. The alley may not be required to accommodate a fire engine if adequate access is provided from the street or by other means approved by the Fire Marshal.

801.06 INTERSECTIONS

A. All street intersections are intended to provide adequate safety measures for all vehicles, bicycles and pedestrians and shall meet the minimum requirements of the MUTCD for signage and striping and AASHTO guidelines for the appropriate design speed.

B. When two streets intersect between 90 degrees and 75 degrees and do not extend beyond the intersection in either direction (an “L” intersection), a stop condition is not warranted. In this instance, a horizontal curve may be designed. The minimum center line radius of an “L” intersection shall be 45 feet to accommodate emergency vehicles and efficient property layout.

C. Horizontal curves with a minimum centerline radius of 45 feet require adequate sight distance and cannot introduce a safety hazard to the street users. No driveway or other access will be allowed within the curve and any adjacent access shall be a minimum of 30 feet from the point of beginning or point of tangency of the curve.

D. No parking shall be allowed within 30 feet of the point of tangency either side of the intersection.

E. Intersection sight distance requirements as specified in Section 200 shall be provided. Special consideration shall be given to placement of above-ground obstructions (fire hydrants, electrical transformers, light poles, signs, landscape, fencing, etc.) and building setbacks in the vicinity of intersections such that intersection sight distance is not obstructed.

F. The minimum street width through an "L" intersection shall be 24 feet exclusive of curb and gutter section.

G. If commercial driveway access or alley access is aligned with an "L" intersection, the alley or driveway may become the third leg of a Tee intersection. Tee intersections shall be controlled by stop signs at all three corners including a driveway. The center line of the alley or driveway shall align with the centerline of the adjoining street. Parking and other access points shall not be allowed within 30 feet of the Tee intersection as measured from the centerline of the right-of-way to the center line of the adjacent access.

H. Street intersections with an interior angle less than 75 degrees shall be designed as a traffic circle.

801.07 PARKING

A. Parking shall be provided in accordance with Title 15, City Code. If no on-street parking is proposed for local residential street sections, an Alternative Parking Plan will be required providing off- street parking or other alternatives.

B. Parallel parking within the public right-of-way on local streets will not be striped, but design of the street shall allow for a minimum of seven (7) feet from the flow line of the curb to the drive lane and a length of at least 24 feet per parking space.

C. Angled parking adjacent to the public right-of-way may be considered through an Alternative Parking Plan. The plan shall outline the ownership and maintenance of the parking area. The design will incorporate a minimum of a two (2) foot overhang of vehicles either by providing parking blocks or extending the width of the sidewalk to seven (7) feet adjacent to the parking stalls. No 90-degree parking stalls shall be designed within or directly access public right-of-way.

D. No parking is permitted within 30 feet of the intersection of two-way streets. No parking is permitted within 20 feet of the intersection of an alley and a street. Such areas shall be designated as fire lanes and posted no parking.

801.08 OTHER STREET DESIGN REQUIREMENTS

A. See Section 800.03 for additional street design requirements related to storm drainage.
B. See Section 800.06 for additional street design requirements related to public safety

802.00 STORM DRAINAGE

802.01 GENERAL

A. All development shall meet the storm drainage requirements of the Longmont Storm Drainage Criteria Manual (LSDCM), Title 15 and Section 14.26, City Code, as well as any applicable State and Federal requirements.

B. All new development shall not increase storm water flows downstream of the site or impede the historic flow of off-site basins. Development shall not make any drainage issue worse than the existing condition by increasing flows or raising the elevation of ponded water on other properties or within right-of-way.

802.02 STORM HYDROLOGY CALCULATIONS - IMPERVIOUS CALCULATIONS

A. Each development will be required to calculate imperviousness as a weighted average by the area of buildings, paving, and landscaping. The anticipated increased density of development does not align with general impervious values for business, residential and industrial imperviousness as provided in Table 600 of the LSDCM or Table 6-3 of the Mile High Flood District Storm Drainage Criteria Manual No. 1, therefore the calculated weighted average will be used to determine the impervious value of the developed drainage basins.

802.03 DETENTION

A. Traditional open surface detention ponds, without structural walls, are the preferred approach to storm water control but to utilize the property more fully, regional detention and underground detention may be considered.

B. Regional Ponds may be utilized if accounted for in a master drainage plan for the area. Additional agreements and financial participation may be required for multiple developments to utilize a regional detention facility. A development may be required to perform a regional master drainage plan if regional detention is desired, and no master plan exists.

C. Underground Detention may be considered given the following conditions:
   (1) No regional detention is available, and the site is constrained in such a manner that traditional detention ponds are not feasible.
   (2) Storm water quality WQCV must be provided on grade, even if detention is provided below ground.
   (3) Adequate maintenance access capable of supporting the required equipment shall be provided. The underground facilities and access shall be within an easement dedicated to the city either by plat or separate instrument.
   (4) Ownership and maintenance responsibilities shall be delineated on the Site Plan. If no Site Plan is required for development, a separate maintenance agreement shall be provided by the property owner to the city.
   (5) Underground detention facilities shall have a gravity outfall, no storm water pump system shall be allowed.
   (6) Adequate cover must be provided in accordance with the specifications of the manufacturer and all applicable structural analysis.
   (7) No structures shall be allowed over an underground detention facility. Private retaining walls and private fences or parking areas may be placed over the facility if considered in the underground chamber design.
   (8) The detention facility shall not be located within a floodplain.

(9) An operations and maintenance manual shall be provided within the Drainage Report.

802.04 LOW IMPACT DEVELOPMENT (LID) CONSIDERATIONS

A. All developments shall incorporate LID design as much as practical in accordance with Municipal Code Chapter 14.26.

B. Where the neighborhood layout lends to the creation of commonly owned outlots, these areas should be considered for low impact and distributed water treatment (WQCV elements).

802.05 STREETS AND STORM SEWER SYSTEMS

A. Storm sewer inlets must be placed where the allowable street flows, in accordance with the Longmont Storm Drainage Criteria Manual, are exceeded. The design engineer shall compute the allowable flow capacities and flow depths for streets using equivalent values in the Storm Drainage Criteria Manual and the following criteria:
   (1) For local streets, the Minor Storm (5 year) Flow must not cross the street crown from one side to the other and should not overtop the curb. The Major Storm (100-year) Flow shall not exceed the lesser of twelve-inch (12”) depth at the gutter or inundate private property without the appropriate drainage easement. In no case shall storm water flood adjacent buildings. If possible, the 100-year flow should be contained within the public right-of-way but in no instance shall Major Storm Flows adversely impact any structures or private property. If the Major Storm Flow path crosses private property, a public drainage conveyance easement will be required.
   (2) Allowable alley storm flows shall be limited to the flows generated from the rear of the lots along the alley. Alleys shall not convey storm water from adjacent streets or other basins.
   (3) Alley flows shall not cross the intersecting streets but shall be captured via an inlet or directed along the intersecting street gutter.
   (4) Flow spread shall be confined to the right-of-way at a depth not to exceed 10 inches.
   (5) Inlets shall conform to the standard Type R inlets in street right-of-way. Combination type inlets may be allowed in right-of-way when physical constraints will not allow a Type R. Area Inlets such as CDOT Type C and D Inlets may be utilized outside of right-of-way. Slotted or trench drains are prohibited within right-of-way.

B. Public storm sewer infrastructure shall be placed within street right-of-way or on private property within an adequate easement dedicated to the public. Storm sewer infrastructure is generally discouraged within alleys, but if proposed, additional alley width may be required to meet utility separation and maintenance access.

C. Underdrain systems, if required, shall remain privately owned and maintained. Any underdrain collection system within public right-of-way will require an Infrastructure Permit.

803.00 WATER AND WATERWATER UTILITES

803.01 GENERAL

A. Public water and sanitary sewer services shall be extended to all properties in a manner which provides for efficient operation and maintenance by the City.

B. Reduced width of street sections may not provide adequate separation between water, sewer, storm and other utilities within the street right-of-way necessitating location of one or more utilities within other corridors such as the alley or an easement on private property.

C. The impact of utility corridors may be reduced by strategic placement and coordinated development of a site.

803.02 HORIZONTAL LOCATION

A. Water mains shall be placed in public right-of-way at the front of lots. Water mains may be located within common greenspaces within public easements between buildings when fronts of buildings do not face public right-of-way and are served by alley access only. Adequate operation and maintenance access to meters and valves is required.

B. Water mains shall be designed so that valves and valve boxes are located outside of concrete including but not limited to sidewalk, drainage pans, curb and gutter.

C. Sanitary sewer mains shall generally be located within alley right-of-way or within street pavement area greater than 33 feet wide. Manholes shall be located so that the manhole frame and cover are outside of the flowline of the alley.

D. Water mains shall be a minimum of 15 feet from any structure with a foundation.

E. Sanitary sewer mains shall be a minimum of 12 feet from any structure with a foundation and additional separation will be required for mains deeper than 10 feet from the final grade to the top of pipe.

803.03 VERTICAL LOCATION

A. Vertical clearances of utilities shall not vary from the standards listed in Section 100.

803.04 EASEMENTS

A. For any utility placed outside of public right-of-way, the property owner shall dedicate an easement for city access, maintenance, and operation.

B. Pocket easements shall be provided for water meters, fire hydrants or other appurtenances in areas outside of the right-of-way or easement for a water main. The dimensions of the pocket easement will be such that a minimum three feet wide buffer is provided around the appurtenances.

C. When water and electrical service is provided at the front of lots for single family attached and detached units, a combined pocket easement for water and electric may be provided given adequate clearances, as defined in Section 100, are maintained.

803.05 WATER METERS AND CURB STOPS

A. For single family development (detached and attached), a dedicated water service line shall be provided to each unit. Water meters up to and including one (1) inch in size will be placed in a meter pit on private property within an easement, which may be shared with electrical equipment. Each service shall have a curb stop installed. In certain cases where the City Engineer agrees that an easement on the property is not viable, a meter may be placed in a tree lawn as indicated below.

B. Water Meter and Curb Stop Locations.
   (1) Detached walk with eight (8) or five (5) foot wide tree lawn and pocket easement on the property.
      a. Meter pit shall be six (6) feet behind the walk.
      b. Meter pit shall be five (5) feet from the adjacent property line.
      c. Curb stop shall be centered in the tree lawn.
   (2) Attached Walk, no tree lawn.
      a. Meter pit shall be six (6) feet behind the walk.
      b. Meter pit shall be five (5) feet from the adjacent property line.
      c. Curb stop shall be four (4) feet from the back of walk.
   (3) Detached walk with eight (8) foot wide tree lawn, no easement.
      a. Meter pit shall be six (6) feet from top back of curb.
      b. Meter pit shall be five (5) feet from the adjacent property line.
      c. Curb stop shall be four (4) feet from top back of curb.
   (4) Detached walk with five (5) feet tree lawn, no easement.
      a. Meter pit shall be three (3) feet from top back of curb.
      b. Meter pit shall be five (5) feet from adjacent property line.
      c. Curb stop shall be one (1) foot from top back of curb.

C. Any meter and curb stop installation within the public right-of-way will require special construction sequencing to ensure adequate compaction under the curb and gutter as well as the sidewalk. Any meter pit or curb stop installed prior to the construction of the curb and gutter or sidewalk must be protected from damage.

D. Water meters greater than one (1) inch in size shall be placed in a vault on private property within a dedicated easement. For commercial and multi-family development, the water meter may be placed inside a building within a dedicated utility room. The utility room shall provide adequate maintenance and operational space and be accessible to the city at all times. No water meter vaults shall be placed in public right-of-way.

E. Multi-family development may serve several units through a single meter in accordance with Section 500 of these standards.

804.00 LONGMONT POWER AND COMMUNICATIONS (LPC) AND NEXTLIGHT

804.01 GENERAL

A. Design and construction of all City of Longmont electrical and City of Longmont communications infrastructure shall conform to Section 700 of these Standards. To facilitate the layout of Urban Neighborhood developments, the City will consider alternative routing locations with the intent of reducing utility corridor widths.

B. The proposed street sections and allowable reductions of structural setbacks will guide the final design of the electrical and communication infrastructure.

804.02 LPC/NEXTLIGHT INFRASTRUCTURE AND UTILITY LOCATIONS

A. Detached walk with tree lawn:
   (1) LPC electric/Nextlight may install City of Longmont electric and City of Longmont communications subsurface infrastructure within the public right-of-way under the walk with power transformers, junction vaults, streetlights, and fiber handholds installed in pocket easements on private property generally at property corners.
   (2) When pocket easement locations are not feasible on private property, LPC/Nextlight equipment may be installed within the tree lawn if the following conditions are met:
      a. Tree lawn is a minimum eight (8) feet wide.
      b. Vertical equipment is placed a minimum of 24 inches from the edge of walk and top back of curb.
      c. Adequate protection is provided by the means of bollards or similar landscape features.
      d. The equipment does not interfere with pedestrian or traffic movements.
      e. The placement of street trees allows for the placement of equipment without reducing the required number of trees.

B. Attached walk, no tree lawn:
   (1) Preferred design is to provide a seven (7) feet wide easement behind the walk for standard installation.
   (2) If running an easement behind the walk is not feasible, LPC/Nextlight may install subsurface infrastructure under the walk and require pocket easements at property corners or other equipment locations, in accordance with Section 700 of the Design Standards.
   (3) Street lighting shall be placed behind the walk on private property within a pocket easement.

C. Alleys:
   (1) If no front or side lot equipment locations are available, LPC may install subsurface infrastructure in the five (5) foot wide easement adjacent to the alley right-of-way. Additional pocket easements for power transformers, vaults and hand holes are required to be coordinated with LPC during the project design.
   (2) Street lighting on the residential road sections will require additional design considerations and easements.
   (3) All transformers and junctions within the alley require protection in the form of raised curbs and/or bollards.
   (4) Pocket easement dimensions may be increased based on other utility needs.

D. Co-location of dry utilities

(1) Due to the restricted area and maintenance issues, only LPC and Nextlight infrastructure can be located within the easements and trench paths. No other utilities may be co-located within the easement or trench.

E. LPC EQUIPMENT EASEMENTS

(1) Easements may be based on front or back lot design policy.

F. METER LOCATIONS:

(1) Meters will be located as indicated in Section 700.

805.00 PUBLIC SAFETY

805.01 GENERAL

A. Design and construction of all City of Longmont electrical and City of Longmont communications infrastructure shall conform to Section 700 of these Standards. To facilitate the layout of Urban Neighborhood developments, the City will consider alternative routing locations with the intent of reducing utility corridor widths.

B. The proposed street sections and allowable reductions of structural setbacks will guide the final design of the electrical and communication infrastructure.

805.02 STREET DESIGN

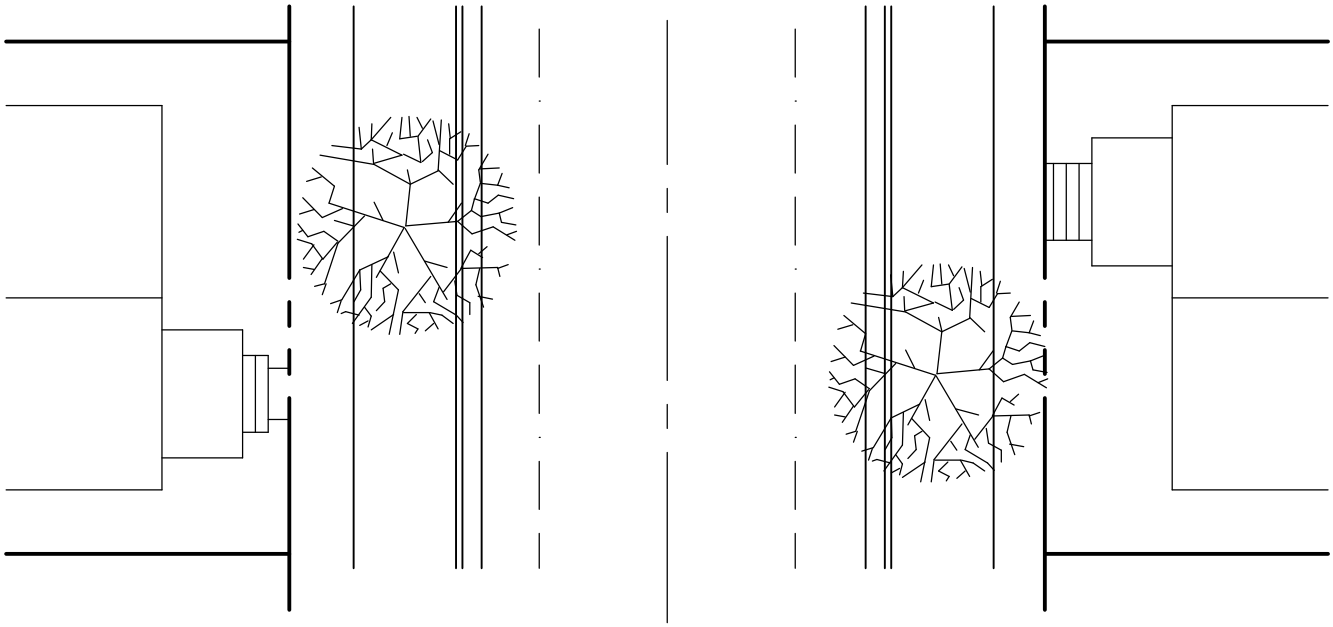
A. The street network design shall conform to a grid system and shall consider a street pattern that provides the most advantageous configuration to provide emergency access to the development as well as the adjoining areas and the entire neighborhood.

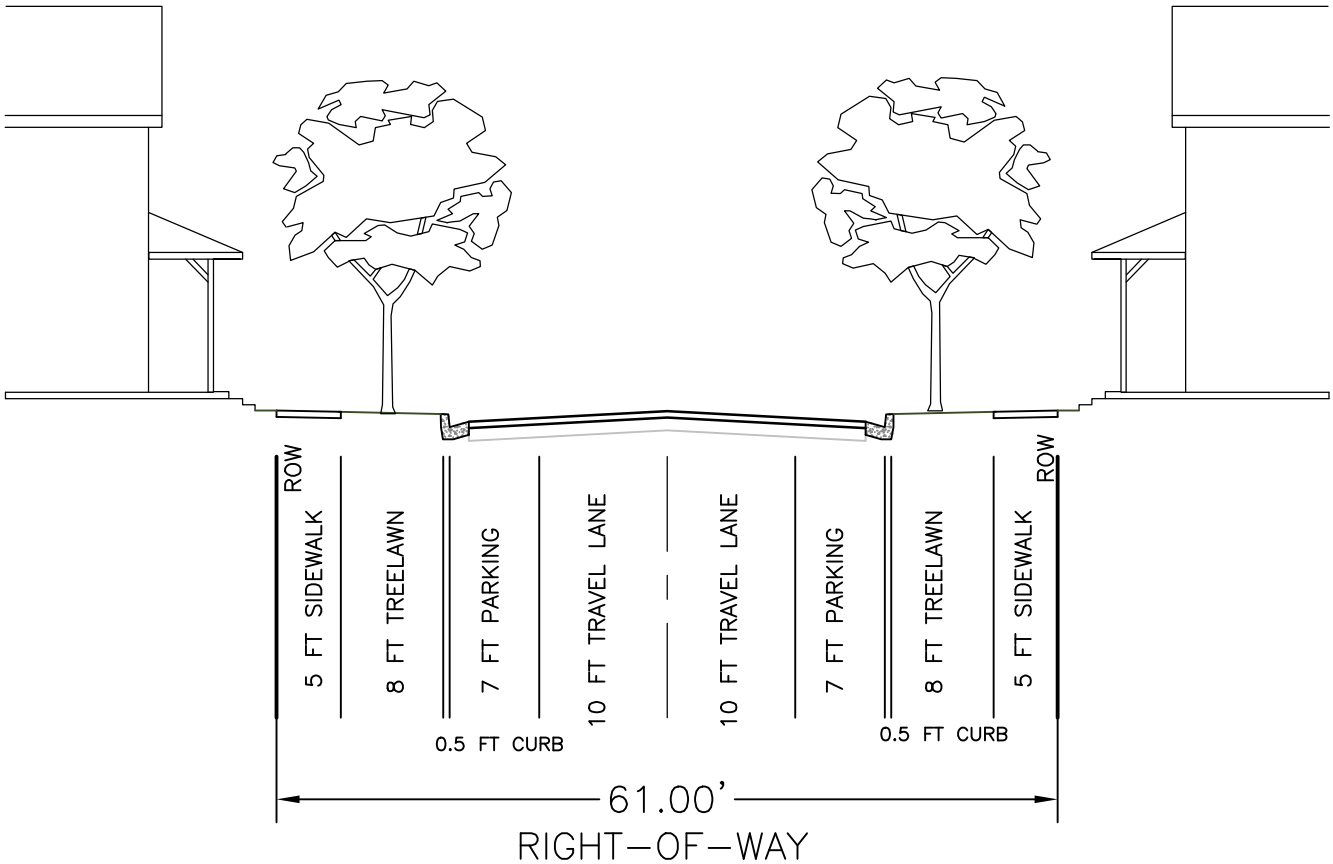
B. The intent of the street standards includes fire apparatus access from street rights-of-way with alleys providing secondary access for smaller emergency vehicles. Alley design may be modified to allow fire apparatus access where necessary if turning radii and adequate travel lane widths as provided in 800.01, or as approved by the Fire Marshal. Any alley emergency access shall be approved by the Fire Marshal.

C. Travel Lane reduction may be allowed if mitigated by additional suppression and reduction in building height and setbacks as approved by the Fire Marshal.

D. Developments providing structures greater than 30 feet in height require aerial apparatus emergency access. This type of development shall provide a minimum 26-foot-wide paved area clear of all vertical obstructions, a minimum of 15 feet and maximum 30 feet from the face of the structure, as acceptable to the Fire Marshal. To meet this requirement within the adjacent right of way, options to be considered include:

    (1) The drive lanes may be extended to 13 feet each direction to provide 26-foot-wide access.
    (2) Streets with parking may provide “No Parking Fire Lane” restricted areas placed according to Fire Marshal direction. Depending upon the length of the block, restricted parking areas a minimum of 30 feet long will be provided at each end of the block and an area 60 feet long at the center of the block.
    (3) Streets with no parking or parking on one side, may utilize attached concrete walks to meet the minimum 26-foot-width. The sidewalk will be designed to support additional loading from aerial apparatus out rigging.
    (4) Narrow street sections with tree lawns may provide concrete infill of the tree lawn in locations specified by the Fire Marshal to meet the minimum access width.





NOTES:
1. ACCEPTABLE FOR ALL RESIDENTIAL STREETS.
2. POSTED AND DESIGN FOR 25 MPH TRAFFIC SPEED.
3. NO STRIPING ON LOCAL STREET BUT PARKING DELINEATED FOR CLARITY IN THIS DETAIL.

CITY OF LONGMONT COLORADO

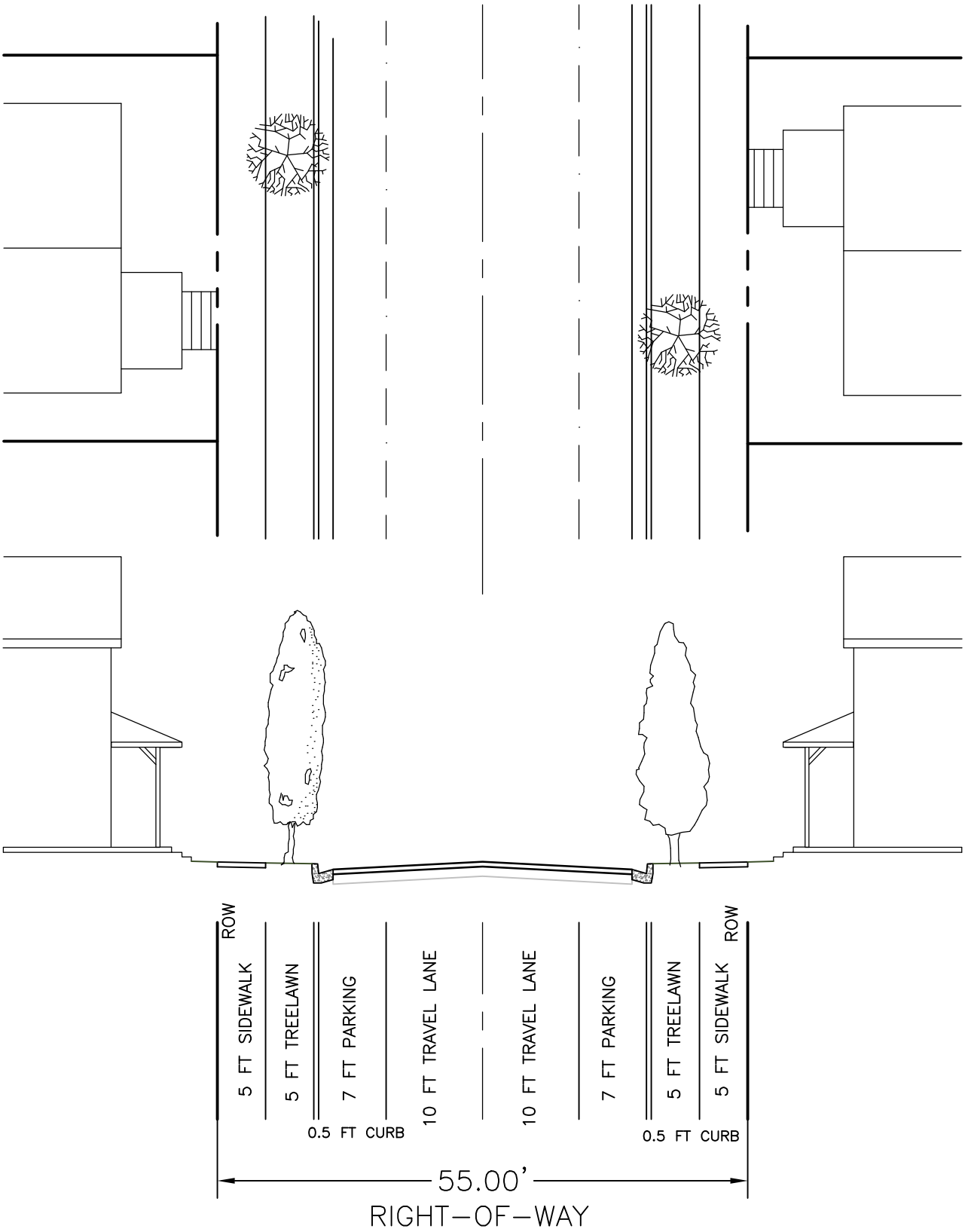
LOCAL RESIDENTIAL STREET
DETACHED WALK W/ PARKING
61 FT ROW

DETAIL

800-01

DATE: 09/12/2024

SCALE: NOT TO SCALE



NOTES:
1. ACCEPTABLE FOR ALL RESIDENTIAL STREETS.
2. POSTED AND DESIGN FOR 25 MPH TRAFFIC SPEED.
3. NARROW TREE LAWN REQUIRES COLUMNAR TREES NO CANOPY TREES ALLOWED.

CITY OF LONGMONT COLORADO

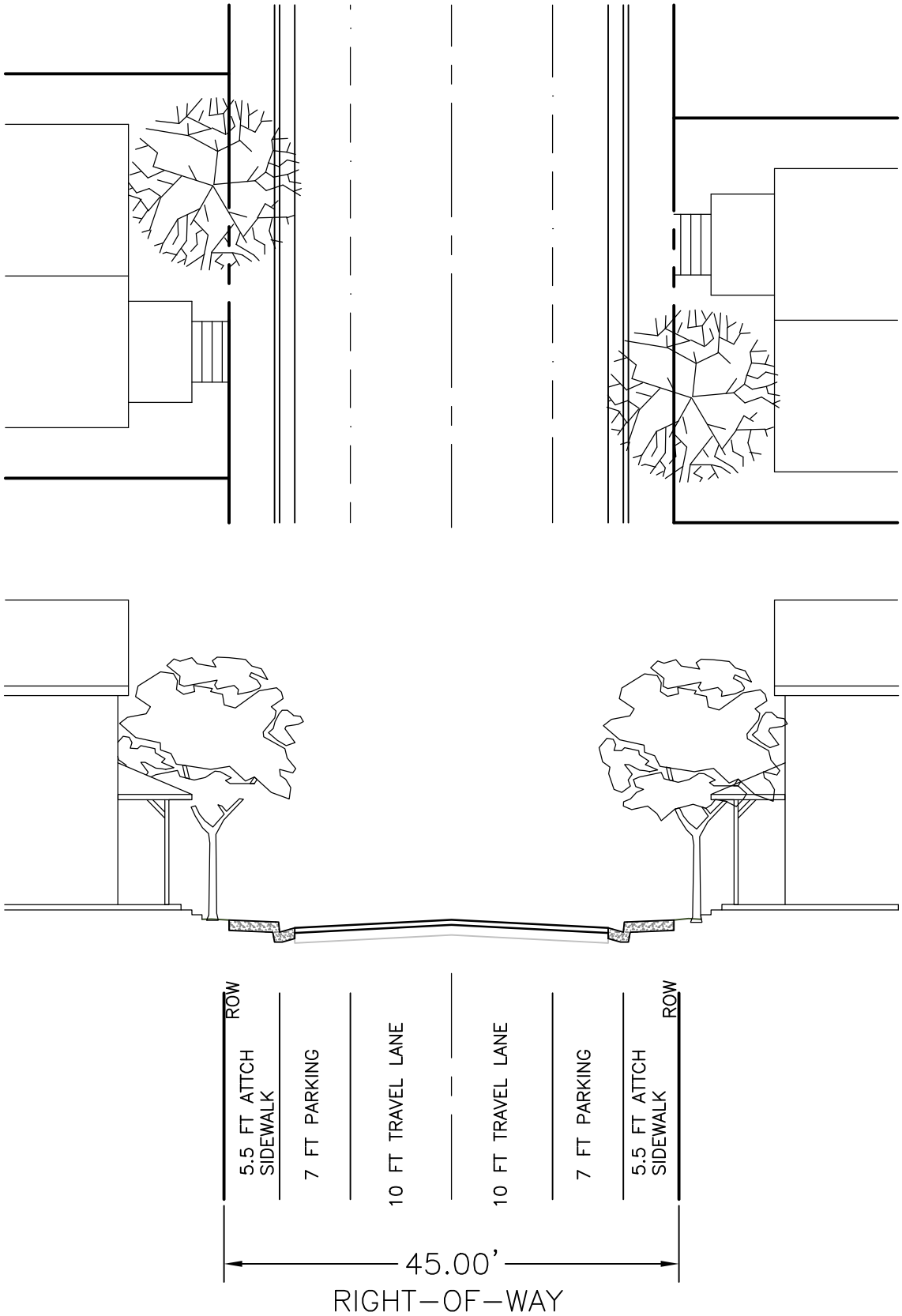
LOCAL RESIDENTIAL STREET
DETACHED WALK W/ PARKING
55 FT ROW

DETAIL

800-02

DATE: 9/12/2024

SCALE: NOT TO SCALE



NOTES:
1. ACCEPTABLE FOR ALL RESIDENTIAL STREETS.
2. POSTED AND DESIGN FOR 25 MPH TRAFFIC SPEED.

CITY OF LONGMONT COLORADO

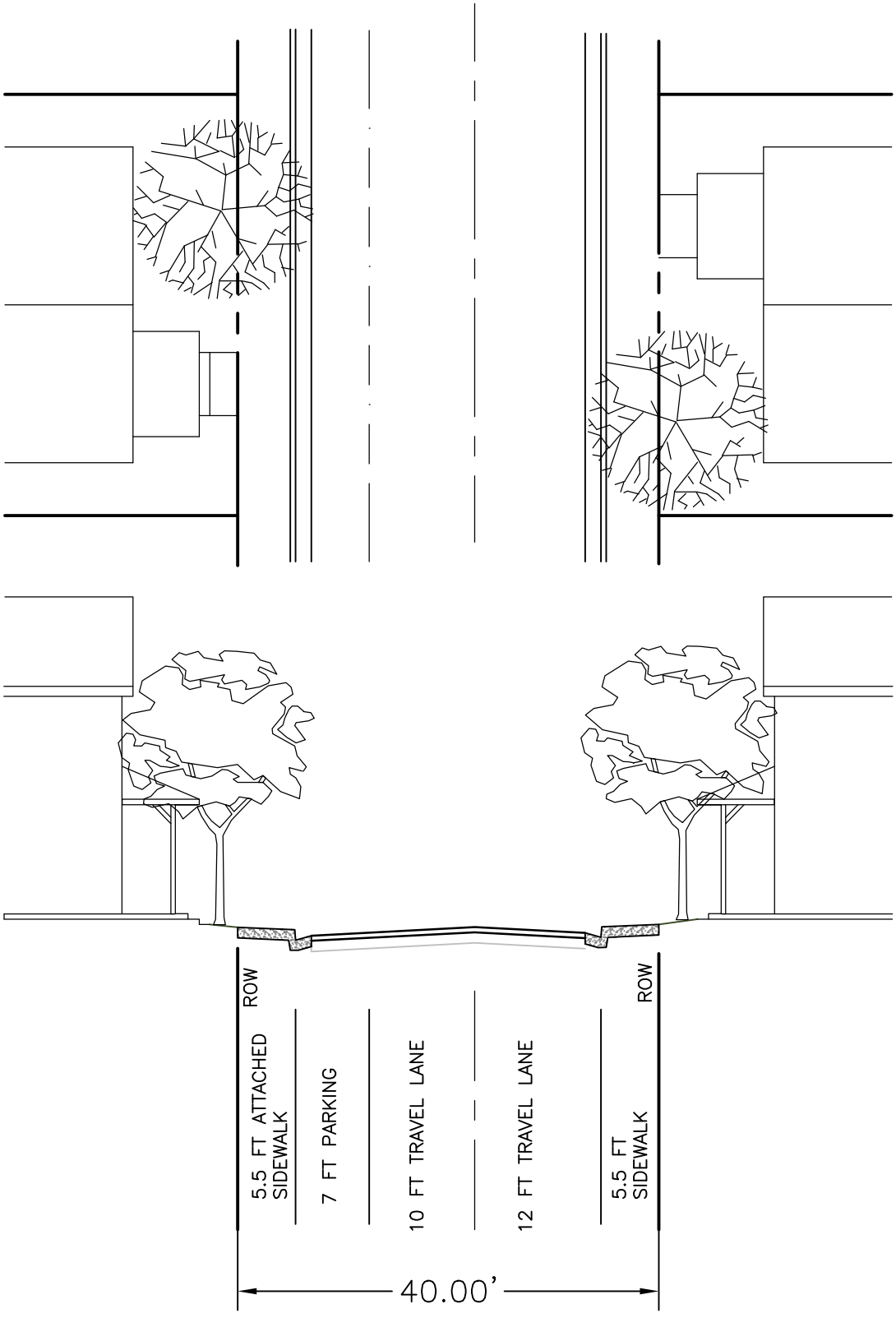
LOCAL RESIDENTIAL STREET
ATTACHED WALK W/ PARKING
45 FT ROW

DETAIL

800-03

DATE: 09/12/2024

SCALE: NOT TO SCALE



NOTES:
1. ACCEPTABLE FOR ALL RESIDENTIAL STREETS.
2. ALLEY'S REQUIRED BASED UPON UTILITY CORRIDOR NEEDS AND LAYOUT.
3. POSTED AND DESIGN FOR 25 MPH TRAFFIC SPEED.

CITY OF LONGMONT COLORADO

LOCAL RESIDENTIAL STREET

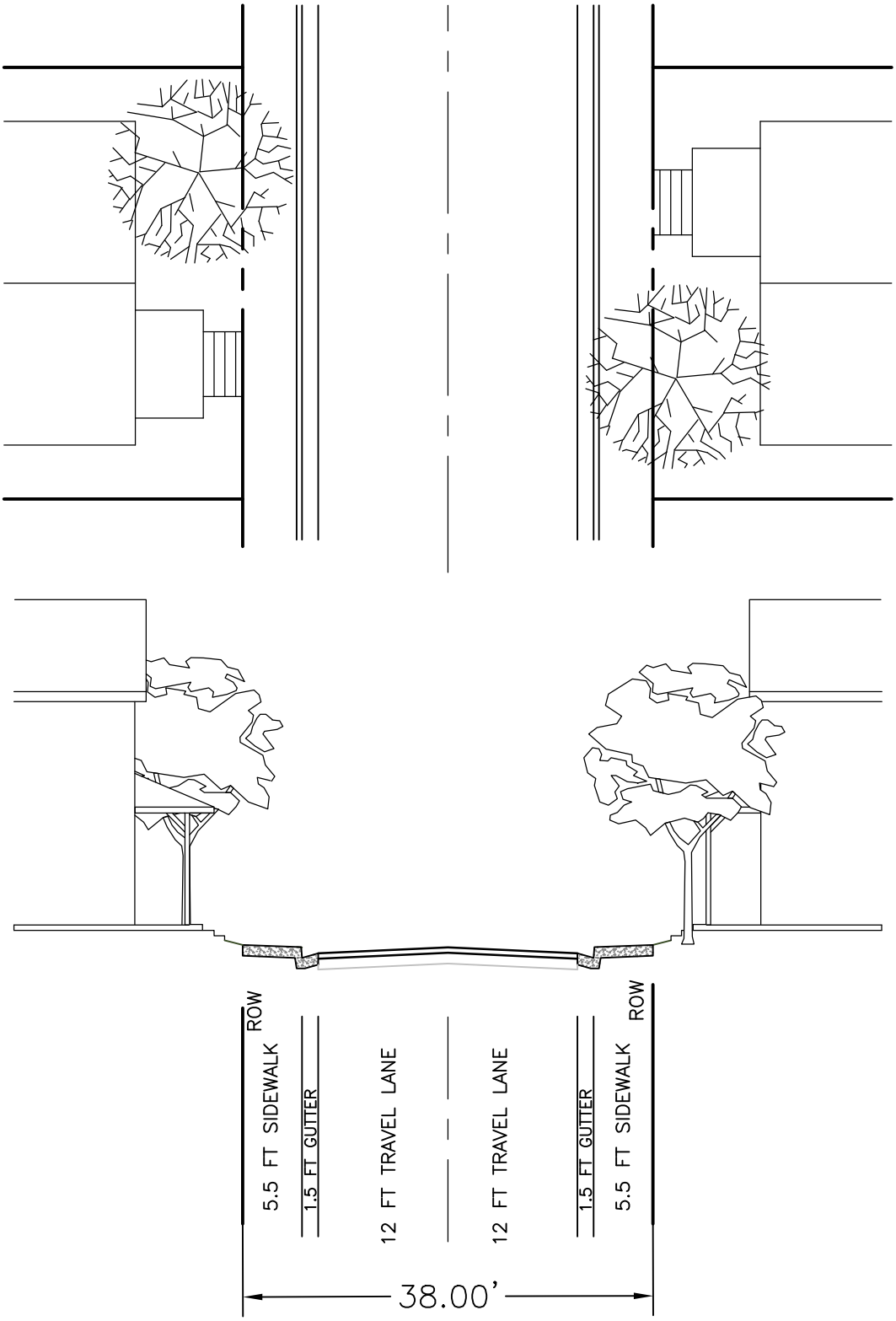
ATTACHED WALK 1 SIDE PARKING 40 FT ROW

DETAIL

800-04

DATE: 09/12/2024

SCALE: NOT TO SCALE



NOTES:
1. ACCEPTABLE FOR ALL RESIDENTIAL STREETS.
2. ALLEYS REQUIRED FOR ADEQUATE UTILITY CORRIDORS.
3. POSTED AND DESIGN FOR 25 MPH TRAFFIC SPEED.

CITY OF LONGMONT COLORADO

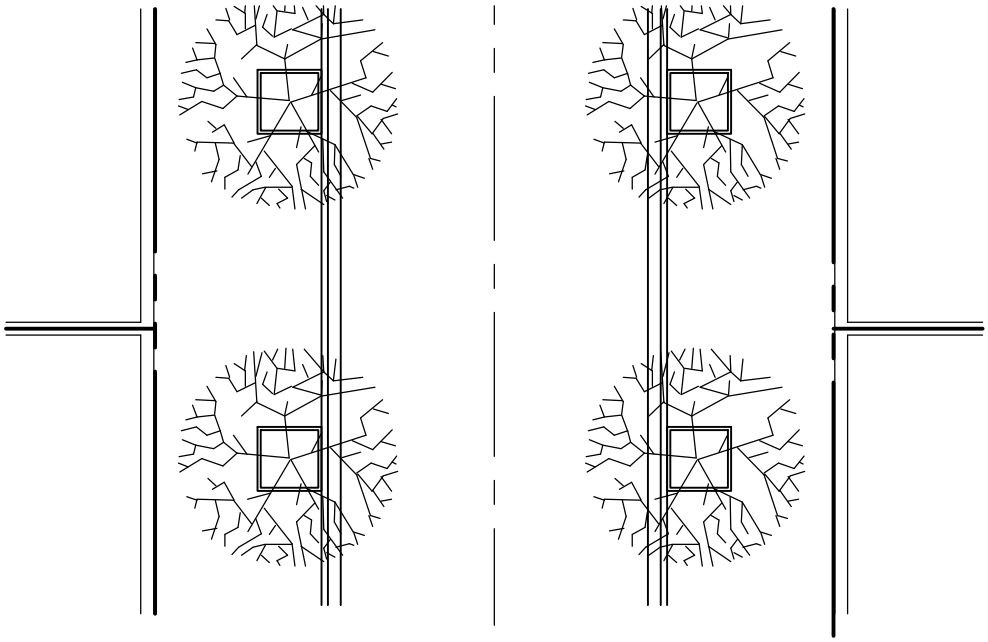
LOCAL RESIDENTIAL STREET
ATTACHED WALK NO PARKING
38 FT ROW

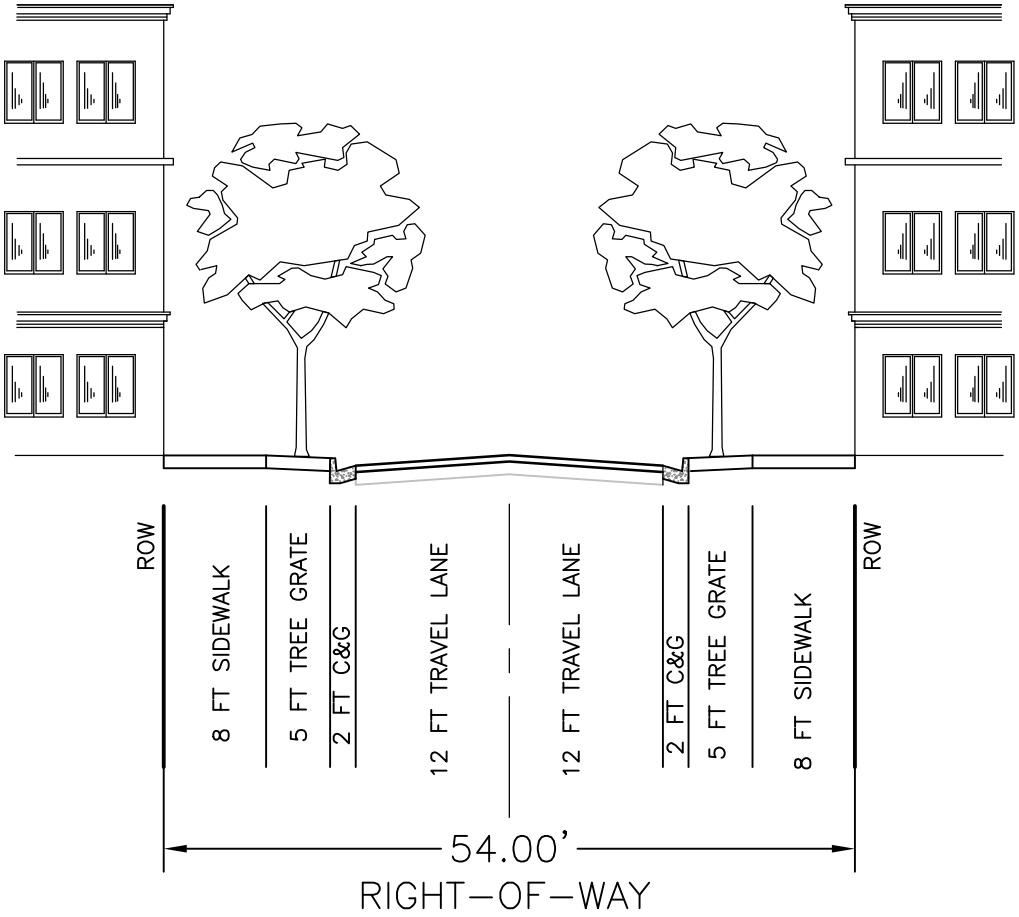
DETAIL

800–05

DATE: 03/28/2024

SCALE: NOT TO SCALE





NOTES:
1. INTENDED FOR DOWNTOWN AND URBAN DEVELOPMENT. GENERALLY MULTIFAMILY AND MIXED USE WITH ZERO LOT LINE SET BACKS.
2. ALLEY'S AND ADDITIONAL OFF STREET PARKING REQUIRED.
3. SECTION CAN BE EXPANDED TO 34 FEET FL TO FL TO ADD ON STREET PARKING (7 FT WIDE PARALLEL PARKING).
4. POSTED AND DESIGN FOR 25 MPH TRAFFIC SPEED.
5. TREE GRATES TO MEET CITY STANDARD 5 FT X 5 FT FRAME. ALL TREE GRATES PROVIDED DRIP IRRIGATION FROM ADJACENT PROPERTY.
6. ZERO SETBACK BUILDINGS SHALL PROVIDE ACCESS RECESSED FROM THE ROW A MINIMUM OF 5 FEET. NO PORTION OF THE FOUNDATION SYSTEM MAY EXTEND INTO THE ROW. AWNING AND OTHER OVERHANG FROM BUILDINGS A MINIMUM OF 14 FEET ABOVE ADJACENT GRADE MAY BE ALLOWED THROUGH THE USE OF PUBLIC PLACES PERMIT PROCESS.

CITY OF LONGMONT COLORADO

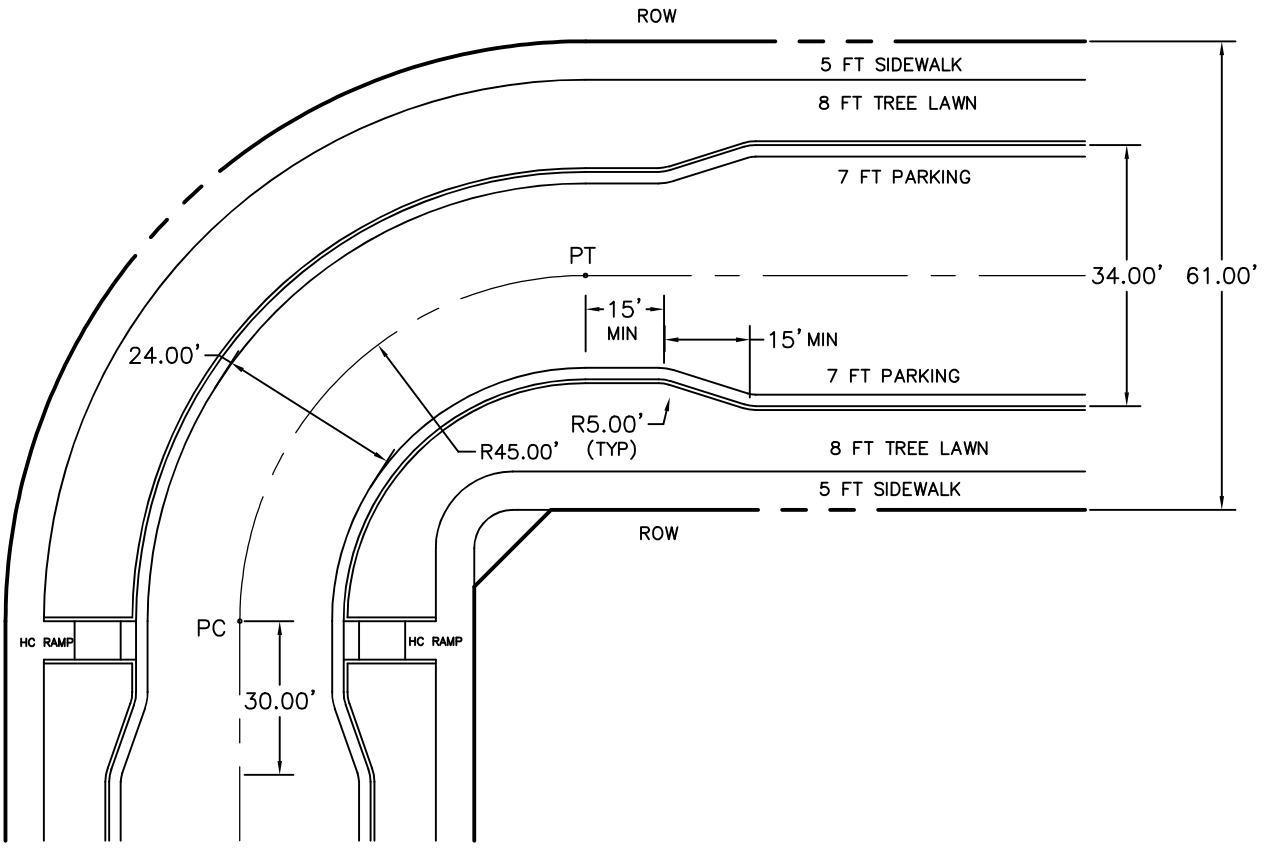
URBAN RESIDENTIAL STREET
NO PARKING
54 FT ROW

DETAIL

800-06

DATE: 11/13/2024

SCALE: NOT TO SCALE



NOTES:
1. CURVE MAY BE POSTED 20 MPH.
2. NO DRIVE ACCESS TO STREET WITHIN THE CURVE.
3. IF PEDESTRIAN CROSSING IS NECESSARY, IT SHALL BE LOCATED OUTSIDE OF THE CURVE AND PARKING AREA.

CITY OF LONGMONT COLORADO

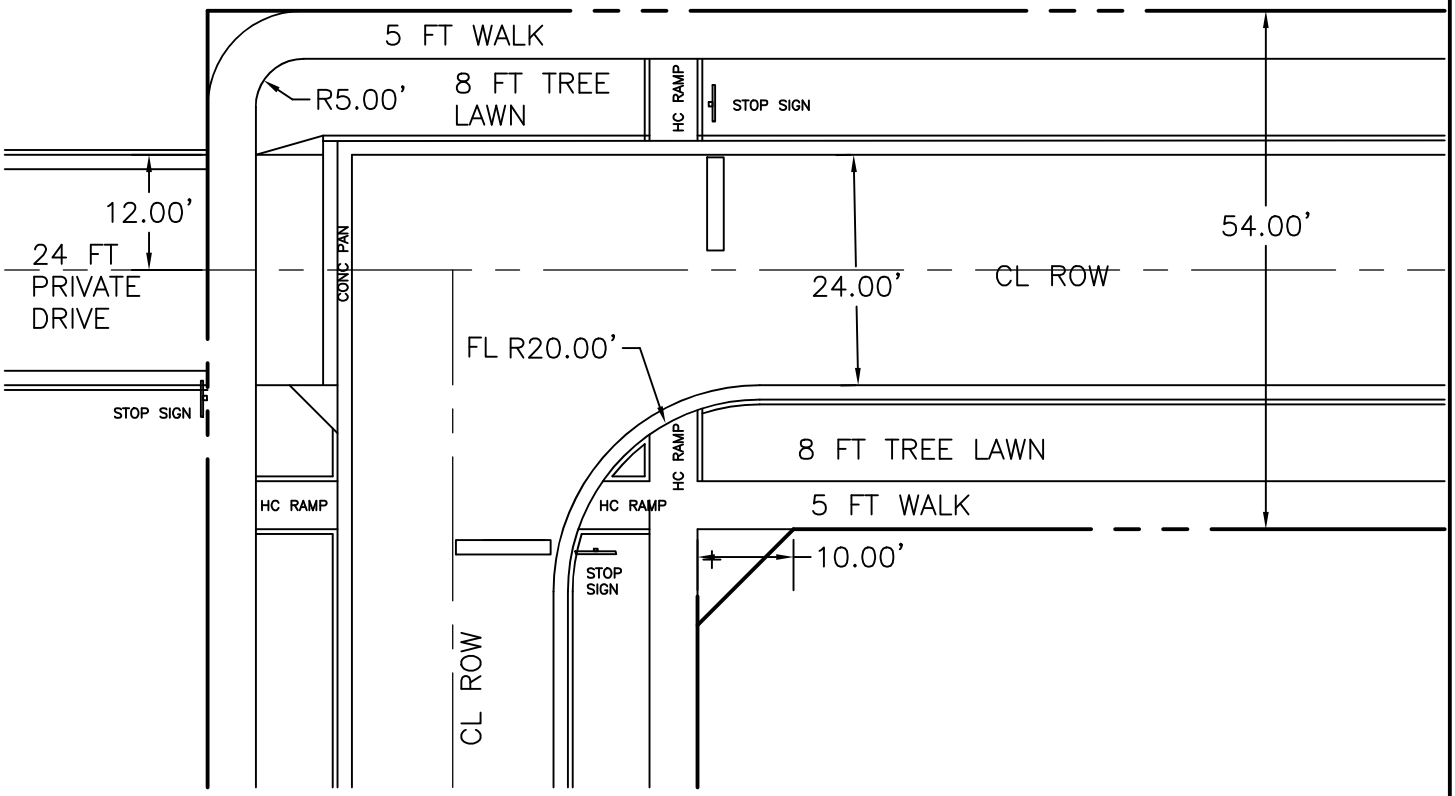
SMALL RADIUS CURVE
45 FT CL RADIUS
61 FT ROW

DETAIL

800-07

DATE: 09/12/2024

SCALE: NOT TO SCALE



NOTES:

1. PRIVATE DRIVE MAY BE FOR COMMERCIAL USES OR MULTIFAMILY PARKING LOT. NO SINGLE FAMILY RESIDENTIAL ACCESS.
2. THE DRIVE SHALL BE CENTERED ON THE CENTER OF THE STREET ROW.
3. NO PARKING WITHIN 30 FEET OF INTERSECTION.
4. STOP SIGNS AND STOP BARS SHALL BE PLACED BEHIND THE HC RAMPS AND CROSSING LOCATIONS.
5. HC RAMPS AND CROSSINGS SHALL MEET MINIMUM ADA AND DESIGN STANDARDS SECTION 200.
6. GRADING OF THE INTERSECTION SHALL PROVIDE FOR DRAINAGE SO THAT PONDING WILL NOT OCCUR.

CITY OF LONGMONT COLORADO

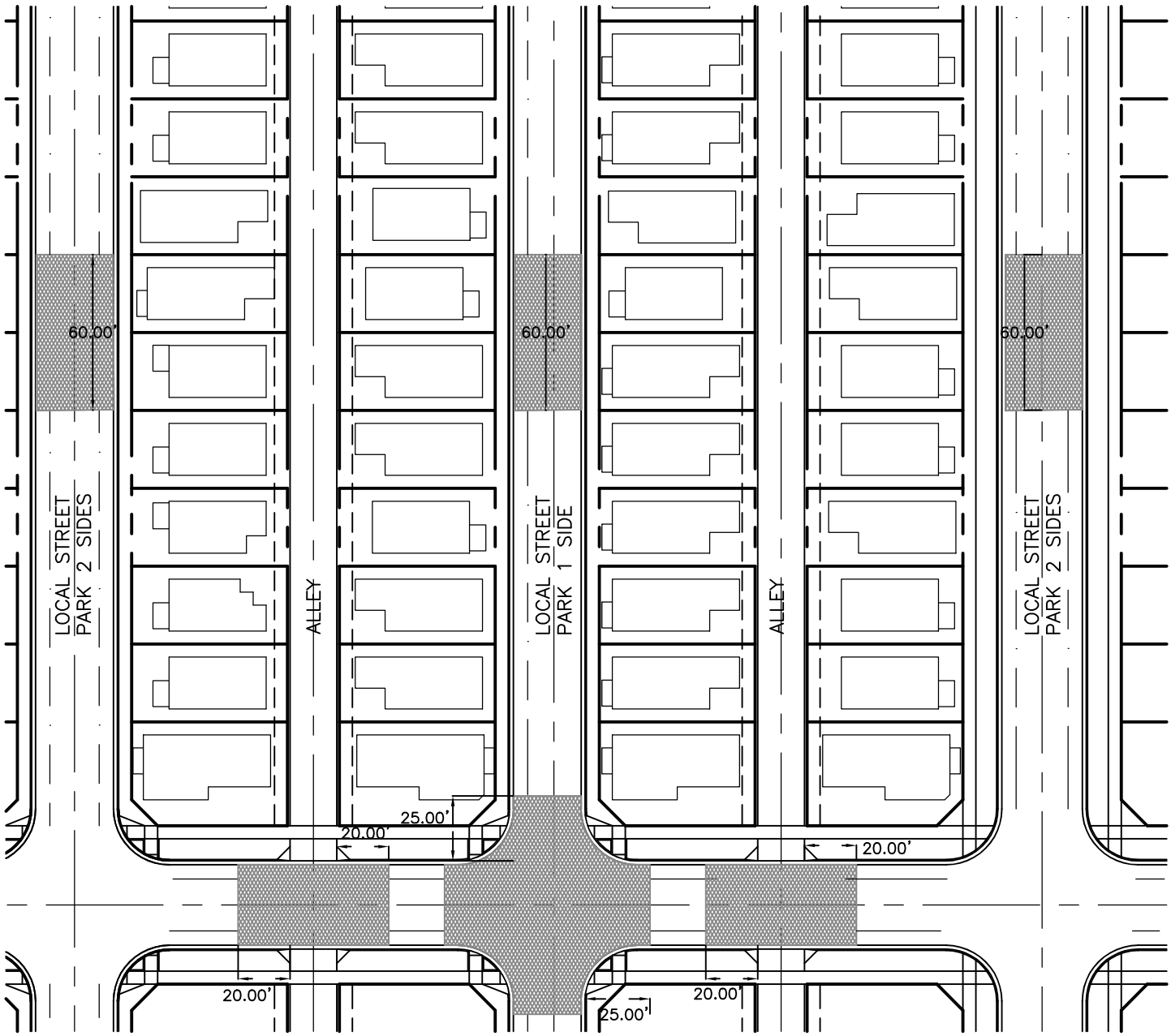
TEE INTERSECTION
W/ PRIVATE DRIVE
54 FT ROW

DETAIL

800-08

DATE: 09/12/2024

SCALE: NOT TO SCALE



NOTES:
1. EMERGENCY ACCESS AREA SHALL BE PROVIDED AT THE MID-POINT OF A BLOCK. IT SHALL BE SIGNED NO PARKING FIRE LANE.
2. THE AREA SHALL BE A MINIMUM 60 FEET IN LENGTH AND PROVIDE A MINIMUM 26 FEET WIDE AREA FOR EQUIPMENT.
3. AT THE DIRECTION OF THE FIRE MARSHAL, PAVEMENT MAY BE DESIGNED TO SUPPORT OUTRIGGING OF AN AERIAL APPARATUS.
4. NO PARKING SHALL BE ALLOWED WITHIN 15 FEET OF THE ALLEY ROW.
5. AT STREET INTERSECTIONS, PARKING IS NOT ALLOWED WITHIN 20 FEET OF THE CURB RETURN.

CITY OF LONGMONT COLORADO

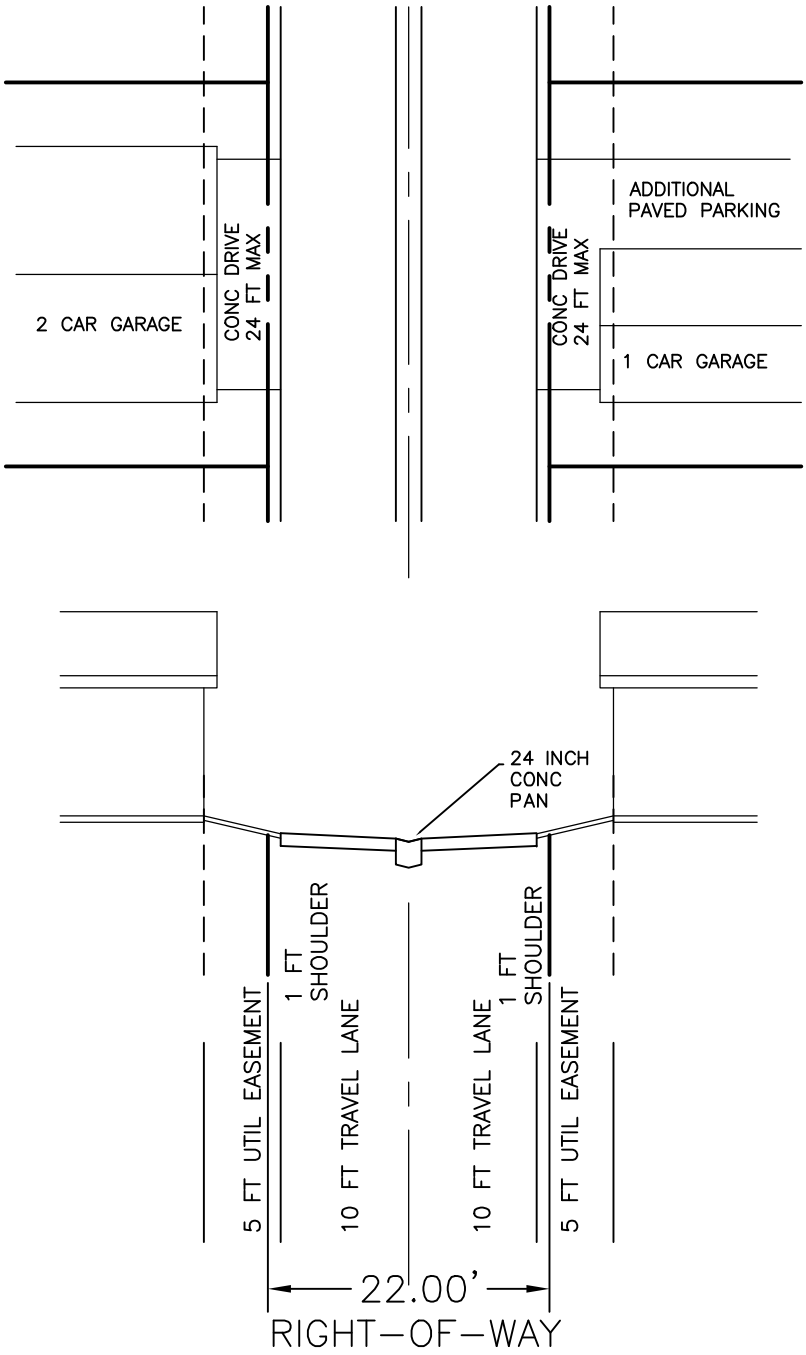
EMERGENCY ACCESS
MID-BLOCK AND INTERSECTIONS NO PARKING AREAS

DATE: 11/13/2024

SCALE: NOT TO SCALE

DETAIL

800-09



NOTES:

1. ALLEY SHALL BE PAVED 20 FEET WIDE EITHER IN CONCRETE OR ASPHALT. IF ASPHALT, A 24 INCH WIDE CONCRETE PAN SHALL BE PROVIDED, CENTERED ON THE ALLEY SECTION.
2. PAVEMENT SHALL SLOPE MIN. 2% TO MAX 4% FROM THE EDGE OF ALLEY TO THE CENTER OR EDGE OF PAN.
3. A MINIMUM 5 FT WIDE UTILITY EASEMENT SHALL BE PROVIDED ON EACH SIDE OF THE ALLEY. THE EASEMENT MAY BE REQUIRED TO BE DEDICATED AS A GENERAL UTILITY EASEMENT OR AS AN EXCLUSIVE LPC/NEXTLIGHT EASEMENT DEPENDING UPON THE DESIGN OF THE PROJECT.

CITY OF LONGMONT COLORADO

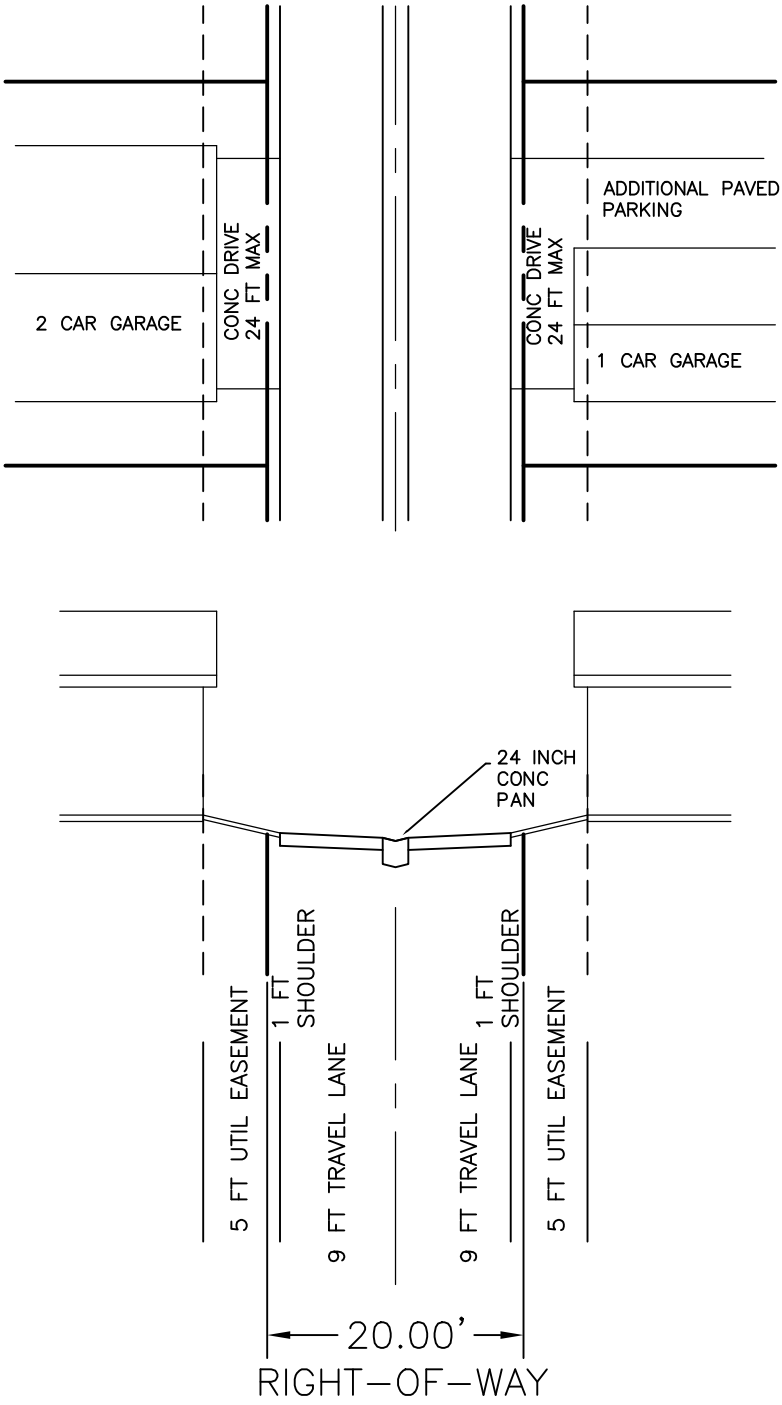
ALLEY SECTION
20 FT PAVEMENT
22 FT ROW

DETAIL

800-10

DATE: 11/13/2024

SCALE: NOT TO SCALE



NOTES:

1. ALLEY SHALL BE PAVED 18 FEET WIDE EITHER IN CONCRETE OR ASPHALT. IF ASPHALT, A 24 INCH WIDE CONCRETE PAN SHALL BE PROVIDED, CENTERED ON THE ALLEY SECTION.
2. PAVEMENT SHALL SLOPE MIN. 2% TO MAX 4% FROM THE EDGE OF ALLEY TO THE CENTER OR EDGE OF PAN.
3. A MINIMUM 5 FT WIDE UTILITY EASEMENT SHALL BE PROVIDED ON EACH SIDE OF THE ALLEY. THE EASEMENT MAY BE REQUIRED TO BE DEDICATED AS A GENERAL UTILITY EASEMENT OR AS AN EXCLUSIVE LPC/NEXTLIGHT EASEMENT DEPENDING UPON THE DESIGN OF THE PROJECT.

CITY OF LONGMONT COLORADO

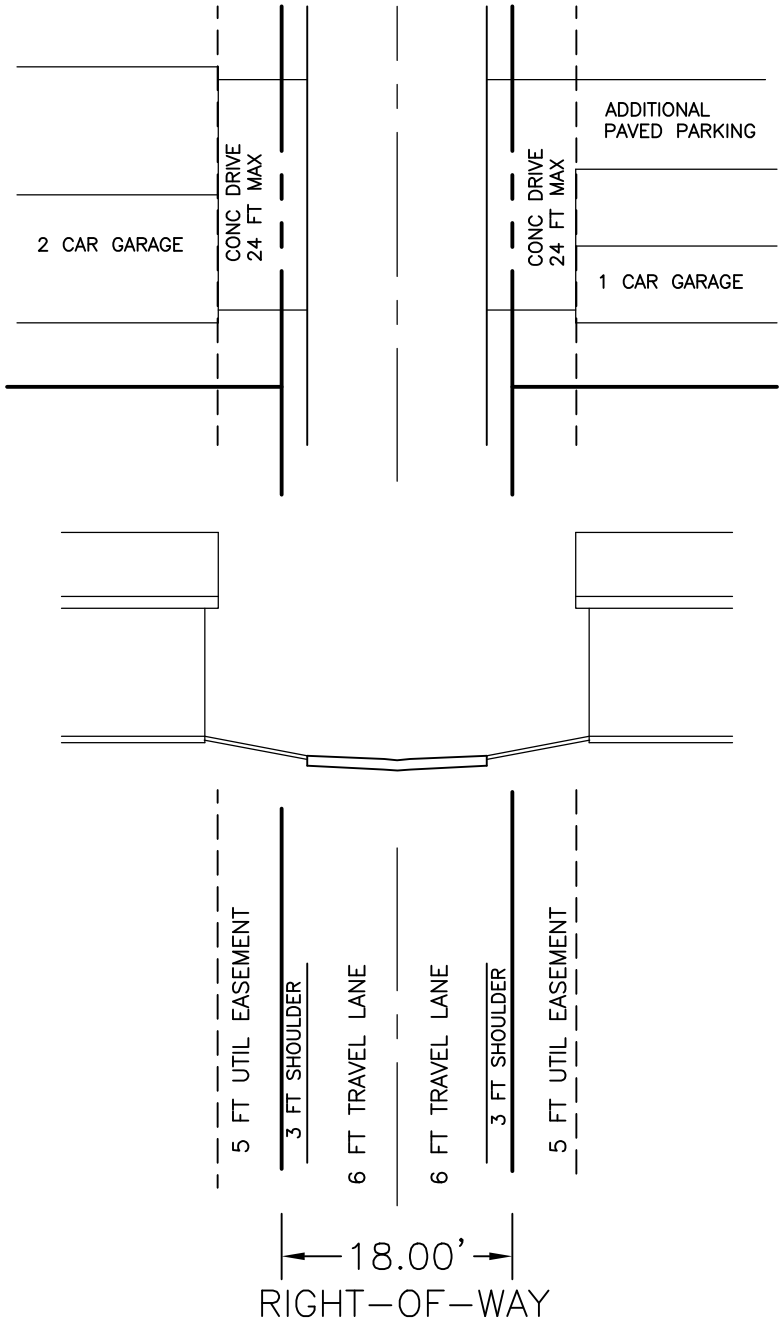
ALLEY SECTION
18 FT PAVEMENT
20 FT ROW

DETAIL

800-11

DATE: 11/13/2024

SCALE: NOT TO SCALE



NOTES:
1. ALLEY SHALL EXTEND FROM ONE INTERSECTING STREET ROW TO ANOTHER WITH NO CURVES AND NO INTERSECTIONS WITH OTHER ALLEYS.
2. PROPERTY SHALL HAVE ACCESS TO A FULL STREET SECTION ON THE FRONT OF THE LOT (NOT FRONTING A GREEN SPACE OR OUTLOT.
3. ALLEY SHALL BE CONCRETE PAVED 12 FEET WIDE WITH A 3 FT GRAVEL SHOULDER.
4. PAVEMENT SHALL SLOPE MIN 2% TO MAX 4% FROM THE EDGE OF ALLEY TO THE CENTER.
5. A MINIMUM 5 FT WIDE UTILITY EASEMENT SHALL BE PROVIDED ON EACH SIDE OF THE ALLEY. THE EASEMENT MAY BE REQUIRED TO BE DEDICATED AS A GENERAL UTILITY EASEMENT OR AS AN EXCLUSIVE LPC/NEXTLIGHT EASEMENT DEPENDING UPON THE DESIGN OF THE PROJECT.
6. THE CITY ENGINEER MAY REQUIRE A WIDER ALLEY RIGHT OF WAY TO ACCOMMODATE EMERGENCY ACCESS OR ADEQUATE UTILITY CORRIDORS.
7. NO BUILDING EVES MAY OVERHANG THE EASEMENT.

CITY OF LONGMONT COLORADO

ALLEY SECTION

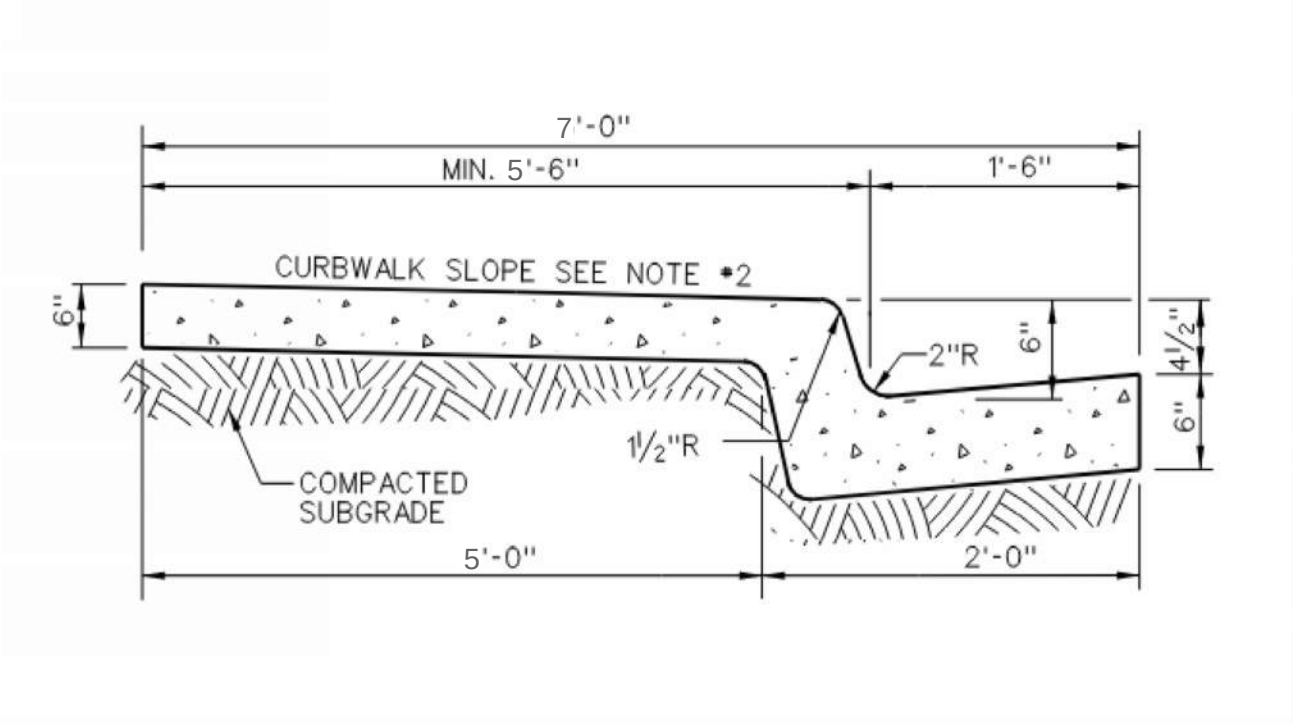
MIN PAVING 12 FT
18 FT ROW

DETAIL

800-12

DATE: 11/13/2024

SCALE: NOT TO SCALE



NOTES:

1. GUTTER SLOPE = 1 $\frac{1}{2}$" IN 1'–6"
2. CURBWALK SLOPE = MAX 2% TARGET 1.7%
3. SEE SECTION 200 FOR ALL OTHER CONSTRUCTION REQUIREMENTS.

CITY OF LONGMONT COLORADO

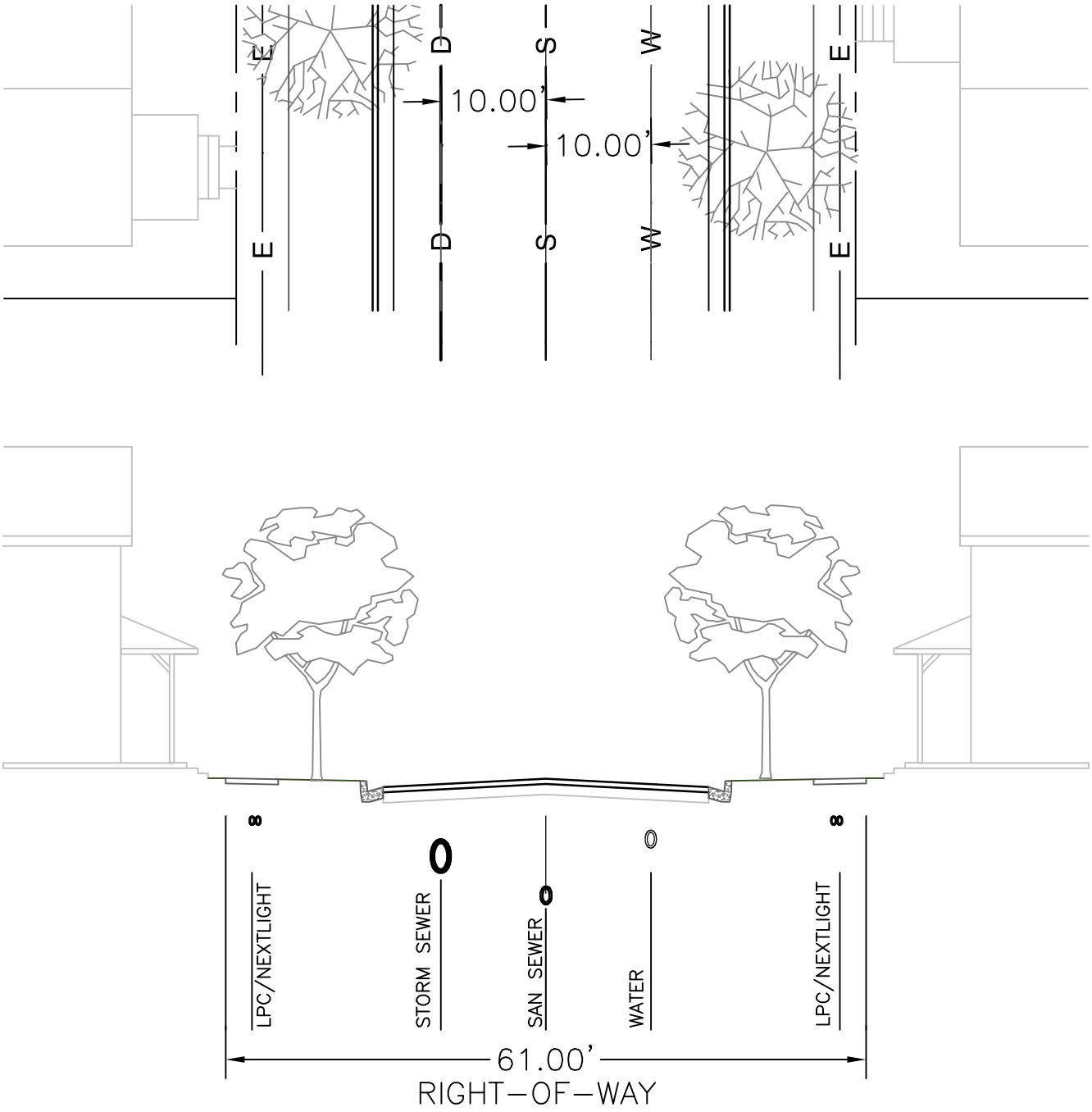
ATTACHED SIDEWALK
5 FT WIDE CURBWALK

DETAIL

800–13

DATE: 11/13/2024

SCALE: NOT TO SCALE



NOTES:
1. WATER, SAN SEWER AND STORM SEWER SHALL BE PLACED MINIMUM 10 FT FROM CL OF PIPE TO CL OF PIPE. SAN SEWER SHALL BE PLACED AT THE CENTER OF THE ROW.
2. FOR LPC DESIGN AND SERIVCE, ELECTRICAL CONDUITS SHALL BE CENTERED ON THE WALK WITH POCKET EASEMENTS PROVIDED ON PRIVATE PROPERTY FOR JUNCTION BOXES, TRANSFORMERS AND OTHER APPERTENANCES. BASED ON SITE DESIGN AND BUILDING ENVELOPES, LPC AND NEXTLIGHT FACILITIES MAY BE PLACED IN THE TREELAWN IF SEPARATION AND PROTECTION REQUIREMENTS ARE MET.
3. ACCEPTABLE FOR STORM SEWER 24-IN DIAMETER AND LESS.
4. FOR STORM SEWER GREATER THAN 24-IN DIAM, THE SANITARY SEWER SHALL BE PLACED IN ALLEY TO MAINTAIN REQUIRED SEPARATION.

CITY OF LONGMONT COLORADO

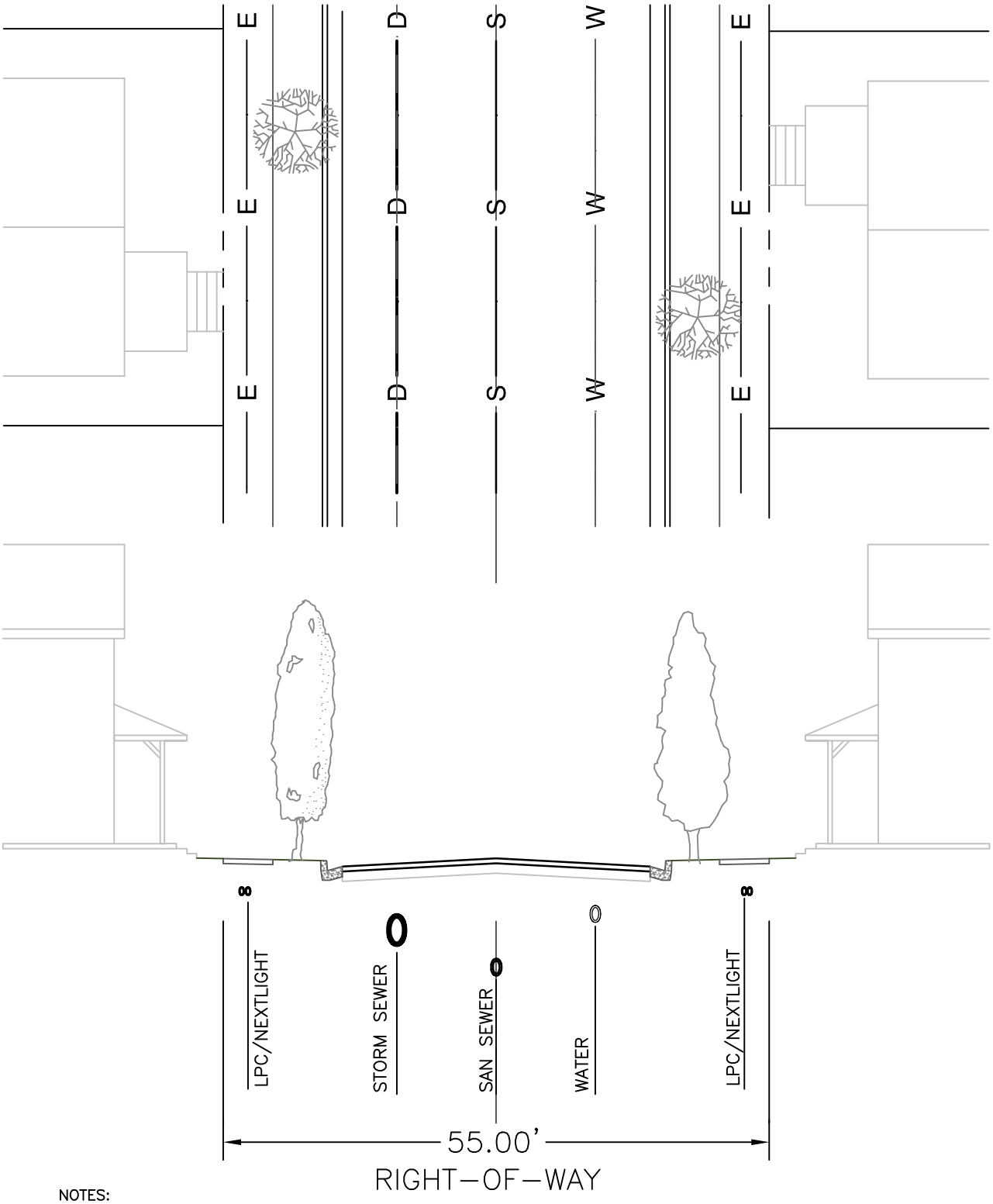
TYPICAL UTILITY LAYOUT
DETACHED WALK W/ PARKING
61 FT ROW

DETAIL

800-21

DATE: 10/15/2024

SCALE: NTS



NOTES:
1. WATER, SAN SEWER AND STORM SEWER SHALL BE PLACED MINIMUM 10 FT FROM CL OF PIPE TO CL OF PIPE.
2. FOR LPC DESIGN AND SERIVCE, ELECTRICAL CONDUITS SHALL BE CENTERED ON THE WALK WITH POCKET EASEMENTS PROVIDED ON PRIVATE PROPERTY FOR JUNCTION BOXES, TRANSFORMERS AND OTHER APPERTENANCES. LPC/NEXTLIGHT FACILITIES CANNOT BE PLACED IN THE TREELAWN.
3. ACCEPTABLE FOR STORM SEWER 24-IN DIAMETER AND LESS.
4. FOR STORM GREATER THAN 24-IN DIAM, PLACE SANITARY SEWER IN ALLEY TO MAINTAIN SEPARATION REQUIREMENTS.

CITY OF LONGMONT COLORADO

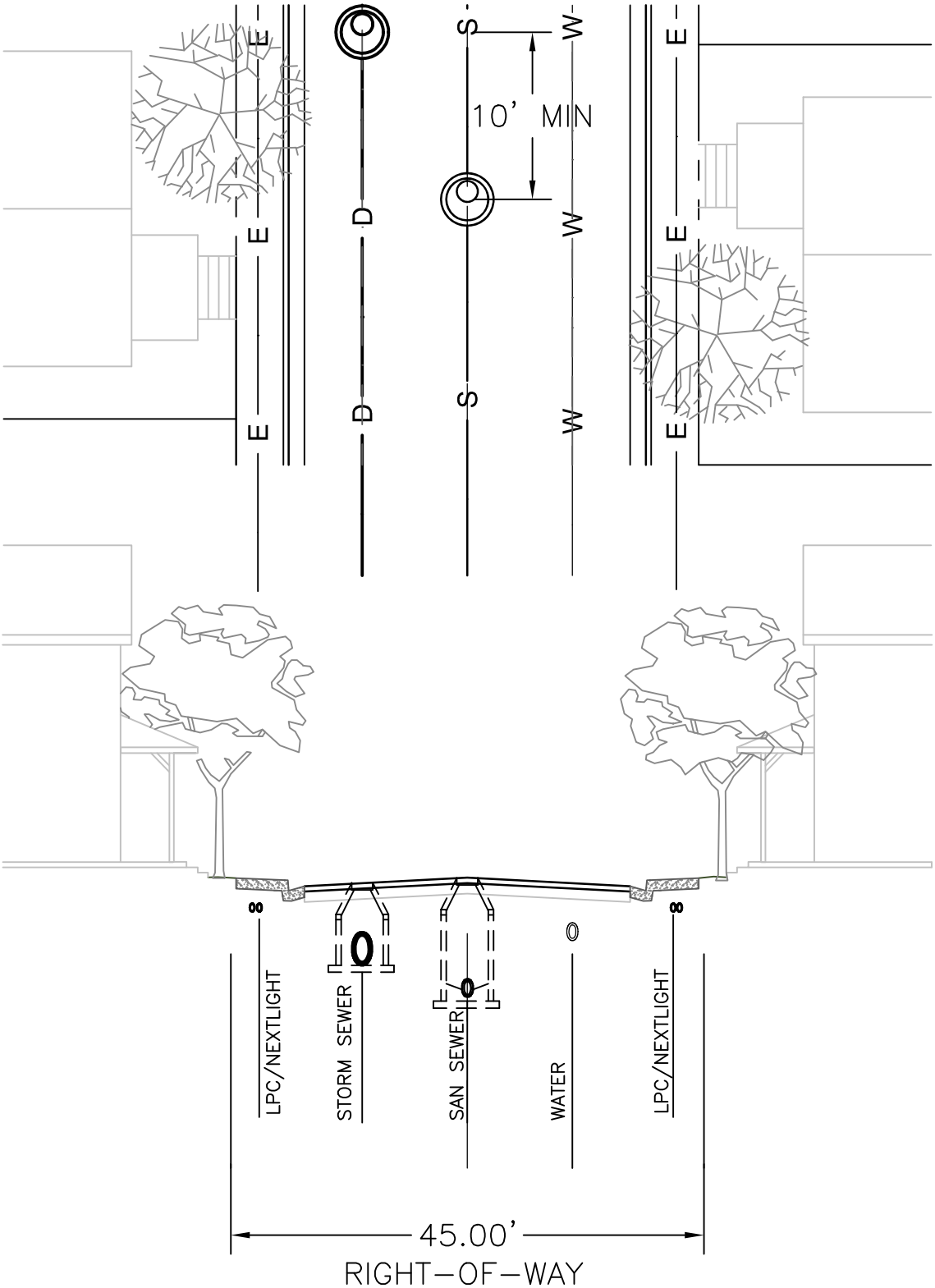
TYPICAL UTILITY LAYOUT
DETACHED WALK W/ PARKING
55 FT ROW

DETAIL

800-22

DATE: 10/15/2024

SCALE: NTS



NOTES:
1. ACCEPTABLE FOR STORMSEWER 24 IN DIAMETER AND LESS.
2. SANITARY SEWER MH SHALL BE PLACED A MIN OF 10 FT LINEARLY FROM ANY STORM SEWER MH. NO MH SHALL BE PLACED IMMEDIATELY ADJACENET TO ANY OTHER MH.
3. FOR LPC DESIGN AND SERIVCE, EITHER PROVIDE POCKET EASEMENTS BEHIND ROW FOR ELECTRIC/WATER, OR PLACE LPC/NEXTLIGHT INFRASTUCTURE IN 5-FT EASEMENT ALONG ALLEY.
4. FOR STORM GREATER THAN 24 IN DIAM, PLACE SANITARY SEWER IN ALLEY.

CITY OF LONGMONT COLORADO

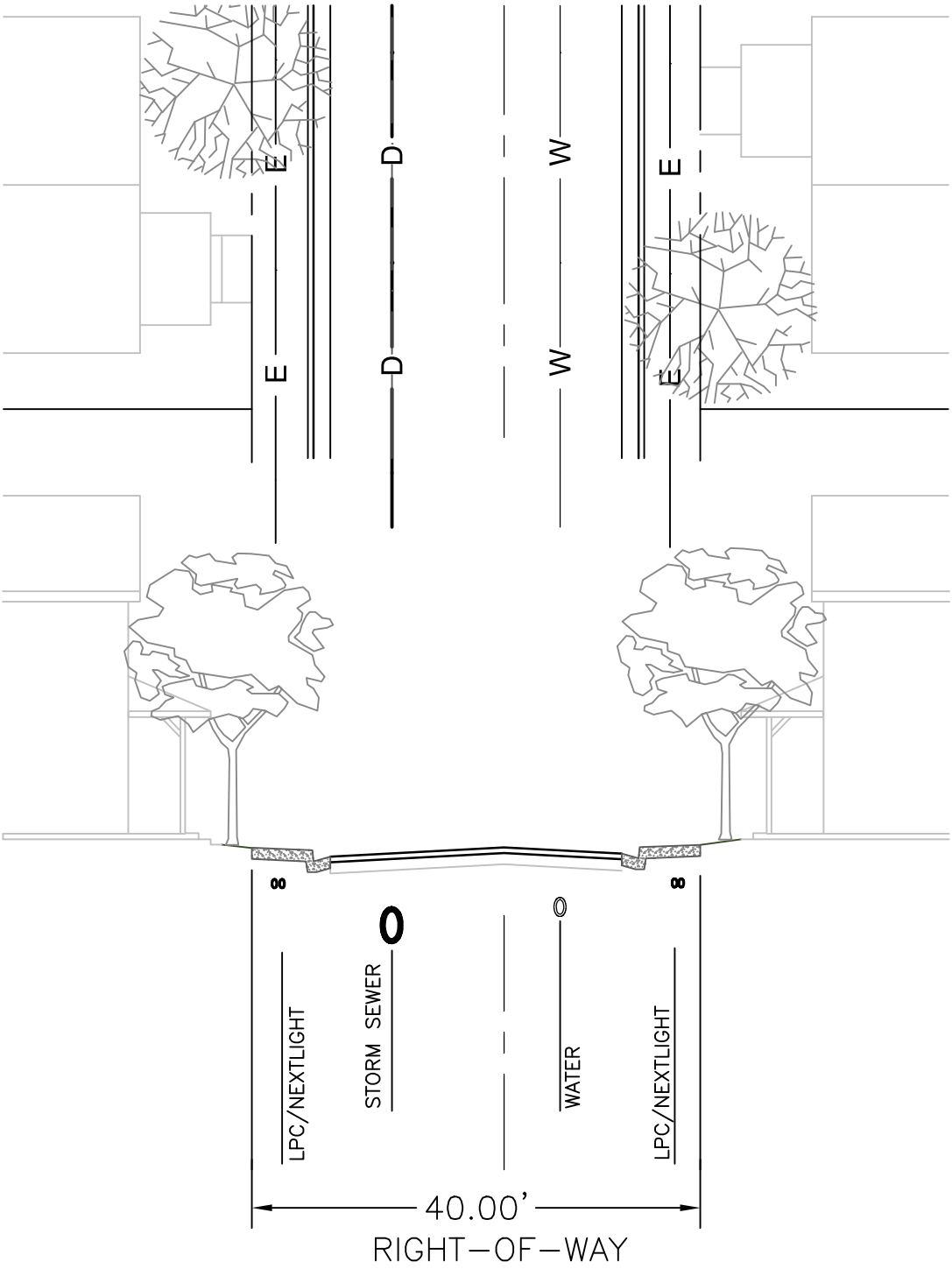
TYPICAL UTILITY LAYOUT
ATTACHED WALK W/ PARKING
45 FT ROW

DETAIL

800-23

DATE: 10/15/2024

SCALE: NTS



NOTES:
1. SANITARY SEWER MAINS SHALL BE PLACED IN ALLEY.
2. FOR LPC DESIGN AND SERIVCE, EITHER PROVIDE POCKET EASEMENTS BEHIND ROW FOR ELECTRIC/WATER, OR PLACE LPC/NEXTLIGHT INFRASTUCTURE IN 5-FT EASEMENT ALONG ALLEY. ADDITIONAL EASEMENTS FOR STREET LIGHTS MAY BE REQUIRED.

CITY OF LONGMONT COLORADO

TYPICAL UTILITY LAYOUT

ATTACHED WALK PARKING ONE SIDE

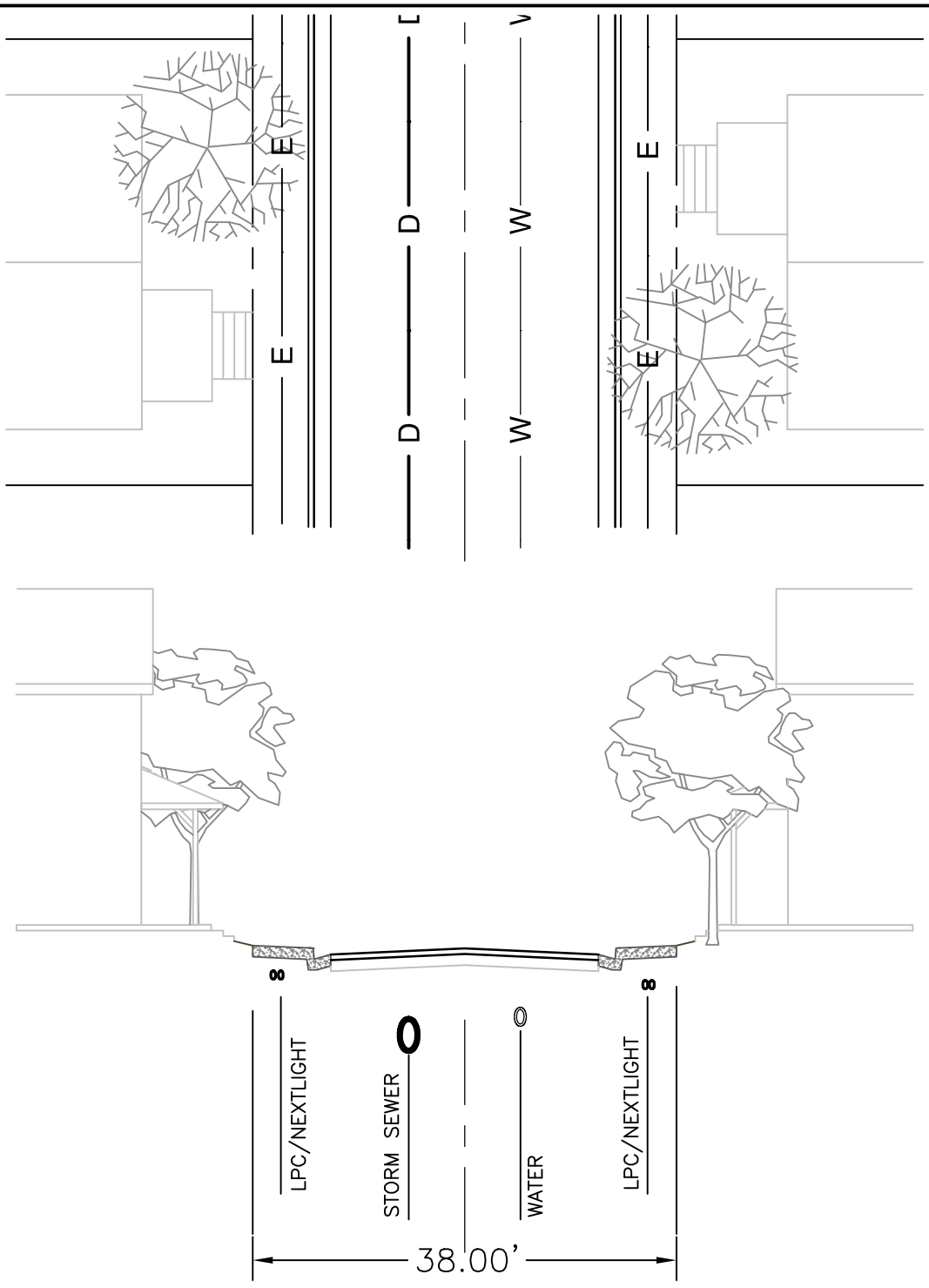
40 FT ROW

DATE: 10/15/2024

SCALE: NTS

DETAIL

800-24



NOTES:
1. SANITARY SEWER MAINS PLACED IN ALLEY.
2. FOR LPC DESIGN AND SERIVCE, EITHER PROVIDE POCKET EASEMENTS BEHIND ROW FOR ELECTRIC/WATER, OR PLACE LPC/NEXTLIGHT INFRASTUCTURE IN 5-FT EASEMENT ALONG ALLEY. ADDITIONAL EASEMENTS FOR STREET LIGHTS MAY BE REQUIRED.

CITY OF LONGMONT COLORADO

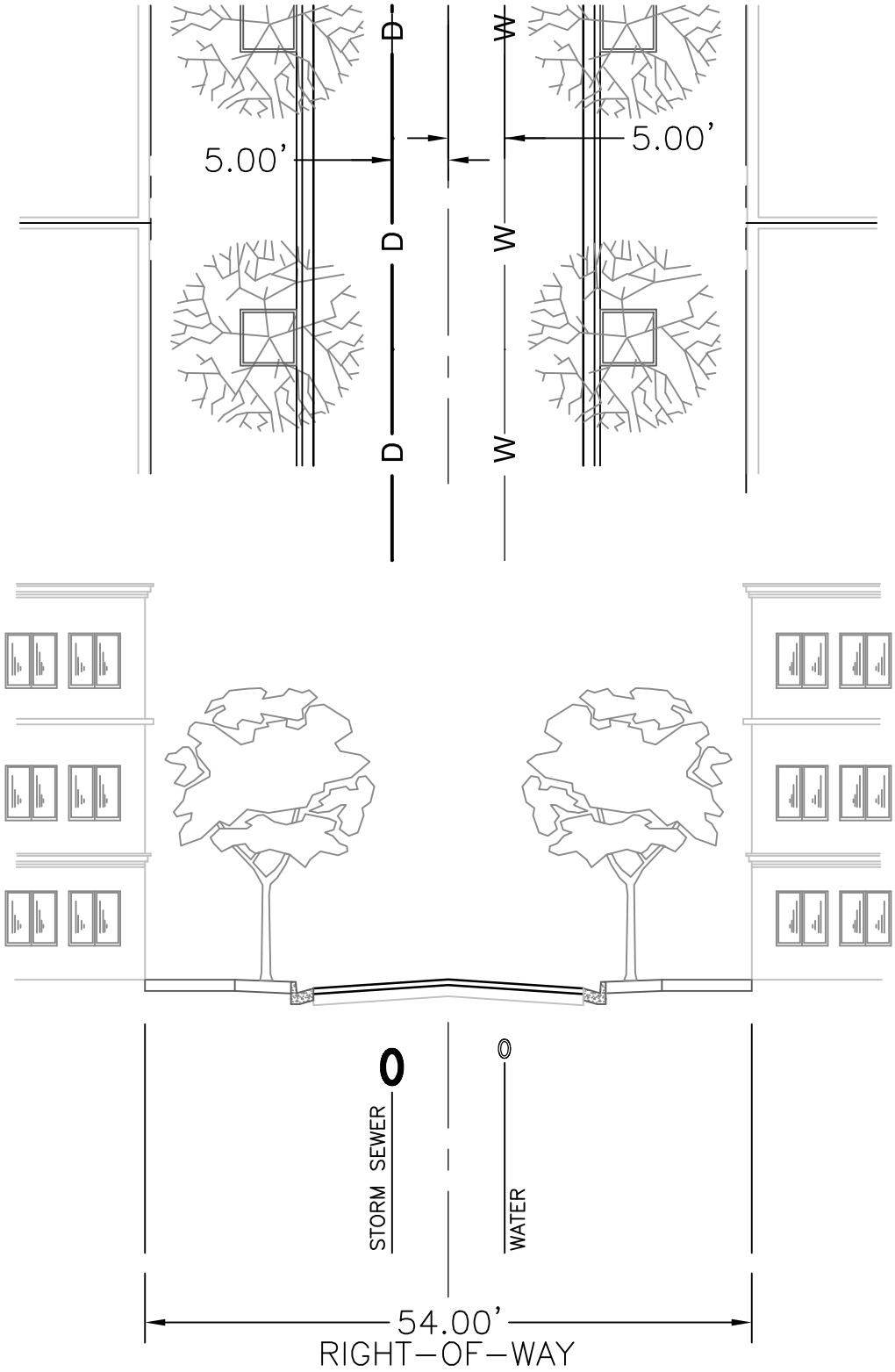
TYPICAL UTILITY LAYOUT
ATTACHED WALK NO PARKING
35 FT ROW

DETAIL

800-25

DATE: 10/15/2024

SCALE: NTS



NOTES:
1. SEWER SERVICE FROM ALLEY, NO SANITARY SEWER MAIN IN STREET.
2. WATER METER GENERALLY INTERNAL TO BUILDING, WATER METER VAULTS MAY BE PLACED IN THE SIDEWALK WITHIN 5 FT OF THE BUILDING FACE AS DETERMINED BY THE CITY ENGINEER. ALL OTHER WATER SERIVCE REQUIREMENTS MUST BE MET.
3. ELECTRICAL TRANSMISSION LINES AND TRANSFORMERS TO BE PLACED IN ALLEY OR IN EASMENTS WITHIN THE PRIVATE PROPERTY.

CITY OF LONGMONT COLORADO

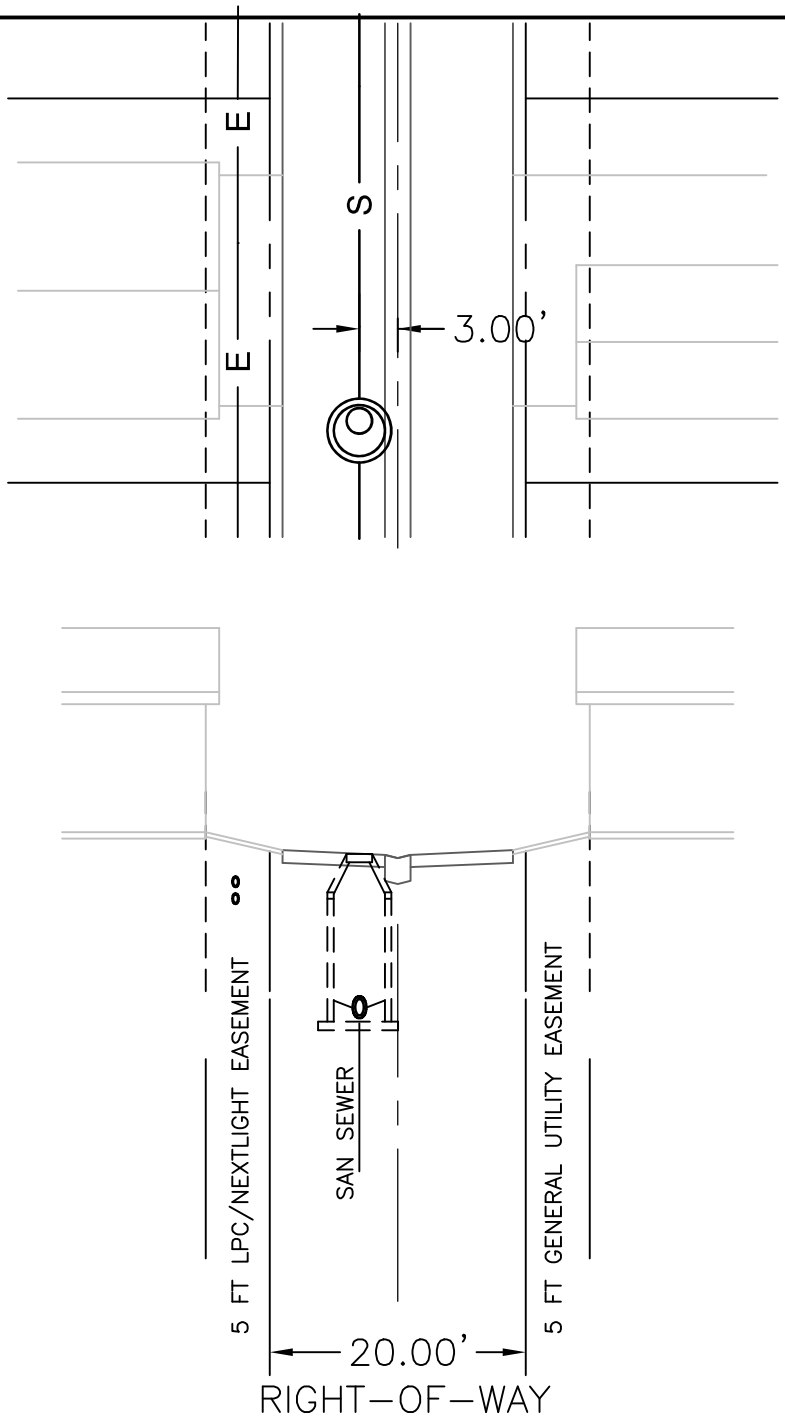
TYPICAL UTILITY LAYOUT
URBAN STREET SECTION
54 FT ROW

DETAIL

800-26

DATE: 10/15/2024

SCALE: NTS



NOTES:
1. SAN SEWER SHALL BE PLACED A MIN OF 3 FT FROM CL OF ALLEY. HORIZ LOCATION SHALL PROVIDE A MIN 10 FT FROM ANY STRUCTURE.
2. THE ECCENTRIC CONE SHALL BE PLACED SO THAT THE MH DOES NOT INTERFERE WITH THE CONC PAN. MH OPENING SHALL GENERALLY BE OVER THE UPSTREAM INCOMING PIPE.
3. CLEANOUT ON SAN SEWER SERVICE SHALL BE PLACED WITHIN 2 FT OF THE FOUNDATION OF ANY STRUCTURE THE SERVICE PASSES UNDER.
4. DRY UTILTIES SHALL BE PLACED IN THE 5 FT EASEMENTS OUTSIDE OF ROW.

CITY OF LONGMONT COLORADO

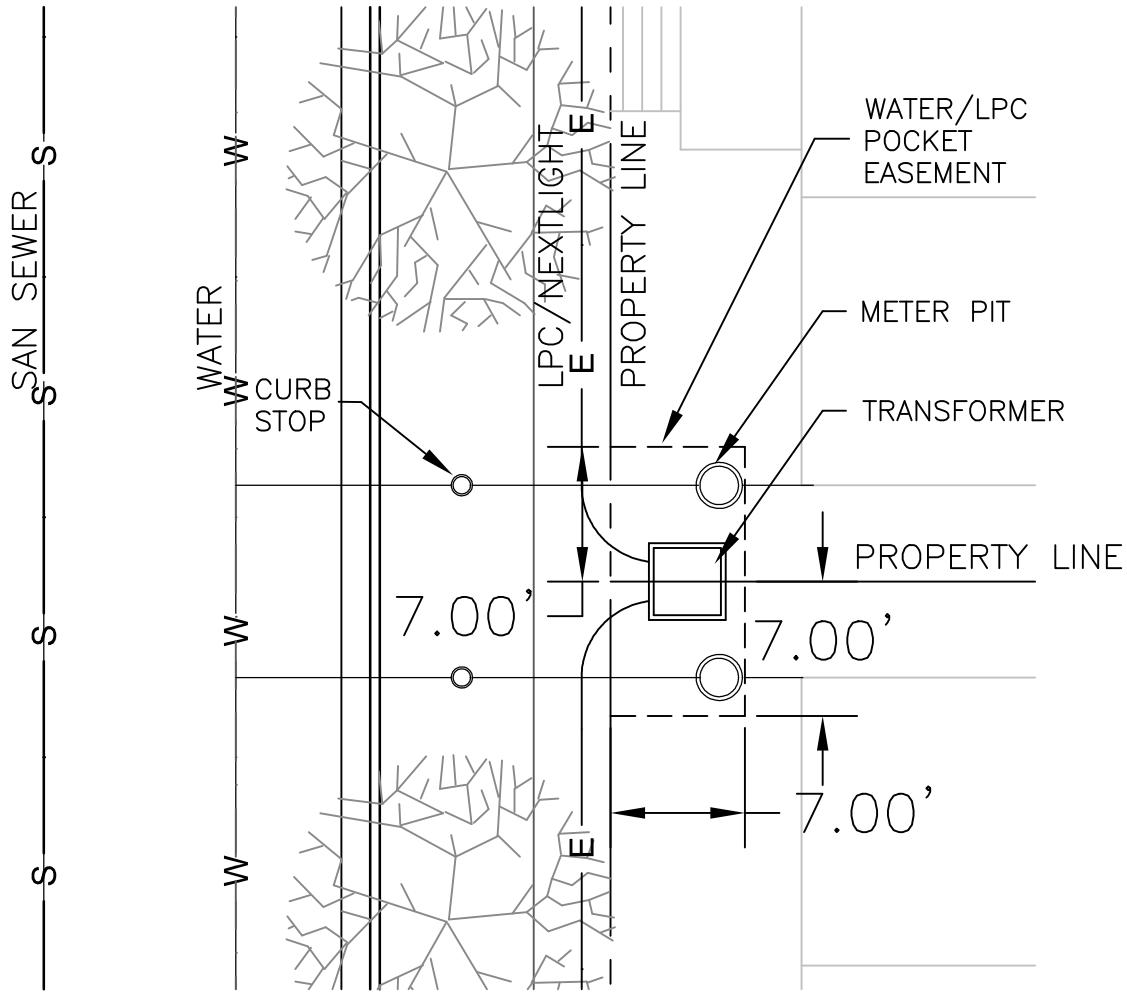
ALLEY UTILITY LAYOUT
20 FT ROW
ASPHALT ALLEY W/ CONC PAN

DETAIL

800-27

DATE: 00/00/00

SCALE: NTS



NOTES:
1. FOR AREA CONTAINING A TRANSFORMER AND WATER METERS, A POCKET EASEMENT SHALL BE GRANTED BEHIND RIGHT OF WAY A MINIMUM OF 7 FEET WIDE AND A MINIMUM OF SEVEN FROM THE COMMON LOT LINE BETWEEN BUILDINGS.
2. WATER METER SHALL BE LOCATED FIVE FEET FROM ADAJCENT COMMON LOT LINE AND SIX FEET FROM RIGHT OF WAY.
3. THE CURB STOP SHALL BE CENTERED IN THE TREE LAWN WITHIN RIGHT OF WAY.
4. THE TRANSFORMER SHALL BE PLACED A MINIMUM OF TWO FEET FROM THE SIDEWALK AND RIGHT OF WAY AND CENTERED ON THE COMMON LOT LINE.
5. SEE SECTION 500 FOR ADDITIONAL WATER LINE AND MEETER PLACEMENT.
6. SEE SECTION 700 FOR ADDITIONAL TRANSFORMER AND J-BOX LOCATIONS.

CITY OF LONGMONT COLORADO

UTILITY EASEMENTS
STREETS WITH TREE LAWN
POCKET EASEMENT FRONT LOT

DATE: 10/15/2024 | SCALE: NTS

DETAIL

800-28

APPENDIX A – CONSTRUCTION PLAN REQUIREMENTS

A-1 ALTA SURVEY REQUIREMENTS

A-2 LONGMONT POWER & COMMUNICATIONS (LPC) BASIC REQUIREMENTS

A-3 LONGMONT POWER & COMMUNICATIONS (LPC) DRC SUBMITTAL CHECKLIST

A-4 RESERVED (FIRE LINE DESIGN CHECKLIST)

A-5 RESERVED (CONCEPT LANDSCAPE PLAN CHECKLIST)

A-6 RESERVED (PRELIMINARY LANDSCAPE PLAN CHECKLIST)

A-7 RESERVED (FINAL LANDSCAPE PLAN CHECKLIST)

A-8 RESERVED (ARTERIAL ROW LANDSCAPING)

A-9 PUBLIC IMPROVEMENT PLAN CHECKLIST

ALTA SURVEY REQUIREMENTS

PURPOSE

All projects requiring an American Land Title Association (ALTA®) Survey shall be prepared in accordance with the Minimum Standard Detail Requirements for ALTA®/NSPS Land Surveys published by the American Land Title Association and National Society of Professional Surveys.

REQUIREMENTS

In addition to the general requirements/standards for an ALTA® Survey, the following TABLE A - Optional Survey Responsibilities and Specifications shall be included with the ALTA® survey:

A. Optional Item Numbers 1 through 5

B. Optional Item Numbers 8 and 9

C. Optional Item Number 11

D. Optional Item Numbers 13 and 14

E. Optional Item Numbers 18 and 19

All other optional items may be included however, the items listed above shall be considered the minimum requirements for an ALTA® surveys submitted to the City of Longmont.

The list of optional items is based on the Minimum Standard Detail Requirements for ALTA®/NSPS Land Title Survey, effective on February 23, 2021 published by the American Land Title Association (ALTA®) and the National Society of Professional Surveyors (NSPS).

LONGMONT POWER & COMMUNICATIONS (LPC)
BASIC REQUIREMENTS

GENERAL AND ADDITIONAL CONTACT INFORMATION

If any of the following items apply to the development application, include them with the submittal. Please contact the LPC staff member assigned to the project with any questions.

A. General Contact Information

Phone: (303) 651-8386
Fax: (303)651-8796
1100 S. Sherman St., Longmont, CO, 80501
www.longmontcolorado.gov/LPC

B. Additional Contact Information

FE Coordinator:
Jeremy Rachak, (303) 774-3632
Jeremy.Rachak@longmontcolorado.gov

Construction Coordinator:
Brad Kaufman, (303) 651-8842
Brad.Kaufman@longmontcolorado.gov

Meter Shop Supervisor:
Kari Spotts, (303) 651-8458
Kari.Spotts@longmontcolorado.gov

PLAT GUIDELINES

A. Provide easements for the purposes of:

(1) Surveying, locating, installing, constructing, using, operating, maintaining, inspecting, repairing, altering, removing and replacing cable, conduit and equipment in whole or in part, and all necessary subsurface and surface appurtenances; and

(2) Right of ingress and egress over and on the Easement Area that is necessary and appropriate.

PLAT COMMENTS

A. Identify the width and label all electrical easements as LPC easements.

B. Identify the width and label all combined electrical and water easements as LPC/Water Easement.

C. Place a note on the plat describing the use of the Out-lots and include the use for utilities.

D. Place the following note/s on the plat:

(1) Architectural features such as porches, overhangs, cantilevers, and window wells are not permitted in easements.

(2) Fences, landscaping with plant shrubs, woody plants, nursery stock or other crops may be located within easements provided they do not interfere with the use of, obstruct the operation of or access to said easement. Any fence, landscaping, or other improvement that obstructs the operation of or access to said easements may be removed by grantee without liability for damages arising there from.

(3) LPC and/or Water Easements are for the purpose of surveying, locating, installing, constructing, using, operating, maintaining, inspecting, repairing, altering, removing and replacing cable, conduit, equipment, and all necessary subsurface and surface appurtenances or other uses approved by LPC. Together with a perpetual right of ingress and egress for installation, operation, maintenance, repair and/or replacement of such.

SUBDIVISION GUIDELINES

A. Single Family Residential**:**

(1) Shall include a corridor seven feet in width adjacent to the right-of-way. The use of the specific easement will be shared with Water/Wastewater and labeled as "7' LPC/Water Easement."

B. Multi-family Residential**:**

(1) Shall have a minimum five-foot wide easement throughout the site with:

a. 10ft pocket easements around each 1ph transformer

b. 12.5ft pocket easements around each 3ph transformer

(2) Once the electrical design has been completed, this easement may be provided by choosing one of the following options:

a. Provide a specific easement on the Final Plat; or

b. Provide an easement over the entire lot or out-lot, exclusive of buildings, for LPC on the Final Plat; or

c. If a Re-plat or Final Plat is not available then provide an easement by separate document. This option must be completed before Final Approval.

C. Commercial

(1) Shall have a minimum five-foot wide easement throughout the site with:

a. 10ft pocket easements around each 1ph transformer

b. 12.5ft pocket easements around each 3ph transformer.

(2) A 12-foot wide easement will be required along any main feeder network path. Any deviations to this must be approved by LPC.

(3) Once the electrical design has been completed, this easement may be provided by choosing one of the following options:

a. Provide a specific easement on the Final Plat; or

b. Provide an easement over the entire lot or out-lot, exclusive of buildings, for LPC on the Final Plat; or

c. If a Re-plat or Final Plat is not available then provide an easement by separate document. This option must be completed before Final Approval.

D. Street Lighting

(1) LPC will place street lighting along the right-of-way only.

(2) Additional easements may be required for lighting in areas where primary electric facilities are not installed adjacent to the right-of-way.

E. Alleys

(1) Alley installations or areas not adjacent to the right-of-way will require a minimum 5' wide easement, as well as potential pocket easements for any equipment locations, in order to maintain the clearance requirements for electrical equipment from traveled roadways.

F. Ditches

(1) The Customer is responsible for negotiating, licensing and installing utility crossings of ditches.

PUBLIC IMPROVEMENT PLAN (PIP) OR SITE PLAN COMMENTS (THE CONSTRUCTION DOCUMENTS)

A. Create a section called "LPC CONSTRUCTION NOTES" and include all applicable notes:

(1) The Customer is responsible for obtaining utility locates. Call the Utility Notification Center of Colorado at 1-800-922-1987.

(2) The Customer shall organize the utility construction from deepest to shallowest; this includes private lighting and irrigation. Should LPC mobilize for construction efforts and find conflicts with shallow installations, the scope of the project may require extra charges.

(3) LPC shall not be held responsible for any delay in the project due to the Customer's failure to properly coordinate the installation of utilities as described in the item above.

(4) Longmont Power and Communications underground electric cable that exists near the project work area cannot be de-energized for crossing purposes. The Customer must take all precaution necessary to prevent damage to the cables or injury to the construction crew. Should the Customer damage these facilities, contact Longmont Power & Communications immediately at (303)651-8386. Longmont Power & Communications will repair the facilities and bill the Customer for all associated costs.

(5) Where Longmont Power & Communications overhead facilities exist in the development area, the Customer must keep all equipment operation a minimum of 10 feet from existing overhead electric lines. If this is not feasible, or conditions warrant additional protection or pole stabilization, the Customer must contact the LPC Operations Construction Coordinator at (303)651-8386. It is the Customer's responsibility to arrange protective covering and or pole stabilization, 48 hours in advance. Should the electric facilities be damaged, the Customer must contact LPC at (303)651-8386. Additionally, all costs associated with repairs will be the responsibility of the Customer.

(6) For cost effectiveness, streets, parking surfaces and sidewalks should not be paved or concrete placed until the conduit crossing for use by Longmont Power & Communications has been installed. The Customer is responsible for installing sleeves under roadways, culverts, ditches, sidewalks and existing utility facilities for the use of Longmont Power & Communication's facilities. Notification and coordination of the ditch crossings is a Customer responsibility. Refer to section 700 in the City of Longmont Design Standards and Construction specifications.

(7) An electric community investment fee will be charged for any new or upgraded services. The charge is calculated and based on the panel rating of the electric service and will be collected with the building permit fee.

(8) The cost to extend the electric utility system to the site and within the site, relocations or other changes is at the Customer's expense.

(9) Electric service lines and metering equipment are installed by the Customer. Refer to Detail 700-16 in the city of Longmont's metering standards and construction specifications for further details.

(10) The Customer is responsible for the preparation of their site to meet the specifications provided below. Engineering project designs and costs for the installation of LPC facilities are based on the Customer

meeting all site readiness requirements referenced in section 702.01. Additional charges may be incurred if the site is not properly prepared prior to the start of work by LPC. These charges may result from soil conditions, inadequate grading, surveying, road crossings, or construction phasing of other utilities.

(11) Customer installed street and sidewalk crossings shall be located and installed in accordance with City Standards. Reference detail 700-03 **(For All Development Types)**

(12) A ten (10) foot corridor along LPC's trench path must be graded to within 2 tenths of final grade at the time of LPC's installation. This path must be sloped relatively flat and smooth to facilitate trencher access and cable installation**. (For All Development Types)**

(13) LPC's trench path must be free of construction equipment, materials, scrap, concrete, or any object(s) that may inhibit trenching operation.

(14) The Customer is to coordinate the installation of facilities according to specifications, from deepest to shallowest, (i.e., sewer, water, electric, gas, communications, irrigation, landscaping). Facilities requiring an installation depth less than LPC utilities, which are installed prior to LPC facilities, will require a change order and may result in additional installation charges**. (For All Development Types)**

(15) Customer installed facilities shall be placed as shown on the master utility plan, back-filled, and compacted **(i.e., sewer, water, storm drainage, etc.) (For All Development Types)**

(16) The Customer shall provide utility locates for underground infrastructure installed but not currently owned and maintained by the City, i.e., sewer, water and storm drainage. Additionally, all empty conduits used as sleeves for irrigation and dry utilities must be located and clearly identified. LPC shall not be responsible for repairs to underground utility infrastructure that is not properly located and marked by using standard utility locating materials, paint, stakes, locating flags, per the typical locating procedure. Minimum accuracy of all locate marks must be within 18" either side of the underground infrastructure to be considered properly located**. (For All Development Types)**

(17) The Customer is responsible for accurate survey information, including elevations, for the center of LPC's trench path and five (5) foot offsets for two corners of each of LPC's equipment locations. **(All types of development; except for Single Family Residential)**

(18) Concrete sidewalks, curbs, gutters and pavement shall be installed. **(Single Family Residential only)**

(19) Concrete Driveways, landscaping and irrigation shall not be installed prior to LPC's facilities**. (Single Family Residential only)**

(20) Sidewalks shall be free of all debris with front property lines painted on the sidewalk and the rear property lines clearly staked. The Customer shall not place property pins within LPC's prepared path until the installation of LPC's infrastructure has been completed. **(Single Family Residential only)**

(21) The Customer is responsible for the cost to repair or replace any electric facilities damaged by the Customer or their agents during construction activities.

(22) LPC's warehouse can be accessed through the south gate at 1100 S. Sherman St, Longmont, CO 80501. Follow the instructions on the sign outside of the gate to gain access.

B. Landscape Plans

(1) Add the following notes to the Landscape Plans:

a. Installation of the landscaping within the ROW, electric easement and in the vicinity of the on-site electric distribution system cannot begin until the installation of Longmont Power &

communications facilities is complete. Expenses for any repairs of landscaping due to the electric installation will not be the responsibility of the City.

b. Landscaping is to maintain 3ft of clearance on the sides and back, and 10ft of clearance in the front of LPC's equipment (transformers/switches/vaults). In addition, any deep rooted trees must maintain 3 ft. of clearance from any of LPC's underground infrastructure (cables/conduits). Location of landscape material may be altered to provide adequate clearance from the final location of the electric distribution facilities to the satisfaction of Longmont Power & Communications. Refer to Details 700-01 Trench Clearances and **700-02** Equipment Clearances of the City of Longmont Design Standards and Construction Specifications.

C. Irrigation Plans

(1) Add the following notes to the "Irrigation Notes":

a. The electric services for the irrigation controllers are installed, owned and maintained by the owner or HOA.

b. The irrigation controller's metered electric service must be built to the National Electric Code (NEC), require a building permit and a one-line diagram. The one-line diagram must be shown as cold sequenced and labeled with the service size & voltage requirements.

(2) Show and label all irrigation controllers, lift station & pump locations that require electric service.

D. Electrical Details

(1) Please add a new sheet labeled Electrical Details and add the following details as the apply to the development (for any questions contact the LPC staff member assigned to the project):

a. (700-10) 3ph pad spec

b. (700-16) Metering single Family

c. (MTR-1) UG temp service

d. (MTR-2) post type temp service

e. (MTR-3) OH temp service

f. (MTR-4) Residential point of delivery

g. (MTR-8) clearance requirements

h. (MTR-9) gang metering

i. (MTR-10) CT cab specs

j. (MTR-11) installation specs

k. (MTR-13) meter house 1ph 150a & less

l. (MTR-14) meter house 1ph 200a

m. (MTR-16) wire configuration 3ph self-contained

n. (MTR-17) meter house 120/208 200a

E. One-Line Details

(1) Create a section called "LPC NOTES"

(2) Place the following notes under "LPC NOTES":

(3) The electric service lines and metering equipment are installed, owned and maintained by the Customer. **(Commercial)**

(4) The electric service lines and metering equipment are installed by the Customer and are required to maintain a direct line of site from the utility source to the meter. **(Residential)**

(5) Concrete transformer pads are to be installed, owned and maintained by the Customer. Refer to Detail **700-10** of the City of Longmont Design Standards and Construction Specifications. Timing for the construction of the transformer pad must be coordinated with LPC. **(Commercial 3ph, Multi-Family 3ph)**

(6) Meter housings for all types of services shall be located on the outside of the building or structure and accessible to meter readers as referenced in LPC Rates and Regulations Governing Electric Service.

(7) Badging of single, commercial and multiple meter sockets are the Customer's responsibility. Each meter of a multiple meter socket and all individual meter sockets will have a permanent phenolic badge showing which home, apartment, office, unit or room is metered by each meter.

(8) An additional 2" pvc conduit (provided by LPC) will be installed by the Customer in the service lateral trench from the Broadband J-Box located at the transformer to the telecom demarcation point on/in the building.

(9) Secondary cabinets are supplied/installed/owned and maintained by the Customer. Secondary cabinets can be installed a minimum of 5' and a maximum of 10' from the servicing LPC transformer.

(10) The Customer is responsible for the installation of (X)-4" PVC conduits with 90 degree, 48" radius sweep, in the secondary window of the transformer pad to a depth of 38" top of pipe and then brought into the Customer's secondary cabinet.

(11) LPC will be responsible for installing the cables between the transformer and secondary cabinet and terminating the cables in the transformer. The Customer is responsible for terminating the cables within the secondary cabinet.

NEXTLIGHT FIBER

A. Longmont's City owned broadband network will be installed to the point of service on the project.

B. The point of service will generally be adjacent to a buildings electrical source. Whether that is a transformer or electric junction box.

C. To complete the path to the unit reach out to the assigned LPC staff member or Ian Carmichael / Jonathan Keen with the Broadband Services department all of whom can be reached at (303) 651-8386.

DRC SUBMITTAL INFORMATION

A. Provide an Electric Service Request Form

B. PC will complete a design with the first submittal of the Public Improvement Plans or the first submittal of the Site Plan if no Public Improvement Plans are required.

C. Multi-phase developments may require LPC to complete an overall capacity design with the first phase submittal.

D. Charges for the development review and design effort are billable and collected with charges for the installation of the electric distribution system. If the project does not move forward to the construction phase, review and design charges will be invoiced to the Customer and are due upon receipt.

E. Provide an electric one-line diagram for all commercial and multi-family developments that shows the proposed service size/ampacity and voltage. All unit numbers, as well as house panels must be labeled on the one-line document.

F. The one-line diagram must be a part of the construction documents.

G. **With the initial submittal and all subsequent submittals the Owner/Customer shall provide LPC with:**

(1) An updated CAD file that shall include a minimum of the site, utilities, contours, landscaping and irrigation.

a. This file must be a single, compressed, 2D, unenhanced (dwg) or (dgn).

b. All drawings are to be spatially correct, to allow information to be transferred to the City's geographic information system.

c. The basis of bearing of the proposed development must be in the Colorado State Plane Coordinate System, based on the 1992 HARN adjustment of the 1982 North American Datum (HPGN NAD 83/92).

d. Upon submittal of the actual Preliminary Plat and/or Final Plat, the surveyor must include a location and a written description of coordinate values for monumentation on the plat. At least two (2) control points must be labeled on the plat using the state plane coordinate values.

e. The primary and secondary control points and other GIS land points, which may be used as initial starting values are provided free through the Boulder County web page. However, the information being provided by Boulder County does include a disclaimer. Please note that these GIS Land points cannot be used for determining legal boundaries. Please note that the GIS land points cannot be used for determining legal boundaries. Boulder County accepts no liability for the accuracy of these data points.

f. The primary and secondary control point data can be found at:

g. https://bouldercounty.gov/property-and-land/surveyor/control-networks/

h. Or by calling the Boulder County information line at: (303) 441-1700

(2) An updated One-Line diagram.

a. This must be a sheet within the site's construction documents.

(3) Updated pdf files (The pdf files and CAD file must match each other)

(4) The current submittal date must be incorporated at the end of each file name with the following scheme "_MM.DD.YYYY". This will help ensure we are always working with the most recent file.

(5) Attach LPC's CAD file to the design file (do not redraw it).

(6) LPC expects a clean CAD file from the applicant, if the CAD file from LPC isn't clean, notify LPC, and clean file will be provided.

(7) LPC's trench path, conduit crossings and equipment locations must be shown in all of the utility plan and profile views.

(8) Electrical equipment serving residential subdivisions adjacent to the right-of-way straddles property lines to provide service to two parcels. Refer to the Water Department standards for the installation of water service lines and fire hydrants. The locations and clearances from electric facilities are established to provide adequate clearances and access for the two utilities sharing an easement.

(9) Traffic signs shall not be installed on top of the electric distribution facilities. Maintain clearance requirements as outlined in the General Section and subject to utility locates.

(10) Electrical equipment requires clearance or setback on all sides from vehicular traffic. This includes driveways, alleys, parking lots, etc. Protection such as bollards will be installed at the Customer's expense, Refer to detail **700-18** in the City of Longmont Design Standards and Construction Specifications.

(11) Other than single family residential sites, LPC will allow for a joint trench operation with other telecommunication utilities. **This must be coordinated by the Customer.**

LPC CLEARANCES

A. Keep the LPC clearances in mind while designing other utilities as well as landscaping and irrigation.

B. 5' of clearance on sides and back, and 10' of clearance in front from structures, signs and any landscaping *(transformers)*

C. 5' of clearance from structures, signs and deep rooted landscaping *(trench)*

D. 5' from fire hydrants *(trench/transformers/junction facilities)*

E. 12" of clearance from storm inlets *(trench)*

F. 5' of horizontal & 12" of vertical clearance from Gas with 18" recommended

G. 5' of Horizontal & 12" of vertical clearance from Water with 18" recommended

H. 10' of Horizontal & 12" of Vertical clearance from Storm, SS and irrigation pipes/ditches with 18" recommended *(LPC understands that this isn't always possible and will allow our infrastructure to lay on top when crossing perpendicularly)*

I. The bottom of LPC' typical electric distribution trench will be at 42" deep with a 36" min and 48" maximum amount of cover.

J. 4" PVC standard LPC sleeves installed by the Customer **(These are to be used at road crossings and if the 36" min clearance from top of pipe to final grade can't be met)**

K. Typical Street light / fiber only trench will be at 24" deep

Additional specifications can be found online at: https://longmontcolorado.gov/planning-and-development-services/development-process/development-and-design-standards/

LONGMONT POWER & COMMUNICATIONS (LPC)
DRC SUBMITTAL CHECKLIST

REQUIREMENTS

A. General

Yes	No	N/A	Requirement
			1. Provide an Electric Service Request Form.
			2. LPC will complete a design with the first submittal of the Public Improvement Plans or the first submittal of the site plan if no Public Improvement Plans are required.
			3. Multi-phase developments may require LPC to complete an overall capacity design with the first phase submittal.
			4. Charges for the development review and design effort are billable and collected with charges for the installation of the electric distribution system. If the project does not move forward to the construction phase, review and design charges will be invoiced to the customer and are due upon receipt.
			5. Provide an electric one-line diagram for all commercial and multi-family developments that shows the proposed service size/ampacity and voltage. All unit numbers, as well as house panels, shall be labeled on the one-line document.
			6. The one-line diagram must be a part of the construction documents.

B. CAD File – Initial submittal and updated with each subsequent submittal

Yes	No	N/A	Requirement
			1. CAD file shall include a minimum of the site, utilities, contours, landscaping, and irrigation.
			2. CAD file shall be a single, compressed, 2D, unenhanced (.dwg) or (.dgn).
			3. All drawings are to be spatially correct, to allow information to be transferred to the City's geographic information system (GIS).
			4. The basis of bearing of the proposed development shall be in the Colorado state plane coordinate system, based on the 1992 Harn adjustment of the 1982 north American datum (hpgn nad 83/92).
			5. Upon submittal of the actual preliminary plat and/or final plat, the surveyor shall include a location and a written description of coordinate values for monumentation on the plat. At least two (2) control points shall be labeled on the plat using the state plane coordinate values.
			6. The primary and secondary control points and other GIS land points which may be used as initial starting values are provided for free through the Boulder County web page. However, the information being provided by Boulder County does include a disclaimer. Please note that GIS land points cannot be used for determining legal boundaries. Boulder County accepts no liability for the accuracy of the data points provided.
			7. The primary and secondary control point data can be found at: https://bouldercounty.gov/property-and-land/surveyor/control-networks/ - **OR** – Obtain each by calling the Boulder County Information Line at (303) 441-1700

C. One-Line Diagram - Initial submittal and updated with each subsequent submittal			
Yes	**No**	**N/A**	**Requirement**
			1. Diagram shall be a sheet within the site's construction documents.
			2. One-Line Diagram shall include updated pdf files (the pdf files and CAD file shall match each other).
			3. The current submittal date shall be incorporated at the end of each file name with the following scheme "mm.dd.yyyy". This will help ensure we are always working with the most recent file.
			4. LPC's trench path, conduit crossings, and equipment locations shall be shown in all of the utility plan and profile views.
			5. Electrical equipment serving residential subdivisions adjacent to the right-of-way straddles property lines to provide service to two parcels. Refer to Section 500 of the City Standards for the installation of water service lines and fire hydrants. The locations and clearances from electric facilities are established to provide adequate space and access for the two utilities sharing an easement.
			6. Traffic signs shall not be installed on top of the electric distribution facilities. Maintain clearance requirements as outlined in Section 100 of the City Standards.
			7. Electrical equipment requires clearance or setback on all sides from vehicular traffic. This includes driveways, alleys, parking lots, etc. Protection such as bollards will be installed at the customer's expense, refer to detail 700-18 in the City Standards.
			8. Other than single family residential sites, LPC will allow for a joint trench operation with other telecommunication utilities. This shall be coordinated by the Developer.

RESERVED (FIRE LINE DESIGN CHECKLIST)

RESERVED (CONCEPT LANDSCAPE PLAN CHECKLIST)

RESERVED (PRELIMINARY LANDSCAPE PLAN CHECKLIST)

RESERVED (FINAL LANDSCAPE PLAN CHECKLIST)

RESERVED (ARTERIAL ROW LANDSCAPING)

PUBLIC IMPROVEMENT PLAN CHECKLIST

REQUIREMENTS

A. Formatting & General Requirements

Yes	No	N/A	Requirement
			1. Scale: Plan Sheet 1" = 50' horizontal or in greater detail (example: 1" = 30'). Bar scale.
			2. Scale: Profile 1" = 5' vertical or in greater detail (example: 1" = 1'). Grid scale.
			3. North Arrow
			4. Title Block: Including name of Engineer of Record, Owner/Developer, and revisions table.
			5. Size: 22"x34" on 24"x36" paper, such that it is scalable to 11"x17" (50%).
			6. Revision table: Submittal date and revision dates, as applicable.
			7. Professional Engineer's Certification in Title Block.
			8. Project boundaries and ownership information: Show project boundaries, property lines, adjacent property ownership information, lot and block numbers, section corners and rights-of-way (ROW) with dimensions. Provide recorded document reception numbers where available
			9. Easements: Show all existing and proposed easements, including type, width, and recordation information.
			10. Street Names: Show all adjacent street names and label ROW width on either side of centerline. All streets shall be clearly labeled Public or Private.
			11. Limits of Construction: Clearly demark the limits of construction.
			12. Existing & Proposed improvements: Show existing items screened back/lighter line type and proposed items in a darker line type.
			13. Key Map: Provide key map on each sheet of the plan set. Plan and profile shall provide a key map showing the area being detailed.
			14. Label the following for all proposed utility mains: size, material and type.
			15. Provide unique numbering system for manholes, cleanouts, and inlets and label each.
			16. All abbreviations used as callouts shall be defined.
			17. A legend defining all symbols used shall be included. As a minimum, the legend shall show different symbols and line types for all existing and proposed utility lines, fittings, and manholes, with the proposed items shown more prominently than the existing.
			18. Match lines and sheet numbers.

B. Cover Sheet

Yes	No	N/A	Requirement
			1. Project Name: Subdivision Name shall be placed in large letters at the top center of the page with the title "Public Improvement Plans" located below.
			2. Project Location: Legal description of the project shall be placed below the "Public Improvement Plans" title.
			3. Planning Annexation Number shall be centered below the Public Improvement Plans title.
			4. Provide names, addresses and phone numbers for the Developer(s), Owner(s), and Consultant Engineer.

Yes	No	N/A	Requirement
			5. Sheet Index: Number sheets consecutively and place sheet numbering in bottom right corner of each sheet to allow for indexing of multiple sheet plan sets.
			6. Vicinity Map: Adequately shows the project location including nearest two Arterial streets, existing street system, street names for major streets, City limits, and major public facilities.
			7. Vertical Survey Datum: Benchmark description and elevation conforming to NAVD88.
			8. Horizontal Control: Basis of bearings description shall be in the Colorado State Plane Coordinate System, based on the 1992 HARN adjustment of the 1982 North American Datum (HPGN NAD 83/92).
			9. All lineal units of measurement shall be defined in U.S. Survey Foot.
			10. Legend: Legend for all sheets with symbols pertaining to the sheet.
			11. Signature Block for City approval for Public Works, Natural Resources, LPC, and Fire.
			12. Signature Block for Professional Engineer's Certification: "These Public Improvement Plans were prepared by me or under my direct supervision in accordance with the requirements of the City of Longmont and State of Colorado Statutes. I am fully responsible for the accuracy of all design, revisions, and record conditions that I have noted on these plans."
			13. Floodplain statement and when applicable, delineation of the 100 year floodplain: "This property is located in ZONE AE (the based flood elevations determined) and Zone X (areas determined to be outside the 500-year floodplain) according to the Flood Insurance Rate Map (FIRM) for Boulder County, Colorado and incorporated areas, map number 08013CO268 K, effective October 24, 2024."

C. Construction Notes Plan Sheet

Yes	No	N/A	Requirement
			1. General Construction Notes.
			2. Landscape General Construction Notes.
			3. Longmont Power & Communications Construction Notes.
			4. Sanitary Sewer Construction Notes.
			5. Storm Sewer Construction Notes.
			7. Underdrain Construction Notes.
			8. Water Distribution Construction Notes.
			9. Wildlife Restrictions Construction Notes

D. Typical Section Sheet

Yes	No	N/A	Requirement
			1. Provide a typical section for each roadway type planned within the Project. Provide as either a separate sheet or as part of the roadway plan and profile sheets.
			2. Include dimensions for flow line to flow line; back of walk to back of walk; and ROW width.
			3. Label the type of curb, gutter, sidewalk, pavement section (or reference Pavement design report), and cross slopes.
			4. Provide any applicable horizontal or vertical dimensions in addition to providing a section of all improvements within the Right-of- Way.
			5. Include with each distinct section a list of streets to which the section applies.

E. Control Sheet			
Yes	**No**	**N/A**	**Requirement**
			1. Project control shall be tied to a minimum of two points that are Sectional Corners used as Horizontal Control.
			2. If State Plane coordinates HPGN NAD 83/92 are used and converted to Project Coordinates (Ground), include the Grid Factor (Sea level factor combined with scale factor). Show the Grid Factor to nine decimal places. If the Project Coordinates (Ground) were truncated, note what number was subtracted from the north and east coordinates. Project coordinates are to be shown to four decimal places.
			3. Include a table titled "Control Points" listing the HPGN NAD 83/92 Coordinates (Grid) compared to the Project Coordinates (Ground) on the same section and/or quarter section corners. In the table include all control points used for the project and found or set property pins noting the point numbers, the coordinates, elevations, and description sufficiently detailed to allow others to locate and identify the monuments. Clearly identify whether the Project Coordinates are modified to Ground, were truncated, or are assumed.
			4. Use Benchmarks from the City of Longmont Interactive Surveying Vertical Benchmark Map. Elevations shall be shown to two decimal places. Include a note listing the benchmark name, a complete description, and elevation, and clearly identify NAVD 88 is the basis for all elevations.
			5. Any Public Land Survey System corner that was occupied and has been re-monumented shall be noted and a Colorado State Monument Record shall be filed with the State, per Colorado Revised Statutes.
			6. Right-of-way shall be shown with adjoining subdivision names. The right-of-way limits shall be used to establish the street centerline stationing for plan and profiles. Include centerline curve and line data by labeling on plan or in a table format.
			7. The survey control drawing shall be stamped and signed by a Professional Land Surveyor, licensed in the State of Colorado, under whose supervision the drawing was prepared. Signature and date shall be written over the PLS stamp.
			8. Uniquely identify project control on the construction plans to show the relationship of the project control to the construction site.

F. Demolition & Removal Plan Sheet			
Yes	**No**	**N/A**	**Requirement**
			1. Clearly depict and label existing improvements that are being demolished or removed.
			2. Provide legend for material removals.
			3. Provide notes for removal including identifying areas to be sawcut.
			4. Provide existing contours.
			5. Identify protect in place items.
			6. Show existing infrastructure including utilities, meters, and service lines etc.
			7. Show abandonment of any existing utilities.

G. Overall Utility Plan			
Yes	**No**	**N/A**	**Requirement**
			1. Provide an overall utility layout for the site on one sheet and include a key map for any additional utility plan sheets required to show sufficient detail.
			2. Show existing and proposed public and private infrastructure including transportation components (e.g. traffic signals, handicap ramps, sidewalks,curbs, gutters, bike paths) and utility components (e.g. street lights, sanitary, storm, water supply.).
			3. Show locations of proposed structures, including walls, fences, trash enclosures, etc.
			4. Provide horizontal water distribution system alignment including valves, tees, connections to existing system, future stub outs, hydrants, services, water meters, irrigation meter(s) and POC's, backflow devices, and any other proposed appurtenances.
			5. Show and depict dimension to nearest valve at proposed connections to the existing water system.
			6. Provide horizontal sanitary sewer collection system alignment, connections to existing system, future stub outs, manholes, and services.
			7. Provide horizontal storm sewer system alignment, connections to existing system, manholes, inlets, swales, ditches, detention, and water quality facilities.
			8. Provide horizontal electric system alignment, connections to existing systems, electrical equipment locations, and trench alignment.
			9. Provide horizontal underdrain collection system alignment, connections to existing system, future stub outs, manholes, cleanouts, and services. For larger sites provide symbol/legend combining sewer and underdrain utility.
			10. Show abandonment of existing utility lines.
			11. Provide service layout detail for residential lots.

H. Grading Plan			
Yes	**No**	**N/A**	**Requirement**
			1. Provide an overall grading plan for the site on one sheet showing proposed and existing grades at five-foot contours and include a key map for any additional grading plan sheets required to show sufficient details.
			2. Show limits of construction and any required additional temporary construction easements.
			3. Show existing and proposed public and private infrastructure including transportation components (e.g. traffic signals, handicap ramps, sidewalks,curbs, gutters, bike paths, storm sewer system, and irrigation ditches).
			4. Show proposed and existing grades at one-foot contours at a scale of 1"=20', or in greater detail.
			5. Show existing site topography and contours on adjacent properties extending a minimum of 50 feet past property line.
			6. Label elevations of all lot corners, finished floors, grade breaks, high points, and low points.
			7. Label slopes of swales, gutters, pavement, driveways, sidewalks, sidepaths, ditches, and any other required facilities.
			8. Streets with separate plan and profile sheets do not need elevations and slopes.

Yes	No	N/A	Requirement
			9. If the plan does not warrant separate sheets for intersection details, grading plan shall include spot elevations and flowlines for crosspans, handicap ramps, and radius of curb returns. Include stationing and cross-sections for radius of curb returns.
			10. Label all catch and spill gutters.
			11. Show location of fences, retaining walls, and other physical site improvements impacting site drainage. Cross-sections may be necessary to detail these features.
			12. Show all retaining walls and label top of wall and bottom (bottom of footer) of wall elevations and setback to property lines. Walls greater than 4 feet from bottom of footing to top of wall require a separate submittal (with a structural design) for a building permit.
			13. Show stormwater conveyance features and the location of all stormwater facilities.
			14. Show boundary of the existing and proposed one-hundred-year floodplain limits and base flood elevations.
			15. Show drainage channels and other significant natural features and wetlands within the property boundary. Dashed lines shall be used to show any proposed modification to drainage channels and floodplains.
			16. Information on the Neighborhood Grading Plan (NGP) shall include lot elevations at all corners, finish floor or top of foundation grades with building envelope, grading pattern around the building with spot elevations and arrows indicating directions of flow, and lot designation as Type A or B. On the plan include a detail for typical lot grading for each of proposed Type A or B.
			17. For NGP concentrated flows shall be conveyed in drainage easements located on common property lines. Where more than 2 lots convey flows to the common property line of another lot, the drainage easement shall be located in a outlot owned by an HOA, district, or other responsible entity and no lot shall receive inflow from a tributary area exceeding 1.5 times the receiving lot area. A note shall be added to the Plat allowing only split rail fencing on these losts.
			18. For the NGP include the Neighborhood Grading & Drainage Notes.
I. Transportation Improvements			
Yes	**No**	**N/A**	**Requirement**
1. General			
			1. Plan and profile sheets shall include all existing and proposed utilities.All applicable transportation and utility information shall be shown on a single profile. However, if information is not able to be shown sufficiently, separate plan and profiles may be requested.
			2. Call out and include pertinent details related to the transportation improvements. Use City of Longmont Section 200 standard details, as applicable.
2. Roadway Plan View			
			1. Define the roadway horizontal alignment and show centerline stationing at 50-foot intervals.
			2. Annotate and dimension curves including point of curvature, horizontal curve radius and length, degree of curvature, and superelevation. Label PC, PT, and return radii at intersection connections and access locations as applicable.

Yes	No	N/A	Requirement
			3. Annotate and dimension each tangent with point of tangency (PT), tangent length and bearing.
			4. Annotate the PI stationing at intersections (Intersection equations).
			5. Label the flowline-flowline and right-of-way width dimensions.
			6. Include traffic calming elements.
			7. Label existing and proposed curb and gutter type and sidewalks on or adjacent to site. Label begin and end stations and offsets of roadway features such as pavement construction, curb and gutter, sidewalk, etc.
			8. Label existing and proposed sidewalk widths.
			9. If plan does not have separate intersection details; include spot elevations and flow lines for cross pans, handicap ramps and radius of curb returns and include stationing and cross-sections for radius of curb returns.
3. Roadway Profiles			
			1. Label the profile along the roadway centerline and label grade. Include curb and gutter flowline profiles as requested.
			2. Label roadway stationing and existing and proposed profile grade elevations.
			3. Show profile of connecting streets at a minimum of 50 feet beyond the proposed roadway connection or as requested by the City Engineer.
			4. Annotate vertical curve data, e.g. stationing at point of curvature (PVC), point of vertical intersection (PVI), curve length, k-value, beginning and ending grades.
			5. For crosspans identify stationing and elevations for edge of pan and flowline and start of transition from street crown to crosspan.
			6. Label beginning and end crown transition stations.
			7. Show plan and profiles for at least 100ft beyond the interim terminus for dead end streets slated for future extension.
			8. Provide flowline profiles at all intersecting streets (where flowlines are not symmetric with centerline profile.) This can also be shown on the Intersection Grading Details.
			9. Provide flowline profiles at cul-de-sacs.
			10. Show culverts or bridges.
4. Intersection Grading Details			
			1. Provide key map uniquely labeling each intersection location.
			2. Provide curb and gutter flowline match elevations, spot elevations, arrows, and percent grade in the plan view.
			3. Include return radii flowline profiles at all intersections and include stationing.
			4. Provide match elevations and spot elevations for all handicap ramps.
5. Roadway Cross Sections			
			1. Include cross-sections for all Principal/Minor Arterial and Collector streets at 50-foot intervals and extend 50-foot beyond the project limits and/or as determined by the City Engineer.
			2. Show existing and proposed surface grade, roadway, curb and gutter, sidewalk, catch slopes, roadside swales, ROW lines, and utilities. Label ROW lines and proposed slopes and grades.

Yes	No	N/A	Requirement
			3. Cross-section width shall extend a minimum of 25-foot beyond property lines or as required by the City Engineer.
6. Signage and Striping Plan			
			1. Provide permanent and temporary traffic signing and pavement markings.
			2. Show locations of signs and pavement markings. Each shall be indicated by station/offset or other specific dimensions indicating exact locations.
			3. Pavement marking and sign types shall be indicated on these plan sheet(s) (i.e., epoxy paint with x/x glass-to-bead ratio, R1-1 Stop Sign, etc.)
			4. This sheet shall also contain any construction or application notes (i.e., application temperatures, surface cleaning methods to be used prior to application, etc.).
			5. Include a note that relevant signage per paragraph 606.03 is to be provided per Longmont Parks & Greenways Signage Manual for all publicly owned park and greenway areas.
			6. Include a signage schedule with sign type, message, size of panel, type of post, and symbol key for all publicly owned park and greenway areas. Include Courtesy signs, Regulation Signs, Entry Identification signs and Temporary signs, Specialty signs, and MUTCD Bike Route signs.
			7. Include a site furnishings schedule with amenity type and symbol key for all publicly owned park and greenway areas.
7. Sight Distance Plan			
			1. The construction plan set shall have a sight distance sheet that indicates all criteria, assumptions, and calculations for the proposed sight distance triangles showing compliance to AASHTO sight distance criteria.
8. Traffic Signal Plan			
			1. These sheets(s) shall show all Plan views and details necessary to construct a traffic signal. Equipment, materials, and installation shall conform to the City of Longmont's Traffic Signal Adopted Standards and Technical Specifications and the National Electrical Code. Signal poles on state highways shall conform to CDOT Standard Specifications for Road and Bridge Construction but shall otherwise defer to City of Longmont standards. The traffic signal(s) shall also contain an emergency vehicle preemption device as specified by the TCR.
J. Storm Sewer Plans			
Yes	**No**	**N/A**	**Requirement**
1. General			
			1. Provide plan and profile, vertical and horizontal alignments, connections, manhole and inlet rim and invert elevations, manholes, inlets, culverts, and sizing (annotated with Hydraulic Grade Line) as identified.
			2. Include plan, profile, cross-sections, notes, and details of all minor and major drainageway improvements. Annotate with water surface elevations.
			3. Call out and include pertinent details related to the storm sewer improvements. Use City of Longmont Section 300 standard details, as applicable.
2. Storm Sewer Plan Views			
			1. Label station, offset, unique ID, size, and material type of existing and proposed utility lines, and horizontal clearance from existing and proposed utilities and edge of gutter.
			2. Show proposed tie-in/connection to existing improvements with stationing.

Yes	No	N/A	Requirement
			3. Show existing and proposed obstructions such as vaults, catch basins, traffic islands, street lights, walls, or other permanent structures on or adjacent to site.
3. Storm Sewer Profile			
			1. Provide existing and proposed grade lines.
			2. Label appurtenances (manholes and inlets) with unique ID, station, and elevation of manhole and inlet rims inverts (with direction), and sizes of all pipes coming into and going out of manholes and inlets.
			3. Provide length and slope of main between each manhole or inlet.
			4. Show all utility crossings – include types and sizes of mains, stationing, and vertical clearance dimension between mains.

K. Underdrain Plans

Yes	No	N/A	Requirement
1. General			
			1. Show on utility sheets as unique line symbology for sewer and underdrain in same trench, sewer only and underdrain only.
			2. Call out and include pertinent details related to the underdrain collection system improvements. Use City of Longmont Section 300 standard details, as applicable.
2. Underdrain Sewer Plan Views			
			1. Label station, offset, unique ID, size, and material type of existing and proposed utility lines, and horizontal clearance from existing and proposed utilities and edge of gutter.
			2. Show proposed tie-in/connection to existing improvements with stationing.
			3. Show existing and proposed obstructions, such as vaults, catch basins, traffic islands, street lights, walls, or other permanent structures on or adjacent to site.
1. Underdrain Profiles			
			1. Show existing and proposed grade lines.
			2. Label appurtenances (manholes and clean-outs) with unique ID, station, and elevation of manhole and clean-out rims; inverts (with direction) and sizes of all pipes coming into and going out of manholes and clean-outs.
			3. Label length and slope of main line between each manhole or cleanout.
			4. Show all utility crossings – include types and sizes of mains, stationing, and vertical clearance dimension between mains.

L. Sanitary Sewer Collection System Plan & Profiles

Yes	No	N/A	Requirement
1. General			
			1. Provide plan and profile, vertical and horizontal alignments, connections, manhole rim and invert elevations, and sizing.
			2. Call out and include pertinent details related to the sanitary sewer collection system improvements. Use City of Longmont Section 400 standard details, as applicable.
2. Sanitary Sewer Plan View			
			1. Label station, offset, unique ID, size, and materials of existing and proposed utility lines, casings, and appurtenances.

Yes	No	N/A	Requirement
			2. Show proposed tie-in/connection to existing improvements with stationing.
			3. Show existing and proposed obstructions such as vaults, catch basins, traffic islands, street lights, walls, or other permanent structures on or adjacent to site.
3. Sanitary Sewer Profiles			
			1. Show existing and proposed grade lines.
			2. Label appurtenances (manholes and clean-outs) with unique ID, station, elevation of manhole rims, inverts (with direction), and sizes of all pipes coming into and going out of manholes.
			3. Label length and slope of main line between each manhole.
			4. Show all utility crossings – include types and sizes of mains, stationing, vertical clearance between mains, and stationing for each end of pipe encasement (if applicable).
M. Water Distribution Plans			
Yes	**No**	**N/A**	**Requirement**
1. General			
			1. Provide plan and profile, vertical and horizontal alignments, connections, and graphically depict water distribution appurtenances on the main including valves, thrust blocks, restraints, tees, fittings, hydrants, services, and any other appurtenances that are part of the potable water system.
			2. Call out and include pertinent details related to the water distribution system improvements. Use City of Longmont Section 500 standard details, as applicable.
2. Water Distribution Plan Views			
			1. Label station, offset, size, and materials of existing and proposed utility lines, casings and appurtenances.
			2. Show proposed tie-ins to existing improvements with station, fittings, valves, and tapping or connection method.
			3. Show existing and proposed obstructions, such as vaults, catch basins, traffic islands, street lights, walls, or other permanent structures on or adjacent to site.
3. Water Distribution Profiles			
			1. Provide existing and proposed grade lines.
			2. Label valves and fittings with stations (with direction), elevations and sizes of all pipes and fittings. Label all vertical deflection station and elevations.
			3. Provide length of main between each fitting and/or deflection.
			4. Show all utility crossings – include types and sizes of mains, stationing, and vertical clearance dimension between mains, and stationing for each end of pipe encasement (if applicable).
			5. Depict water line lowering with stationing and elevations for all bends.
N. Landscape Plans			
Yes	**No**	**N/A**	**Requirement**
			1. On the first sheet of the landscape design include the Landscape Plan Notes located in Appendix B of the City Standards.

Yes	No	N/A	Requirement
			2. Landscape designs for City owned areas shall be separate plan sheets from the areas that are private or common areas within the PIP set that contain an individualize legend, notes and details.
			3. Separate landscape schedules shall be provided for each regulated area. Shall include quantity per species, botanical name, common name, size and condition purchased (e.g., balled & burlapped / B&B, mature height and spread, etc.).
			4. Individual plant layout at 2/3 mature size with specific plant species for each plant group as identified by a key that relates to a full landscape schedule.
			5. Provide soil test results and recommendations. Imported topsoil shall require soil testing.
			7. Existing topography at one (1) foot contour interval for all public areas including rights-of-way and greenways (primary and secondary).
			8. Proposed topography that ties to existing contours indicating cut and fill areas clearly.
			9. Slope arrows for sidewalks, sidepaths and landscaped areas indicating minimum and maximum slopes allowable labeled in ratio format.
			10. Location and general dimensions of sidewalks, sidepaths, and greenways with surface grades (vertical and horizontal), showing connections and curve radii.
			11. Logical demarcation of public vs. private lands for ownership and maintenance purposes utilizing fences, sidewalks, sidepaths, shrub beds, or other permanent objects.
			12 Existing and proposed utilities labeled with associated easements and graphically shown in correct alignment, underground or overhead, and easement width dimensions.
			13. Label 100-year floodplain boundary and 10% of 100-year floodplain boundary as required.
			14. Ultimate curbline alignment (horizontal and vertical) and existing edge of asphalt along arterial ROWs slated for future expansion.
			15. Show sight distance triangles and obstruction free zones at each intersections. These areas shall be free of obstructions taller than 30 inches.

O. Irrigation Plan

Yes	No	N/A	Requirement
			1. Include the Irrigation Plan Notes located in Appendix B of the City Standards on the first sheet of the irrigation design.
			2. Irrigation system designs for City owned areas shall be separate plan sheets within the PIP set from the areas that are private common areas and shall contain individualized legend, notes and details.
			3. Provide two separate irrigation schedules for City owned and private common areas that show a key for each piece of equipment that describes the manufacturer and provides model number and/or other designation.
			4. Provide an overall irrigation sheet that shows each irrigation tap and the areas (outlots, ROWs, etc.) that each tap will irrigate. The area being served by each irrigation tap should have a unique hatch pattern corresponding to that tap. This sheet will be similar to a phase map for the irrigation system.
			5. Show irrigation plan information including irrigation mains and laterals, heads, valves, tap, controller and other miscellaneous equipment layout.

Yes	No	N/A	Requirement
			6. Provide gpm, valve size, and valve number for each remote-control zone valve.
			7. Provide pipe sizes for each section of mains and lateral.
			8. Meter pits with taps larger than two (2) inches shall require approval by the City Engineer.
			9. Provide and label minimum design pressure.
			10. All irrigation taps and electric services shall have an address and building permit before installation.
			11. Drip irrigation shall be provided for all trees and shrubs located in shrub beds and in all native seeded areas (even those native seed areas approved for temporary irrigation). Trees located in irrigated turf areas shall not receive drip. Drain valves shall be included at the end of each drip lateral pipe.
			12 Denote the location of the electric meter for irrigation controllers.

P. General

Yes	No	N/A	Requirement
			1. Section 100 Details: General Requirements (Utility Trenching).
			2. Section 200 Details: Transportation.
			3. Section 300 Details: Storm Drainage Improvements.
			4. Section 400 Details: Sanitary Sewer.
			5. Section 500 Details: Water Distribution.
			6. Section 600 Details: Landscaping and Irrigation.
			7. Section 700 Details: Longmont Power & Communication.

Q. Phasing Plan Sheet (as applicable)

Yes	No	N/A	Requirement
			1. Depict the phase plan for the site on one sheet.
			2. Show property boundaries lot lines, rights-of-way, easements (e.g. street lights, sanitary, storm, water supply).
			3. Show existing and proposed public and private infrastructure including transportation components (e.g. traffic signals, handicap ramps, sidewalks,curbs, gutters, bike paths) and utility components (e.g. street lights, sanitary, storm, water supply).
			4. Show locations of proposed structures, including walls, fences, trash...etc.
			5. Show project phase boundaries using wide, dashed lines and annotateeach phase.
			6. Include notes for each phase specifying phase order.
			7. List temporary and permanent improvements required in each phase, i.e. interim turnarounds for dead end roads.

APPENDIX B – CONSTRUCTION PLAN NOTES

B-1 SUBDIVISION PLAT GENERAL NOTES

B-2 GENERAL CONSTRUCTION NOTES

B-3 RESERVED (IRRIGATION PLAN NOTES)

B-4 RESERVED (CONCEPT LANDSCAPE PLAN NOTES)

B-5 RESERVED (PRELIMINARY LANDSCAPE PLAN NOTES)

B-6 RESERVED (LANDSCAPE PLAN NOTES)

B-7 RESERVED (LANDSCAPE GENERAL CONSTRUCTION NOTES)

B-8 LONGMONT POWER & COMMUNICATIONS (LPC) CONSTRUCTION NOTES

B-9 LONGMONT POWER & COMMUNICATIONS (LPC) ONE-LINE DIAGRAM NOTES

B-10 RESERVED (NEIGHBORHOOD GRADING & DRAINAGE PLAN NOTES)

B-11 SANITARY SEWER CONSTRUCTION NOTES

B-12 STORM SEWER CONSTRUCTION NOTES

B-13 RESERVED (STORMWATER POLLUTION CONTROL (SPC) GENERAL NOTES)

B-14 UNDERDRAIN CONSTRUCTION NOTES

B-15 WATER DISTRIBUTION CONSTRUCTION NOTES

B-16 RESERVED (WILDLIFE RESTRICTIONS CONSTRUCTION NOTES)

B-17 TRACER WIRE NOTES

SUBDIVISION PLAT GENERAL NOTES

[*Note: All italicized notes in brackets are intended as instructions and are for reference only and shall be removed from the Final Plat.]*

1. BASIS OF BEARINGS: BEARINGS SHOWN ON THIS PLAT ARE BASED ON THE **[TO BE COMPLETED BY SURVEYOR]**.

2. DIMENSIONS SHOWN ON THIS PLAT ARE IN U.S. SURVEY FEET.

3. *[Note: Date of title commitment to be within 30 days of final plat recordation.]*
THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY **[SURVEYOR NAME]** TO DETERMINE OWNERSHIP OR EASEMENTS OF RECORD. FOR ALL TITLE INFORMATION OF RECORD, **[SURVEYOR NAME]** RELIED UPON COMMITMENT FOR TITLE INSURANCE NO. **[XXXXXXXXX]**, ISSUED BY **[TITLE COMPANY NAME]**, HAVING AN EFFECTIVE DATE OF AT **[TIME]**.

4. NOTICE: ACCORDING TO COLORADO LAW, C.R.S. 13-80-105, YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF CERTIFICATION SHOWN HEREON.

5. ALL LAND USE APPROVALS AND BUILDING PERMITS FOR THE DEVELOPMENT DESCRIBED HEREIN SHALL BE SUBJECT TO LONGMONT MUNICIPAL CODE REQUIREMENTS INCLUDING BUT NOT LIMITED TO: COMPLIANCE WITH THE CITY OF LONGMONT RAW WATER REQUIREMENT POLICY, THE PAYMENT OF IMPACT FEES AND DEVELOPMENT CHARGES, CONCURRENCY MANAGEMENT REQUIREMENTS, MORATORIUMS, BUILDING PERMIT LIMITATIONS, DESIGN STANDARDS, AND ANY OTHER LAND USE AND DEVELOPMENT REQUIREMENTS IN EFFECT AT THE TIME THAT SUCH PROPOSED DEVELOPMENT APPLIES FOR A BUILDING PERMIT.

6. EASEMENT GENERAL NOTES (APPLICABLE TO ALL TYPES OF EASEMENTS)

   6.1 ALL EASEMENTS GRANTED TO THE CITY OF LONGMONT AND ALL NONEXCLUSIVE UTILITY EASEMENTS, AS SHOWN ON THIS PLAT, ARE FOR THE PURPOSES OF THE FOLLOWING:

      6.1.1 SURVEYING, LOCATING, INSTALLING, CONSTRUCTING, USING, OPERATING, MAINTAINING, INSPECTING, REPAIRING, ALTERING, REMOVING AND REPLACING THE FACILITY, E.G. WATER LINE, ELECTRIC LINE, ETC., IN WHOLE OR IN PART, AND ALL NECESSARY SUBSURFACE AND SURFACE APPURTENANCES RELATED THERETO ("IMPROVEMENTS") REQUIRED IN CONNECTION WITH THE DEVELOPMENT, OPERATION, USE, AND MAINTENANCE OF THE EASEMENT PROPERTY.

      6.1.2 MARKING THE LOCATION OF THE EASEMENT, AND ANY IMPROVEMENTS, BY SUITABLE MARKERS SET AND MAINTAINED IN THE GROUND AT LOCATIONS WHICH SHALL NOT INTERFERE WITH SUCH REASONABLE USE AS THE PROPERTY OWNER SHALL MAKE OF THE EASEMENT.

      6.1.3 RIGHT OF INGRESS AND EGRESS AND ANY OTHER ACCESS TO, FROM, OVER, ACROSS, AND ON THE PROPERTY, AS IS REASONABLY NECESSARY, FROM TIME-TO-TIME, TO PERFORM THE ACTIVITIES LISTED HEREIN IN CONNECTION WITH THE ONGOING DEVELOPMENT, OPERATION, USE, AND MAINTENANCE OF THE EASEMENT PROPERTY AND ANY IMPROVEMENTS, AND TO ENFORCE THE RIGHTS GIVEN BY THIS EASEMENT.

      6.1.4 THE CITY OF LONGMONT SHALL HAVE AND EXERCISE THE RIGHT OF LATERAL AND SUBJACENT SUPPORT TO WHATEVER EXTENT IS NECESSARY OR DESIRABLE FOR THE FULL, COMPLETE,

AND UNMOLESTED ENJOYMENT OF THE EASEMENT PROPERTY FOR THE RIGHTS HEREIN DESCRIBED.

6.1.5 THE PROPERTY OWNER SHALL NOT CONSTRUCT OR ALLOW THE CONSTRUCTION OF ANY BUILDING, STRUCTURE, OR OTHER IMPROVEMENTS, SUCH AS ANY FENCE, GATE, HARD SURFACE, OR GROUND UTILITY CONNECTIONS OR APPURTENANCES ON, OVER, UNDER, OR ACROSS THE EASEMENT, OR TAKE ANY ACTION WHICH WOULD IMPAIR OR IN ANY WAY MODIFY THE IMPROVEMENTS OR LATERAL OR SUBJACENT SUPPORT FOR THE IMPROVEMENTS, WITHOUT OBTAINING THE SPECIFIC WRITTEN PERMISSION OF THE CITY OF LONGMONT. IN THE EVENT THAT THE CITY OF LONGMONT'S SPECIFIC WRITTEN PERMISSION IS NOT OBTAINED, THE CITY OF LONGMONT SHALL BE PERMITTED TO IMMEDIATELY REMOVE OR RELOCATE, WITHOUT ANY LIABILITY FOR DAMAGES, ANY OBSTRUCTION THAT INTERFERES WITH OR IMPAIRS THE CITY OF LONGMONT'S RIGHTS HEREUNDER.

6.1.6 NO PORTION OF ANY BUILDING OR STRUCTURE OR OTHER PERMANENT IMPROVEMENT SHALL ENCROACH INTO OR OVER AN EASEMENT WITHOUT WRITTEN PERMISSION OF THE CITY.

6.1.7 TREES, SHRUBS, NURSERY STOCK, AND OTHER CROPS ARE ALLOWED WITHIN EASEMENTS PROVIDED THEY DO NOT INTERFERE WITH THE USE OF, OBSTRUCT THE OPERATION OF, OR IMPEDE ACCESS TO THE EASEMENT. THE CITY OF LONGMONT MAY REMOVE ANY LANDSCAPING, OR OTHER IMPROVEMENT THAT OBSTRUCTS THE OPERATION OF OR ACCESS TO SAID EASEMENT WITHOUT LIABILITY FOR DAMAGES ARISING THEREFROM.

6.1.8 THE UNDERLYING PROPERTY OWNER IS RESPONSIBLE FOR THE MAINTENANCE OF THE EASEMENT AREA.

6.1.9 THE PROPERTY OWNER SHALL NOT GRANT ANY OTHER EASEMENT, GROUND LEASE, LEASE, LICENSE, OR OTHER SIMILAR INTEREST UPON, WITHIN, OR ADJACENT TO THE EASEMENT, OR GRANT ANY OTHER EASEMENT, GROUND LEASE, LEASE, LICENSE, OR OTHER SIMILAR INTEREST THAT MAY AFFECT OR INTERFERE WITH THE CITY OF LONGMONT'S USE OF THE EASEMENT WITHOUT FIRST PROVIDING NOTICE TO AND RECEIVING APPROVAL FROM THE CITY OF LONGMONT OF SAID PROPOSED GRANT.

7. UTILITY EASEMENTS:

[Note: Choose only the appropriate utility easements for the subdivision, delete non-relevant sections.]

NONEXCLUSIVE UTILITY EASEMENTS (UE) ARE FOR UTILITIES AND DRAINAGE FACILITIES, INCLUDING, BUT NOT LIMITED TO: WATER AND SEWER FACILITIES, IRRIGATION LINES, ELECTRIC LINES, COMMUNICATION LINES, GAS LINES, AND CABLE TV; AND ARE HEREBY GRANTED TO THE PUBLIC, AS SHOWN ON THIS PLAT, FOR THE PURPOSES LISTED IN NOTE 6. EASEMENT GENERAL NOTES.

WATER AND SANITARY SEWER EASEMENTS ARE HEREBY GRANTED TO THE CITY OF LONGMONT, AS SHOWN ON THIS PLAT, FOR THE PURPOSES LISTED IN NOTE 6. EASEMENT GENERAL NOTES.

[*Note: Include any other utility easement notes.*]

8. LONGMONT POWER & COMMUNICATIONS (LPC)

8.1 LPC EASEMENTS ARE FOR SURVEYING, LOCATING, INSTALLING, CONSTRUCTING, USING, OPERATING, MAINTAINING, INSPECTING, REPAIRING, ALTERING, REMOVING, AND REPLACING CABLE, CONDUIT, EQUIPMENT, AND ALL NECESSARY SURFACE/SUBSURFACE APPURTENANCES OR OTHER USES APPROVED BY LPC. TOGETHER WITH A PERPETUAL RIGHT OF INGRESS AND EGRESS FOR INSTALLATION, OPERATION, MAINTENANCE, REPAIR, AND REPLACEMENT OF SUCH.

8.2 LPC/WATER EASEMENTS ARE LOCATED ON THE PRIVATE PROPERTY IMMEDIATELY ADJACENT TO THE RIGHT-OF-WAY. THESE EASEMENTS ARE FOR SURVEYING, LOCATING, INSTALLING, CONSTRUCTING, USING, OPERATING, MAINTAINING, INSPECTING, REPAIRING, ALTERING, REMOVING, AND REPLACING CABLE, CONDUIT, EQUIPMENT, VALVES, WATER METERS, FIRE HYDRANTS, AND ALL NECESSARY SUBSURFACE AND SURFACE APPURTENANCES OR OTHER USES APPROVED BY THE CITY OF LONGMONT. TOGETHER WITH A PERPETUAL RIGHT OF INGRESS AND EGRESS FOR INSTALLATION, OPERATION, MAINTENANCE, REPAIR, AND/OR REPLACEMENT OF SUCH.

9. DRAINAGE EASEMENT(S):

[Note: Choose appropriate easement(s) for the subdivision, delete non-relevant sections.]

[Note: Blanket easement typically utilized for developments that do not receive any runoff from public rights-of-way.]

A BLANKET DRAINAGE EASEMENT, EXCLUDING BUILDING FOOTPRINTS, IS HEREBY GRANTED TO AND BETWEEN ALL LOTS WITHIN THE SUBDIVISION FOR THE PURPOSES OF CONVEYING SURFACE AND SUBSURFACE STORM WATER. THE UNDERLYING PROPERTY OWNER OR ASSIGNS WILL BE RESPONSIBLE FOR MAINTENANCE OF THE EASEMENT AREA.

[Note: Specifically defined easement typically utilized for developments that do not receive any runoff from public rights-of-way.]

DRAINAGE EASEMENTS ARE HEREBY GRANTED AS SHOWN ON THE PLAT TO AND BETWEEN ALL LOTS WITHIN THE SUBDIVISION FOR THE PURPOSES OF CONVEYING SURFACE AND SUBSURFACE STORM WATER. THE UNDERLYING PROPERTY OWNER OR ASSIGNS WILL BE RESPONSIBLE FOR MAINTENANCE OF THE EASEMENT AREA.

[Note: Typically utilized for detention ponds that do not detain for public right-of-way.]

A STORM DRAINAGE EASEMENT IS HEREBY GRANTED TO THE CITY OF LONGMONT WITHIN [OUTLOT XX OF] THE SUBDIVISION, AS SHOWN ON THIS PLAT, FOR THE PURPOSES OF STORM WATER DETENTION AND WATER QUALITY FACILITIES. THE CITY HAS THE RIGHT TO ACCESS THE EASEMENT TO INSPECT THE IMPROVEMENTS AND/OR PERFORM MAINTENANCE IF NEEDED, IN THE CITY'S DETERMINATION. THE OWNER OF THE PROPERTY WILL BE RESPONSIBLE FOR REIMBURSING THE CITY FOR ANY EMERGENCY MAINTENANCE THAT MAY BE PERFORMED BY THE CITY. THE UNDERLYING PROPERTY OWNER OR ASSIGNS IS RESPONSIBLE FOR ALL MAINTENANCE OF THE EASEMENT AREA.

[Note: Typically utilized for areas that receives runoff from public rights-of-way, usually utilized for tracts of land that contain storm sewers, and for detention facilities.]

DRAINAGE EASEMENTS ARE HEREBY GRANTED TO THE CITY OF LONGMONT AS SHOWN ON THE PLAT FOR THE PURPOSES OF CONVEYING SURFACE AND SUBSURFACE STORM WATER, AND FOR CONSTRUCTION, MAINTENANCE, REPAIR AND ACCESS TO ALL NECESSARY FACILITIES AND STRUCTURES SUPPORTIVE THERETO. THE UNDERLYING PROPERTY OWNER OR ASSIGNS WILL BE RESPONSIBLE FOR ALL

MAINTENANCE (I.E. MOWING, GRAFFITI REMOVAL, CLEANING OF WATER QUALITY STRUCTURES, TRASH, DEBRIS REMOVAL, AND OTHER SIMILAR MAINTENANCE) OF THE EASEMENT AREA AND STRUCTURAL MAINTENANCE (I.E. REPAIR AND REPLACEMENT OF DROP STRUCTURES, OUTLET STRUCTURES, RIP-RAP AREAS AND SUPPORTING PIPING) OF THE FACILITIES. IF THE PROPERTY OWNER OR ASSIGN FAILS TO MEET THE MAINTENANCE AND OPERATION REQUIREMENTS THE CITY OF LONGMONT SHALL HAVE THE RIGHT TO COMPLETE THE WORK AND BACK CHARGE THE PROPERTY OWNER.

10. FLOODPLAIN NOTES:

[Note: Choose appropriate note per the floodplain map information for the subject property, delete non-relevant sections.]

[Note: Utilized when portions of the plat are not encumbered by the 100-year floodplain; the Final Plat and Site Plan do not need to show any floodplain delineation.]

THE SUBJECT PROPERTY IS NOT LOCATED WITHIN AN A ZONE, AREA OF THE 1% ANNUAL CHANCE FLOODPLAIN (100-YEAR FLOODPLAIN), AS SHOWN ON FIRM PANEL **[XXXX]**, WITH AN EFFECTIVE DATE OF **[XXX XX, XXXX]**.

[Note: Utilized when portions of the plat are encumbered by a 100-year floodplain; the Final Plat does not need to show a floodplain delineation, and the Site Plan shall include the floodplain delineation.]

THE SUBJECT PROPERTY IS LOCATED WITHIN AN A ZONE, AREA OF THE 1% ANNUAL CHANCE FLOODPLAIN (100-YEAR FLOODPLAIN), AS SHOWN ON FIRM PANEL **[XXXX]**, WITH AN EFFECTIVE DATE OF **[XXX XX, XXXX]**.

[Note: Utilized when portions of the plat are affected by a LOMR.]

A LETTER OF MAP REVISION (LOMR), **[FEMA CASE NO. XXXX]** AFFECTS THIS PROPERTY.

NO BUILDING PERMITS SHALL BE ISSUED FOR LOTS WITHIN THE DESIGNATED 100-YEAR FLOODPLAIN UNTIL A FLOODPLAIN DEVELOPMENT PERMIT HAS BEEN ISSUED FOR THE PROPERTY.

11. ACCESS EASEMENT:

[Note: Choose appropriate access easement(s), delete non-relevant sections.]

[Note: Typically utilized for multi-family and commercial subdivisions.]

AN ACCESS EASEMENT, EXCLUDING CURRENT AND FUTURE BUILDING FOOTPRINTS, AND LANDSCAPING, IS HEREBY GRANTED TO THE CITY OF LONGMONT, OVER ALL PAVED AREAS, OUTLOTS, AND OTHER ACCESS ROUTES, FOR THE PURPOSES LISTED IN NOTE 6. EASEMENT GENERAL NOTES.

[Note: Typically utilized for commercial subdivisions.]

A CROSS LOT ACCESS EASEMENT, EXCLUDING CURRENT AND FUTURE BUILDING FOOTPRINTS, AND LANDSCAPING, IS HEREBY GRANTED TO THE PUBLIC BETWEEN ALL LOTS WITHIN THE SUBDIVISION. THE UNDRELYING PROPERTY OWNER OR ASSIGNS IS RESPONSIBLE FOR THE MAINTENANCE OF THE EASEMETN AREA.

[Note: Utilize this note for all plats.]

AN ACCESS EASEMENT EXCLUDING CURRENT AND FUTURE BUILDING FOOTPRINTS IS HEREBY GRANTED TO THE CITY OF LONGMONT FOR EMERGENCY VEHICLES.

[Note: Typically utilized in instances where the Fire Department requires separate specifically defined easements that only emergency vehicles will utilize.]

EMERGENCY ACCESS EASEMENTS ARE HEREBY GRANTED TO THE CITY, AS SHOWN ON THIS PLAT, FOR THE PURPOSES OF INGRESS AND EGRESS OF EMERGENCY VEHICLES. THE UNDERLYING PROPERTY OWNER IS RESPONSIBLE FOR MAINTENANCE OF THE EASEMENT AREA.

12. LANDSCAPING:

    THE RIGHT-OF-WAY LANDSCAPING ALONG COLLECTOR AND ARTERIAL STREETS IS TO BE MAINTAINED BY THE ADJACENT PROPERTY OWNER OR ASSIGNS. THE ADJACENT PROPERTY OWNER OR ASSIGNS SHALL BE RESPONSIBLE FOR MAINTENANCE OF THE LANDSCAPE AND CONCRETE PORTION, INCLUDING THE REMOVAL OF GRAFFITI, SNOW, ICE, SLEET, DEBRIS OR OTHER OBSTRUCTION FROM ALL SIDEWALKS LOCATED IN ADJACENT RIGHT-OF-WAY AND INTERNAL TO THE DEVELOPMENT. THE ADJACENT PROPERTY OWNER SHALL MAINTAIN ARTERIAL MEDIANS, UNLESS OTHERWISE SPECIFICALLY STATED ON THE PLAT.

13. TRANSPORTATION EASEMENT:

    [Note: Typically utilized adjacent to right-of-way where public improvements do not fit within the standard right-of-way dedication.]

    TRANSPORTATION EASEMENTS ARE HEREBY GRANTED TO THE CITY AS SHOWN ON THIS PLAT FOR THE PURPOSES OF TRANSPORTATION IMPROVEMENTS (I.E. SIDEWALKS, AND APPURTENANCES INCLUDING BUT NOT LIMITED TO BENCHES, LIGHTING, SIGNAGE, BUS FACILITIES, ETC.).

14. AVIGATION EASEMENT:

    [Note: Use if the property is within the Airport Influence Overlay Zone.]

    DUE TO THE PROXIMITY OF THE PROPERTY TO THE VANCE BRAND AIRPORT, THERE WILL BE AIRCRAFT PASSING ABOVE THE PROPERTY. AIRCRAFT PASSAGE MAY RESULT IN NOISE AND OTHER IMPACTS ON THE PROPERTY. AIRCRAFT MAY CROSS ABOVE THE PROPERTY AT LOW ALTITUDE IN ACCORDANCE WITH FAA REGULATIONS. THE FREQUENCY OF AIRCRAFT PASSING OVER THE PROPERTY MAY INCREASE IN THE FUTURE. THE OWNERS, THEIR HEIRS, AND SUCCESSORS AND ASSIGNS, SPECIFICALLY ACKNOWLEDGE THE RIGHT OF PASSAGE OVER THE PROPERTY FOR AIRCRAFT AND AGREE TO HOLD HARMLESS THE CITY OF LONGMONT FOR AIRCRAFT OPERATIONS CONDUCTED IN ACCORDANCE WITH FAA REGULATIONS.

15. *[Note: The following note shall be utilized in instances where easements granted by the previous subdivision are still appropriate. All easements that can be depicted shall be shown on the plat.]*

    ALL EASEMENTS WITHIN THE BOUNDARY OF THIS SUBDIVISION THAT WERE PREVIOUSLY GRANTED BY THE **XXX** SUBDIVISION REMAIN.

GENERAL CONSTRUCTION NOTES

1. ALL WORK WITHIN AN EASEMENT OR THE PUBLIC RIGHT-OF-WAY SHALL CONFORM TO THE CITY OF LONGMONT PUBLIC IMPROVEMENT DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS, LATEST EDITION.
2. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL REQUIRED PERMITS PRIOR TO COMMENCEMENT OF ANY WORK ON THE PROJECT.
3. IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNER / DEVELOPER, AND THE CITY, OF ANY PROBLEMS IN CONFORMING TO THE APPROVED PLANS FOR ANY ELEMENT OF THE PROPOSED IMPROVEMENTS PRIOR TO ITS CONSTRUCTION.
4. IT IS THE RESPONSIBILITY OF THE OWNER / DEVELOPER TO RESOLVE CONSTRUCTION PROBLEMS DUE TO CHANGED CONDITIONS OR DESIGN ERRORS ENCOUNTERED BY THE CONTRACTOR DURING ANY PORTION OF THE PROJECT. IF, IN THE OPINION OF THE CITY, THE MODIFICATIONS TO THE APPROVED PLANS PROPOSED BY THE OWNER / DEVELOPER INVOLVE SIGNIFICANT CHANGES TO THE CHARACTER OF THE WORK OR TO THE FUTURE CONTIGUOUS PUBLIC OR PRIVATE IMPROVEMENTS, THE OWNER / DEVELOPER SHALL BE RESPONSIBLE FOR SUBMITTING THE REVISED PLANS TO THE CITY OF LONGMONT FOR APPROVAL, AND OBTAINING SAID APPROVAL, PRIOR TO CONTINUING CONSTRUCTION. ANY CONSTRUCTION WORK PERFORMED IN ACCORDANCE WITH UNAPPROVED PLANS, OR IN FURTHER ACCORD WITH PLANS THAT HAVE BEEN REVISED AND REPLACED, SHALL BE REMOVED AND RECONSTRUCTED ACCORDING TO THE APPROVED PLANS.
5. THE GRADING PLAN IS FOR ROUGH GRADING ONLY. CHANGES MAY BE NECESSARY TO BRING THE PLANS INTO CONFORMANCE WITH THE APPROVED FINAL DRAINAGE PLAN AND SITE PLAN.
6. IF CALLED FOR BY THE INSPECTOR, THE CONTRACTOR WILL PROVIDE A WATER TRUCK TO KEEP DUST IN CHECK.
7. THE CONTRACTOR SHALL IMMEDIATELY REPAIR ANY SETTLEMENT OR SOIL ACCUMULATION BEYOND THE PROPERTY LIMITS DUE TO GRADING OR EROSION.
8. DELINEATED FLOOD HAZARD AREAS SHALL NOT BE GRADED IN ANY WAY UNTIL THE FINAL DRAINAGE PLAN HAS BEEN APPROVED AND ALL APPROPRIATE PERMITS HAVE BEEN OBTAINED.
9. THE CONTRACTOR SHALL IMMEDIATELY REMOVE ANY CONSTRUCTION DEBRIS, MUD TRACKING, SEDIMENT, AND / OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE FLOWLINES AND PUBLIC RIGHTS-OF-WAY OF THE CITY RESULTING FROM THE PROJECT. THE CONTRACTOR SHALL IMMEDIATELY FIX ANY EXCAVATION OR EXCESSIVE PAVEMENT FAILURE CAUSED BY THE PROJECT AND SHALL PROPERLY BARRICADE THE SITE UNTIL CONSTRUCTION IS COMPLETE. THE CONTRACTOR'S FAILURE TO CORRECT ANY OF THE ABOVE WITHIN 48 HOURS OF WRITTEN NOTICE BY THE CITY SHALL CAUSE THE CITY TO ISSUE A STOP WORK ORDER (RED TAG) AND / OR PERFORM THE WORK ITSELF, MAKING A CLAIM AGAINST THE PROJECT'S LETTER OF CREDIT FOR ANY COSTS INCURRED BY THE CITY.
10. THE CONTRACTOR SHALL BE SOLELY AND COMPLETELY RESPONSIBLE FOR THE CONDITIONS AT, AND ADJACENT TO, THE JOB SITE, INCLUDING THE SAFETY OF ALL PERSONS AND PROPERTY, DURING THE PERFORMANCE OF THE WORK. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND SHALL NOT BE LIMITED TO NORMAL WORKING HOURS. THE DUTY OF THE CITY TO CONDUCT CONSTRUCTION REVIEW OF THE CONTRACTOR'S PERFORMANCE IS NOT INTENDED TO INCLUDE REVIEW OF THE ADEQUACY OF THE CONTRACTOR'S SAFETY MEASURES IN, ON, OR NEAR THE CONSTRUCTION SITE.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING UTILITY LOCATIONS AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
12. ALL UTILITY POLES SHALL BE RELOCATED PRIOR TO THE PLACEMENT OF ANY CONCRETE.

13. THE CONTRACTOR SHALL NOTIFY ALL UTILITY OWNERS PRIOR TO ADJUSTING ALL CLEANOUTS, MANHOLES, VALVES, BOXES, SURVEY MONUMENTS, AND ANY OTHER FIXTURES TO FINISHED GRADE PRIOR TO FINAL PAVING.
14. THE CONTRACTOR SHALL PROVIDE ALL LIGHTS, SIGNS, BARRICADES, FLAGPERSONS, AND / OR OTHER DEVICES NECESSARY TO PROVIDE FOR PUBLIC SAFETY IN ACCORDANCE WITH THE CURRENT MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, AND THE LONGMONT SUPPLEMENT TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
15. THE CONTRACTOR SHALL PROVIDE INGRESS AND EGRESS TO PRIVATE PROPERTY ADJACENT TO THE PROJECT THROUGHOUT THE PERIOD OF CONSTRUCTION. PRIOR TO BEGINNING WORK, THE CONTRACTOR SHALL OBTAIN A WRITTEN AGREEMENT FROM THE PROPERTY OWNERS IMPACTED BY THIS ACCESS. THE CONTRACTOR SHALL PROVIDE A COPY OF THESE WRITTEN AGREEMENTS TO THE CITY UPON REQUEST.
16. WHEN ALLOWED BY THE UTILITY, AND PRIOR TO FINAL PLACEMENT OF SURFACE PAVEMENT, ALL UNDERGROUND UTILITY MAINS SHALL BE INSTALLED AND SERVICE CONNECTIONS STUBBED OUT BEYOND CURB LINE. SERVICE FROM PUBLIC UTILITIES SHALL BE MADE AVAILABLE FOR EACH LOT IN SUCH A MANNER THAT IT WILL NOT BE NECESSARY TO DISTURB THE STREET PAVEMENT, CURB, GUTTER, AND SIDEWALK WHEN CONNECTIONS ARE MADE.
17. REPRODUCIBLE COPIES OF RECORD DRAWINGS SHALL BE SUBMITTED TO THE CITY OF LONGMONT PRIOR TO CONSTRUCTION ACCEPTANCE OF THE PUBLIC IMPROVEMENTS.
18. THE CONTRACTOR SHALL NOTIFY THE CITY INSPECTOR AT LEAST 24 HOURS PRIOR TO DESIRED INSPECTION.
19. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSPECTION AND MAINTENANCE OF EROSION CONTROL DEVICES.
20. CONSTRUCTION STAGING AREAS WILL BE REQUIRED TO STAY WITHIN THE LIMITS OF CONSTRUCTION AND AS APPROVED IN THE STORMWATER MANAGEMENT PLAN.
21. THE APPROVED STORMWATER MANAGEMENT PLAN WILL BE REQUIRED ON SITE AT ALL TIMES.
22. ANY RETAINING WALLS OR TIERED WALLS MUST BE DESIGNED BY A STRUCTURAL ENGINEER LICENSED IN THE STATE OF COLORADO AND MUST RECEIVE A BUILDING PERMIT FROM THE CITY OF LONGMONT.
23. ALL SIGNING AND STRIPING SHALL COMPLY WITH CITY STANDARDS AND APPROVED MATERIALS.
24. PER COLORADO REVISED STATUTES TITLE 18, CRIMINAL CODE 18-4-508 – DEFACING, DESTROYING, OR REMOVING LANDMARKS, MONUMENTS, OR ACCESSORIES, ITEM 2: “ANY PERSON WHO KNOWINGLY REMOVES OR KNOWINGLY CAUSES TO BE REMOVED ANY PUBLIC LAND SURVEY MONUMENT, AS DEFINED BY SECTION 38-53-103(18), C.R.S., OR CONTROL CORNER, AS DEFINED IN SECTION 38-53-103(6), C.R.S., OR A RESTORATION OF ANY SUCH MONUMENT OR WHO KNOWINGLY REMOVES OR KNOWINGLY CAUSES TO BE REMOVED ANY BEARING TREE KNOWING SUCH IS A BEARING TREE OR OTHER ACCESSORY, AS DEFINED BY SECTION 38-53-103(1), C.R.S., EVEN IF SAID PERSON HAS TITLE TO THE LAND ON WHICH SAID MONUMENT OR ACCESSORY IS LOCATED, COMMITS A CLASS 2 MISDEMEANOR UNLESS, PRIOR TO SUCH REMOVAL, SAID PERSON HAS CAUSED A COLORADO PROFESSIONAL LAND SURVEYOR TO ESTABLISH AT LEAST TWO WITNESS CORNERS OR REFERENCE MARKS FOR EACH SUCH MONUMENT OR ACCESSORY REMOVED AND HAS FILED OR CAUSED TO BE FILED A MONUMENT RECORD PURSUANT TO ARTICLE 53 OF TITLE 38, C.R.S.”.
25. ANY SURVEY MONUMENTS WITHIN OR NEAR THE PROJECT SITE SHALL BE SHOWN UPON THE PLANS. IF THERE IS ANY ANTICIPATION THAT THE MONUMENT WILL BE DISTURBED AT ANY POINT IN THE COURSE OF THE PROJECT, THE PLANS SHALL ALSO SHOW AND CALL OUT A MINIMUM OF TWO (2) WITNESS CORNERS OR REFERENCE MARKS, AS NOTED IN C.R.S. 18-4-508, ITEM 2. KNOWN CITY MONUMENTS CAN BE RESEARCHED ON THE CITY’S PUBLIC WEBSITE, LONGMONTCOLORADO.GOV, BY SEARCHING “GIS MAPS AND WEBCAMS”,

AND ACCESSING THE "INTERACTIVE VERTICAL AND HORIZONTAL MONUMENT MAP" FOUND THERE. BLOCK INTERSECTION MONUMENT SURVEY AND DOCUMENTATION IS ONGOING: EXERCISE REASONABLE CAUTION WHEN PERFORMING WORK IN INTERSECTIONS.

RESERVED (IRRIGATION PLAN NOTES)

RESERVED (CONCEPT LANDSCAPE PLAN NOTES)

RESERVED (PRELIMINARY LANDSCAPE PLAN NOTES)

RESERVED (LANDSCAPE PLAN NOTES)

RESERVED (LANDSCAPE GENERAL CONSTRUCTION NOTES)

LONGMONT POWER & COMMUNICATIONS (LPC) CONSTRUCTION NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING UTILITY LOCATES. CALL THE UTILITY NOTIFICATION CENTER OF COLORADO AT 1-800-922-1987.
2. THE CONTRACTOR IS RESPONSIBLE FOR PREPARING THE SITE FOR LONGMONT POWER AND COMMUNICATIONS (LPC) PRIOR TO SCHEDULING LPC INFRASTRUCTURE INSTALLATION. ENGINEERING PROJECT DESIGNS AND COSTS FOR THE INSTALLATION OF LPC FACILITIES ARE BASED ON THE CONTRACTOR'S FULL AND COMPLETE COMPLIANCE WITH ALL OF THE FOLLOWING LISTED CONDITIONS. FAILURE TO COMPLY WITH ANY OF THESE SITE PREPARATION REQUIREMENTS MAY RESULT IN INSTALLATION DELAYS AND ADDITIONAL CHARGES. LPC IS NOT RESPONSIBLE FOR ANY DELAYS OR CHARGES INCURRED BY THE CONTRACTOR AS A RESULT OF FAILING TO ENSURE THE SITE IS PREPARED PROPERLY. A SITE SHALL BE CONSIDERED PROPERLY PREPARED WHEN IT MEETS ALL OF THE FOLLOWING CONDITIONS:
    a. A TEN (10) FOOT CORRIDOR ALONG LPC'S PATH MUST BE GRADED TO WITHIN TWO (2) TENTHS OF FINAL GRADE. THIS TRENCH PATH SHALL BE SUFFICIENTLY FLAT AND SMOOTH TO FACILITATE TRENCHER ACCESS AND CABLE INSTALLATION.
    b. LPC'S CORRIDOR SHALL BE FREE OF CONSTRUCTION EQUIPMENT, MATERIALS, SCRAP, CONCRETE, AND/OR ANY OTHER OBJECTS OR OBSTACLES THAT MAY INHIBIT TRENCHING.
    c. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ACCURATE SURVEY INFORMATION, INCLUDING ELEVATIONS, FOR THE CENTER OF LPC'S CORRIDOR. FIVE (5) FOOT OFFSETS FOR TWO CORNERS OF EACH OF LPC'S EQUIPMENT LOCATIONS SHALL ALSO BE PROVIDED.
    d. CONCRETE SIDEWALKS, CURBS, GUTTERS, AND PAVEMENT SHALL BE INSTALLED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO INSTALL SLEEVES FOR LPC'S USE BENEATH ANY ROADWAYS, CULVERTS, DITCHES, SIDEWALKS, AND EXISTING UTILITIES THAT LPC MUST CROSS DURING SUBSURFACE INSTALLATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE NOTIFICATION AND COORDINATION OF DITCH CROSSINGS. ALL SLEEVES SHALL BE INSTALLED PER SECTION 700 OF THE CITY OF LONGMONT DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS.
    e. SIDEWALKS SHALL BE FREE OF ALL DEBRIS, WITH THE FRONT PROPERTY LINES PAINTED ON SAID SIDEWALK, AND THE REAR PROPERTY LINES CLEARLY STAKED.
    f. CONCRETE DRIVEWAKS, LANDSCAPING, AND IRRIGATION EQUIPMENT SHALL NOT BE INSTALLED PRIOR TO LPC'S FACILITIES.
    g. THE CONTRACTOR SHALL COORDINATE ALL SUBSURFACE UTILITY INSTALLATION FROM DEEPEST TO SHALLOWEST. NO UTILITIES REQUIRING A SHALLOWER BURY DEPTH THAN LPC SHALL BE INSTALLED PRIOR TO LPC'S FACILITIES.
    h. PROPERTY PINS SHALL NOT BE INSTALLED IN LPC'S CORRIDOR PRIOR TO LPC'S FACILITIES.
    i. THE CONTRACTOR SHALL PROVIDE UTILITY LOCATES FOR UNDERGROUND INFRASTRUCTURE INSTALLED BUT NOT CURRENTLY OWNED AND MAINTAINED BY THE CITY, I.E., SEWER, WATER AND STORM DRAINAGE. ADDITIONALLY, ALL EMPTY CONDUITS USED AS SLEEVES FOR IRRIGATION AND DRY UTILITIES MUST BE LOCATED AND CLEARLY IDENTIFIED. THE MINIMUM REQUIRED ACCURACY OF LOCATE MARKS SHALL BE WITHIN 18" EITHER SIDE OF THE UNDERGROUND INFRASTRUCTURE TO BE CONSIDERED PROPERLY LOCATED. LPC SHALL NOT BE RESPONSIBLE FOR REPAIRS OR CHARGES RESULTING FROM DAMAGE TO UNDERGROUND UTILITY INFRASTRUCTURE THAT IS NOT PROPERLY LOCATED AND MARKED USING STANDARD UTILITY LOCATING MATERIALS PER TYPICAL LOCATING PROCEDURES, INCLUDING BUT NOT LIMITED TO PAINT, STAKES, AND LOCATING FLAGS.
    j. CONTRACTOR INSTALLED FACILITIES SHALL BE PLACED AS SHOWN ON THE MASTER UTILITY PLAN, BACKFILLED, AND COMPACTED (I.E., SEWER, WATER, STORM DRAINAGE, ETC.).
3. LPC UNDERGROUND ELECTRIC CABLE THAT EXISTS NEAR THE PROJECT WORK AREA CANNOT BE DE-ENERGIZED FOR CROSSING PURPOSES. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PREVENT DAMAGE TO THE CABLES OR INJURY TO THE CONSTRUCTION CREW. SHOULD THE CONTRACTOR DAMAGE THESE

FACILITIES, CONTACT LPC IMMEDIATELY AT 1-303-651-8386. LPC WILL REPAIR THE FACILITIES AND BILL THE CONTRACTOR FOR ALL ASSOCIATED COSTS.

4. WHERE LPC OVERHEAD FACILITIES EXIST IN THE DEVELOPMENT AREA, THE CONTRACTOR MUST KEEP ALL EQUIPMENT OPERATION A MINIMUM OF 10 FEET FROM EXISTING OVERHEAD ELECTRIC LINES. IF THIS IS NOT FEASIBLE, OR CONDITIONS WARRANT ADDITIONAL PROTECTION OR POLE STABILIZATION, THE CONTRACTOR SHALL CONTACT THE LPC OPERATIONS CONSTRUCTION COORDINATOR AT 1-303-651-8386. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ARRANGE PROTECTIVE COVERING AND OR POLE STABILIZATION, 48 HOURS IN ADVANCE. SHOULD THE CONTRACTOR DAMAGE THESE FACILITIES, CONTACT LPC IMMEDIATELY AT 1-303-651-8386. LONGMONT POWER & COMMUNICATIONS WILL REPAIR THE FACILITIES AND BILL THE CONTRACTOR FOR ALL ASSOCIATED COSTS.

5. AN ELECTRIC COMMUNITY INVESTMENT FEE WILL BE CHARGED FOR ANY NEW OR UPGRADED SERVICES. THE FEE IS CALCULATED AND BASED ON THE PANEL RATING OF THE ELECTRIC SERVICE AND WILL BE COLLECTED WITH THE BUILDING PERMIT FEE.

6. THE CONTRACTOR IS RESPONSIBLE FOR THE COST OF EXTENDING THE ELECTRIC UTILITY SYSTEM TO THE SITE, WITHIN THE SITE, RELOCATIONS, OR OTHER CHANGES.

7. ELECTRIC SERVICE LINES AND METERING EQUIPMENT ARE INSTALLED BY THE CONTRACTOR. REFER TO DETAIL 700-16 IN THE CITY OF LONGMONT’S METERING STANDARDS AND CONSTRUCTION SPECIFICATIONS FOR FURTHER DETAILS.
8. THE COST TO REPAIR AND/OR REPLACE ANY ELECTRIC FACILITIES DAMAGED BY THE CONTRACTOR OR THEIR AGENTS DURING CONSTRUCTION ACTIVITIES SHALL BE SOLELY THE RESPONSIBILITY OF THE CONTRACTOR.

LONGMONT POWER & COMMUNICATIONS (LPC)
ONE-LINE DIAGRAM NOTES

1. THE ELECTRIC SERVICE LINES AND METERING EQUIPMENT ARE INSTALLED, OWNED, AND MAINTAINED BY THE CUSTOMER. (COMMERCIAL)

2. THE ELECTRIC SERVICE LINES AND METERING EQUIPMENT ARE INSTALLED BY THE CUSTOMER AND ARE REQUIRED TO MAINTAIN A DIRECT LINE OF SIGHT FROM THE UTILITY SOURCE TO THE METER. (RESIDENTIAL)

3. CONCRETE TRANSFORMER PADS ARE TO BE INSTALLED, OWNED, AND MAINTAINED BY THE CUSTOMER. REFER TO DETAIL 700-10 IN THE CITY OF LONGMONT DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS. THE TIMING OF THE CONSTRUCTION OF THE TRANSFORMER PAD MUST BE COORDINATED WITH LPC. (COMMERCIAL 3PH, MULTI-FAMILY 3PH)

4. METER HOUSINGS FOR ALL TYPES OF SERVICES SHALL BE LOCATED ON THE OUTSIDE OF THE BUILDING OR STRUCTURE AND ACCESSIBLE TO METER READERS AS REFERENCED IN LPC RATES AND REGULATIONS GOVERNING ELECTRIC SERVICE.

5. BADGING OF SINGLE, COMMERCIAL, AND MULTIPLEMETER SOCKETS ARE THE CUSTOMER'S RESPONSIBILITY. EACH METER OF A MULTIPLE-METER SOCKET, AND ALL INDIVIDUAL METER SOCKETS, SHALL HAVE A PERMANENT PHENOLIC BADGE SHOWING WHICH HOME, APARTMENT, OFFICE, UNIT, OR ROOM IS TRACKED BY EACH METER.

6. AN ADDITIONAL 2" PVC CONDUIT (PROVIDED BY LPC) WILL BE INSTALLED BY THE CUSTOMER IN THE SERVICE LATERAL TRENCH FROM THE BROADBAND JBOX, LOCATED AT THE TRANSFORMER, TO THE TELECOM DEMARCATION POINT ON/IN THE BUILDING.
7. SECONDARY CABINETS ARE SUPPLIED, INSTALLED, OWNED, AND MAINTAINED BY THE CUSTOMER. SECONDARY CABINETS CAN BE INSTALLED A MINIMUM OF 5' AND A MAXIMUM OF 10' FROM THE SERVICING LPC TRANSFORMER.
8. THE CUSTOMER IS RESPONSIBLE FOR THE INSTALLATION OF (X)-4" PVC CONDUITS WITH 90 DEG, 48" RADIUS SWEEP, IN THE SECONDARY WINDOW OF THE TRANSFORMER PAD TO A DEPTH OF NO LESS THAN 36" TOP OF PIPE, AND THEN BROUGHT INTO THE CUSTOMERS SECONDARY CABINET.
9. LPC WILL INSTALL, OWN, AND MAINTAIN THE CABLE(S) FROM THE TRANSFORMER TO THE SECONDARY CABINET. LPC WILL TERMINATE ALL CABLES WITHIN THE UTILITY TRANSFORMER. THE CUSTOMER WILL TERMINATE ALL CABLES WITHIN THE SECONDARY CABINET.

RESERVED (NEIGHBORHOOD GRADING & DRAINAGE NOTES)

SANITARY SEWER CONSTRUCTION NOTES

1. SEWER PIPE SHALL BE RIGID POLYVINYL CHLORIDE (PVC) ASTM D3034 (< 15") OR ASTM 679 (> 15") WITH WALL THICKNESS SDR 35. ALL SANITARY SEWER PIPES SHALL BE GREEN.
2. ALL LENGTHS OF SEWER LINE SHOWN ON THE MASTER UTILITY PLAN ARE FROM THE CENTER OF MANHOLE TO THE CENTER OF MANHOLE.
3. ALL SANITARY SEWER MANHOLES SHALL RECEIVE A WATERPROOF COATING.
4. ALL SANITARY SEWER MANHOLES SHALL BE 4 FEET IN DIAMETER UNLESS OTHERWISE NOTED.
5. THE CONTRACTOR SHALL INSTALL TEMPORARY PLUGS IN THE MANHOLES AT THE POINTS OF CONNECTION TO THE EXISTING SEWER SYSTEMS. PLUGS SHALL REMAIN IN PLACE UNTIL CONSTRUCTION ACCEPTANCE IS ISSUED, AT WHICH TIME THE CONTRACTOR SHALL REMOVE THEM.
6. SEWER SERVICES SHALL BE EXTENDED 15 FEET INTO THE LOT AND MARKED WITH A 2X4. SERVICE LOCATIONS SHALL BE CHISELED INTO THE CONCRETE WALK.
7. ALL SANITARY SEWER INFRASTRUCTURE SHALL BE CLEANED PRIOR TO CONSTRUCTION ACCEPTANCE.
8. ALL SANITARY SEWER INFRASTRUCTURE SHALL BE INSPECTED VIA CAMERA PRIOR TO CONSTRUCTION ACCEPTANCE.

STORM SEWER CONSTRUCTION NOTES

1. ALL STORM SEWER REINFORCED CONCRETE PIPE SHALL MEET ASTM C-76, CLASS III STANDARDS.
2. ALL STORM SEWER PIPE JOINTS SHALL BE RUBBER O-RING TYPE PER ASTM C361.
3. STORM SEWER MANHOLES SHALL BE FOUR (4) FEET IN DIAMETER FOR PIPES 36 INCHES IN DIAMETER OR LESS; FIVE (5) FEET IN DIAMETER FOR PIPES GREATER THAN 36 INCHES TO 48 INCHES IN DIAMETER; AND SIX (6) FEET IN DIAMETER FOR PIPES GREATER THAN 48 INCHES TO 60 INCHES IN DIAMETER.
4. ALL STORM SEWER INLETS SHALL BE CDOT TYPE R CURB INLETS UNLESS OTHERWISE NOTED.
5. ALL STORM SEWER MANHOLE AND INLET LIDS SHALL HAVE THE FOLLOWING CONFINED SPACE INFORMATION: “STORM SEWER CAUTION CONFINED SPACE ENTRY PERMIT REQUIRED”.
6. MANHOLE AND INLET LID LOCATIONS SHALL BE COORDINATED WITH THE CITY OF LONGMONT CONSTRUCTION INSPECTOR.
7. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM EROSION AND SEDIMENT CONTROL MEASURES, AND TO MAINTAIN CONSTRUCTED DRAINAGE FACILITIES, THROUGHOUT THE CONSTRUCTION PROCESS IN A MANNER THAT PRESERVES THE INTENDED FUNCTION AND LIFE OF THE DRAINAGE FACILITIES.
8. A TRASH RACK WITH A GALVANIZED COATING SHALL BE DESIGNED FOR ALL STORM SEWER OPENINGS THAT ARE: LARGER THAN 18 INCHES, SUBJECT TO AN UNAUTHORIZED ENTRANCE, OR TRASH ACCUMULATION. GRATES ARE NOT PERMITTED ON THE DOWNSTREAM END OF THE PIPE.
9. ALL STORM INFRASTRUCTURE SHALL BE CLEANED PRIOR TO CONSTRUCTION ACCEPTANCE.
10. ALL STORM INFRASTRUCTURE SHALL BE INSPECTED VIA CAMERA PRIOR TO CONSTRUCTION ACCEPTANCE.
11. OWNERSHIP AND MAINTENANCE RESPONSIBILITY:

    <OWNERSHIP AND MAINTENANCE RESPONSIBILITIES FOR ALL PROPOSED DRAINAGE AND WATER QUALITY FACILITIES SHALL BE CLEARLY DESIGNATED UNDER STORM SEWER CONSTRUCTION NOTE 11 PRIOR TO RECEIVING FINAL ACCEPTANCE. ALL PRIVATE AND PUBLIC FACILITIES APPLICABLE TO THE PROJECT SHALL BE LISTED.>

RESERVED
(STORMWATER POLLUTION CONTROL (SPC) GENERAL NOTES)

UNDERDRAIN CONSTRUCTION NOTES

1. THE UNDERDRAIN COLLECTION SYSTEM IS A PRIVATE SYSTEM OWNED AND MAINTAINED BY THE PROPERTY OWNER(S)/HOA/PROPERTY OWNERS ASSOCIATION.
2. ANY UNDERDRAIN COLLECTION SYSTEM MAIN LINE LOCATED WITHIN CITY ROW SHALL BE MINIMUM SIX (6)-INCH DIAMETER, SOLID, RIGID- WALLED PIPE. A SIX (6)-INCH UNDERDRAIN MAIN CAN BE INSTALLED IN THE SAME TRENCH WITH SANITARY SEWER MAIN. UNDERDRAIN MAIN LARGER THAN SIX (6)-INCH MUST BE PLACED IN A SEPARATE TRENCH FROM ALL OTHER UNDERGROUND UTILITIES.
3. UNDERDRAIN SERVICE LINES SHALL BE MINIMUM FOUR (4)-INCH DIAMETER SOLID PVC AND WILL BE OWNED AND MAINTAINED BY PROPERTY OWNER(S)/HOA/PROPERTY OWNERS ASSOCIATION (REFERENCE UNDERDRAIN AND SANITARY SEWER SERVICE DETAIL).
4. FOUNDATION PERIMETER DRAIN FOR BUILDINGS SHALL BE FOUR (4)-INCH PERFORATED PIPE OWNED AND MAINTAINED BY THE PROPERTY OWNER(S)/HOA/PROPERTY OWNERS ASSOCIATION.
5. A MINIMUM SIX (6)-INCH DIAMETER CLEANOUT SHALL BE INSTALLED EVERY 200 FEET ON UNDERDRAIN MAIN LINE FOR STRAIGHT RUNS OF PIPE. UNDERDRAIN CLEANOUTS ARE REQUIRED AT EVERY CHANGE IN PIPE ALIGNMENT.
6. A 24-INCH INSIDE-DIAMETER UNDERDRAIN INSPECTION MANHOLE SHALL BE INSTALLED IN LOCATIONS WHERE THREE OR MORE UNDERDRAIN PIPES ARE CONNECTED (REFERENCE DETAIL).
7. THE DISTANCE BETWEEN ANY SANITARY SEWER MANHOLE AND UNDERDRAIN MANHOLE SHALL BE A MINIMUM OF THREE (3) FEET (AS MEASURED FROM THE EDGES OF THE MANHOLES) FOR UTILITIES AT A MAXIMUM DEPTH OF 10 FEET. FOR UTILITIES GREATER THAN 10 FEET DEEP, AN ENGINEERING DESIGN WILL BE REQUIRED.
8. THE LOWEST FLOOR ELEVATION (INCLUDING BASEMENTS) SHALL BE MINIMUM THREE (3) FEET ABOVE THE HIGHEST MEASURED GROUNDWATER LEVEL.
9. AN INFRASTRUCTURE PERMIT WILL BE REQUIRED FROM THE CITY TO INSTALL, OWN, MAINTAIN, AND OPERATE PRIVATE UTILITIES IN PUBLIC RIGHTS-OF-WAY.
10. UNDERDRAIN COLLECTION SYSTEM INSTALLATION (MAIN LINE AND SERVICE LINE) SHALL BE INSPECTED BY THE CITY.
11. THE UNDERDRAIN COLLECTION SYSTEM SHALL BE INSPECTED BY DYE TESTING AND VIDEO TESTING, AND THOSE RESULTS PROVIDED TO THE CITY, PRIOR TO CONSTRUCTION FINAL ACCEPTANCE.
12. AS-BUILT PLANS WILL BE REQUIRED FOR ALL UNDERDRAIN COLLECTION SYSTEMS.

WATER DISTRIBUTION CONSTRUCTION NOTES

1. WATER MAIN PIPE SHALL BE RIGID POLYVINYL CHLORIDE (PVC) CONFORMING TO AWWA C900 CL 150. J-M (J-M MANUFACTURING CO.) IS NOT ALLOWED TO BE USED IN THE CITY OF LONGMONT. ALL WATER DISTRIBUTION PIPES SHALL BE BLUE.

2. ALL LENGTHS OF WATER LINE SHOWN ON THE MASTER UTILITY PLAN ARE FROM THE CENTER TO THE CENTER OF ALL VALVES OR FITTINGS.

3. LONGITUDINAL BENDING OF PVC IS NOT ALLOWED. ALL DEFLECTIONS SHALL BE OBTAINED THROUGH FITTINGS OR, IF ALLOWED BY THE MANUFACTURER'S WRITTEN LITERATURE, AT THE JOINTS. IF JOINT DEFLECTION IS ALLOWED, THE DEFLECTION SHALL BE NO MORE THAN ONE-HALF OF THE MANUFACTURER'S ALLOWABLE MAXIMUM.

4. THE CONTRACTOR SHALL INSTALL TEMPORARY BLOW-OFFS FOR TESTING AND FLUSHING OF THE WATER MAINS.

5. A PERMANENT BLOW-OFF OR FIRE HYDRANT IS REQUIRED FOR EACH DEAD-END LINE.

6. FIRE HYDRANT LINES SHALL BE 6-INCH DIAMETER AND SHALL MATCH THE TYPE OF MATERIAL USED FOR THE MAINLINE.

RESERVED
(WILDLIFE RESTRICTIONS CONSTRUCTION NOTES)

TRACER WIRE NOTES

TRACER WIRE NOTES:

1. LOCATING MUST MEET REQUIREMENTS OF SENATE BILL 18-167 OR ANY UPDATE.
2. TRACER WIRE SHALL BE LOCATED ON TOP OF PIPE AND SHALL BE TAPED TO THE PIPE AT FROM THREE (3) TO NO GREATER THAN FOUR (4) FOOT INTERVALS AND AT EACH SIDE OF EVERY JOINT, FITTING, AND VALVE.
3. TRACER WIRE IS REQUIRED FOR ALL WATER SERVICE LATERALS, NON-POTABLE IRRIGATION SERVICE LATERALS, ALL SEWER LATERALS, ALL WATER MAINS, ALL SEWER MAINS, AND ALL NON-POTABLE IRRIGATION MAINS.
4. TWO UNDERGROUND WIRE SPLICES ARE ALLOWED PER SERVICE. SPLICES SHALL HAVE LOCKABLE CONNECTIONS SPECIFICALLY DESIGNED FOR DIRECT BURIAL AND DIELECTRIC SILICONE GEL FILLED OR APPROVED EQUIVALENT.
5. TRACER WIRE SYSTEMS SHALL BE INSTALLED AS A SINGLE CONTINUOUS WIRE, EXCEPT WHERE USING APPROVED CONNECTORS. NO LOOPING OR COILING OF WIRE AROUND THE PIPE SHALL BE ALLOWED.
6. ALL WATER SERVICE LATERAL TRACER WIRE SHALL BE CONNECTED TO MAINLINE TRACER WIRE USING AN APPROVED MAINLINE-TO-LATERAL LUG CONNECTOR WITHOUT CUTTING/SPLICING THE MAINLINE TRACER WIRE.
7. ALL MAINLINE TRACER WIRE BRANCHES SHALL BE MADE WITH AN APPROVED TO-MAINLINE LUG CONNECTOR.
8. REFER TO SECTION 100 AND THE APPROVED MATERIALS LIST FOR APPROVED MATERIALS AND ADDITIONAL REQUIREMENTS.

TEST STATIONS:

1. TRACER WIRE SHALL BE ACCESSIBLE AT LEAST ONCE EVERY 1,000 FT MAX.
2. TEST STATIONS SHALL NOT BE FURTHER THAN 1,000 FT FROM AN APPROVED “FAR-END” GROUNDING ROD.
3. TEST STATIONS MAY EITHER BE IN THE FORM OF A CATHODE WIRE LOOP ACCESSIBLE FROM FINAL GRADE SURFACE OR AN APPROVED TEST STATION ACCESS BOX (SEE APPROVED MATERIALS LIST). EITHER TEST STATION FORM SHALL BE WITHIN THE FAR-END GROUNDING INTERVAL REQUIREMENT, AND MEET CITY OF LONGMONT’S DESIGN STANDARDS AND CONSTUCTION SPECIFICATIONS.
4. THE GROUND SURROUNDING TEST STATION ACCESS BOXES SHALL SLOPE AWAY FROM THE LID AT 2% MINIMUM GRADE.

GROUNDING NOTES:

1. ALL SANITARY SEWER SERVICE LATERAL TRACER WIRES SHALL TERMINATE WITHIN TWO (2) FEET OF THE MAIN WITH AN APPROVED DRIVE-IN MAGNESIUM DRIVE-IN ROD. SINGLE GROUNDING ROD MAY BE UTILIZED FOR UP TO THREE (3) SEWER SERVICES MAX.
2. MAINLINE TRACER WIRE SHALL BE GROUNDED AT EVERY DEAD END/STUB, AND ALONG CONTINUOUS RUNS AT A MAXIMUM OF 2,000 FT INTERVALS WITH A ONE-AND-A-HALF (1.5) LB DRIVE-IN MAGNESIUM GROUNDING ROD PER MANUFACTURER REQUIREMENTS. PLACEMENT OF GROUNDING ROD SHALL BE INSTALLED IN SUCH A WAY THAT ALLOWS FOR PROPER WIRE LOCATING WITHOUT A LOSS OR DETERIORATION OF LOW FREQUENCY SIGNAL (512 HZ) FOR DISTANCES IN EXCESS OF 1,000 FT.

3. IF GROUNDING ROD IS TOO CLOSE TO A TEST STATION THAT IT INTERFERES WITH PROPER LOCATING, THE GROUNDING ROD SHALL BE SWITCHABLE IN ORDER TO TEMPORARILY DEACTIVATE THE INTERFERING GROUND SIGNAL IN THE VICINITY. SUCH A TEST STATION SHALL BE IN THE FORM OF A TEST STATION ACCESS BOX (SEE APPROVED MATERIALS LIST.)

APPENDIX C: REPORT TEMPLATE AND CHECKLISTS

C-1 RESERVED (DRAINAGE REPORT CHECKLIST)

C-2 ELECTRIC SERVICE REQUEST FORM

C-3 EXCEPTION REQUEST FORM

C-4 RESERVED (GEOTECHNICAL REPORT CHECKLIST)

C-5 RESERVED (PAVEMENT DESIGN REPORT CHECKLIST)

C-6 RESERVED (TRANSPORTATION IMPACT STUDY)

C-7 STATEMENT OF EXPECTED UTILITY NEEDS

C-8 RESERVED (UNDERDRAIN REPORT CHECKLIST)

C-9 RESERVED (WATER AND WASTEWATER PROJECT INFORMATION REPORT CHECKLIST)

DRAINAGE REPORT CHECKLIST

The listed requirements apply to all Final Drainage Reports. The column labeled "Prelim" identifies requirements for projects that involve a Preliminary Drainage Report to identify and define the conceptual solutions to drainage problems that will occur on-site and off-site.

REPORT REQUIREMENTS

A. Title Page

Yes	No	Prelim	Requirement
		X	1. Subdivision Name
		X	2. Address
		X	3. Property Owner & Property Jurisdiction
		X	4. Developer/Project Owner
		X	5. Engineer
		X	6. Submittal date and revision dates, as applicable
			7. Include Certification Statement from a Registered Professional Engineer in the State of Colorado and the project Developer

B. General Location and Description

Yes	No	Prelim	Requirement
1. Name of Project			
		X	1. Site Vicinity Map
		X	2. Township, Range, Section, and ¼ Section
		X	3. Streets, roadways, and highways adjacent to the proposed development, or within the area served by the proposed drainage improvements
		X	4. Names of adjacent developments and jurisdictions
2. Description of Property			
		X	1. Total developed area and disturbed area in acres
		X	2. Ground cover, vegetation, site topography and slopes
		X	3. NRCS Soils Classification Map and description
		X	4. Major and minor drainageways
		X	5. Floodplains delineated by FEMA FIRM Maps, City adopted floodplain, draft floodplains, or other City adopted documents.
		X	6. Existing irrigation ditches
		X	7. Existing and proposed land use
		X	8. Groundwater investigations and results (Geotech Report or Groundwater Report)
			9. Provide separate underdrain report (Refer to Section 300 of the City Standards and the underdrain report checklist)

C. Drainage Basins and Sub-Basins

		X	1. Major Drainage Basins On-site and off-site major drainage basin characteristics for historic/existing patterns and paths

Yes	No	Prelim	Requirement
			2. On-site and off-site minor drainage characteristics of each sub-basin including total area, imperviousness, flow patterns and paths, design points, and receiving Permanent Stormwater Control (PSC) facility
		X	3. Phase/Filing improvements
		X	4. Irrigation facilities that will influence or be impacted by the site drainage
		X	5. Impacts of the off-site flow patterns and paths, under fully developed conditions

D. Drainage Design Criteria

Yes	No	Prelim	Requirement
1. Regulations			
		X	1. City Standards Section 300 criteria, Urban Drainage & Flood Control District Criteria Manual, Volume 3, FEMA regulations, USACOE regulations, State of Colorado regulations and optional provisions selected when applicable.
3. Hydrology			
		X	1. UDFCD runoff calculations method(s) – runoff coefficients, % imperviousness, flow rate
		X	2. Design storm events including water quality capture volume
		X	3. Design rainfall
		X	4. Detention Pond calculation (Historical Release rate, storage calculation, hydrograph data, peak flow rate)
4. Hydraulics			
			1. Street & Inlet Capacity
			2. Ditch/Swale Capacity and Flow Calculations
		X	3. Open channel or swale capacities
			4. Weirs, Dams, Bridges, other specialized hydraulic structures

E. Stormwater Management Facility Design and Management

Yes	No	Prelim	Requirement
1. Stormwater Conveyance Facilities			
		X	1. Determining scope of stormwater quality infrastructure on project site
		X	2. General conveyance concepts and schematic for storm sewer system
		X	3. Methods used to determine conveyance facility capacities
			4. Maintenance aspects of the design and easements and outlots that are required for stormwater conveyance and storage purposes
			5. Responsibilities of the PSC Permittee upon conclusion of the construction phase of the development.
			6. Design of all permanent stormwater quality control measures including tributary areas, facility sizing, treatment volumes, design features, base design standards, site constraints, etc.
		X	7. Implementation and calculations for Low Impact Development (LID) strategies, including measures to "minimize directly connected impervious areas" (MDCIA).
			8. Stormwater control measure details (outlet structure, BMPs, etc)
		X	9. Permitting items (PSC, 404)
		X	10. Erosion Control (See erosion control checklist)

I. Overall Drainage Plan			
Yes	**No**	**Prelim**	**Requirement**
		X	1. Is an overall drainage plan sheet required?
		X	2. 24" x 36" in size, 22" x 34" also acceptable when half size sets will be produced
		X	3. Title block, legend, north arrow
		X	4. Scale 1"= 20' to 1"= 100', as required to show sufficient detail
		X	5. Property / Project Site boundary line
		X	6. Existing and proposed streets, roadways, or highways
		X	7. Basin delineations, including off-site basins when feasible
		X	8. Offsite flow entering project site
		X	9. Proposed and existing contours (1' increment)
		X	10. Callouts of existing stormwater management facilities and major water bodies
		X	11. Overlay or figure showing layout of Detailed Drainage Plan sheets (viewports)

J. Detailed Drainage Plan (Can be combined with overall drainage plan depending on complexity of project)			
Yes	**No**	**Prelim**	**Requirement**
		X	1. 24" x 36" in size, 22" x 34" also acceptable when half size sets will be produced
		X	2. Title block, legend, north arrow
		X	3. Scale 1"= 20' to 1"= 100', as required to show sufficient detail
		X	4. Proposed and existing contours (1' increment)
		X	5. General labels
		X	6. Road linework
		X	7. Basin delineation and flow arrows
		X	8. Callout existing stormwater management facilities and major water bodies
		X	9. Floodplain checks
		X	10. Quick Checks / required CAD object/lines
		X	11. Common items shown that should not be seen

Electric Service Request

Project Name or Address: _____

Primary Contact Name and Phone Number: _____

Submit this document with initial Site Plans or Public Improvement Plans into the City of Longmont's Design Review process or prior to applying for a Building Permit Application where electric utility service is required. This form initiates the engineering and design process for an electric service extension or revision of existing electric services within the City of Longmont.

Provide one paper copy and an electronic file to include the items listed below. Refer to the City of Longmont Design Standards for electronic file requirements and LPC submittal requirements.

	Residential Development		Commercial / Industrial	
	Single Family	Multi Family	Subdivision	Site Plan-Single Location
Utility Plan with Existing and Proposed Utilities; Sewer, Water, Storm Drainage, Electric, Gas, Communications	X	X	X	X
Landscape Plan	X	X	X	X
Electric Meter(s) Location	NA	X	When available	X
Electric Transformer(s) Location	NA	X	When available	X
New / Upgrading Electric One-Line Diagram	Square Footage Ranges Electric Heat *(yes or no)*	X	When available	X

Party responsible for payment of temporary electric facilities

Temporary Electric Facilities ❑ **NA**	**Temporary Metering** ❑ **NA**
Name:	Name:
Address:	Address:
Phone:	Phone:
Email:	Email:

Party responsible for payment of final electric facilities

Final Electric Facilities	**Final Metering** ❑ **NA**
Name:	Name:
Address:	Address:
Phone:	Phone:
Email:	Email:

Party responsible for payment of energy usage

Temporary Energy Usage ❑ **NA**	**Final/Permanent Energy Usage** ❑ **NA**
Name:	Name:
Address:	Address:
Phone:	Phone:
Email:	Email:

Applicant: _____ **Date:** _____

1100 South Sherman Street, Longmont, CO 80501
303-651-8386 ● FAX: 303-651-8796 ● www.longmontcolorado/lpc

REQUEST FOR AN EXCEPTION TO CITY STANDARDS

Project Name & Location _____

Date: _____

Developer: _____

Engineer of Record (EOR): _____

DIRECTIONS

All exceptions submitted must be on company letterhead and follow this format.

Attach supporting documentation and calculations for the requested design exception.

Unless otherwise approved by the City Engineer, design exceptions must be signed and sealed by a registered Professional Engineer licensed to do work in the State of Colorado.

See Section 100 of the Longmont Public Improvement Design Standards and Construction Specifications for more information.

EXCEPTION REQUEST

The applicant is requesting an exception to [list the section of the design standards the request is referencing].

JUSTIFICATION

Provide justification for the exception request. The applicant must include calculations, references to other industry standards, how the intent of the standards are being met, and any other information needed to justify the exception.

The applicant shall demonstrate compliance with the following three (3) criteria (per Section 100):

1. Special circumstances or conditions exist which are outside of the control of the applicant and which limit the ability of the design to meet the City Standards outlined in the document. Financial difficulties, loss of prospective profits and previously approved exceptions in other developments shall not be considered special circumstances.
2. The exception represents an alternative design that mitigates the special circumstances or conditions while meeting the intent of the City Standards set forth in this document.
3. The exception will not be detrimental to the public interest or other property, nor in conflict with Envision Longmont or applicable provision of the Longmont Municipal Code, and will not endanger public safety, health or welfare.

LIST OF ATTACHMENTS

Provide a list of the attachments and exhibits supporting the exception request.

SIGNATURE AND STAMP OF ENGINEER OF RECORD

Note: *Approval of construction plans by the City, which contain design elements not in compliance with the City Standards, and for which an exception request has not been specifically requested and approved, does not imply approval of an exception from these City Standards. Only those exceptions submitted in writing and approved by the City Engineer are granted exception.*

GEOTECHNICAL REPORT CHECKLIST

The City of Longmont requires a geotechnical report for all proposed construction within the City's Easements or Right-of-way. The reports are to include information necessary to determine the characteristics of soils encountered within the project limits, and make recommendations on how to deal with problem areas.

REPORT REQUIREMENTS

A. Investigation and Recommendation Requirements (by geotechnical engineer)

Yes	No	N/A	**Requirement:** The soils engineer shall investigate and recommend solutions to problems of**:**
			1. Expansion of cohesive soils
			2. Frost heave in silty soils
			3. Potential ground water problems
			4. Partially constructed streets
			5. Use of sub-base filter fabric
			6. Any other matter that may adversely affect the project design

B. Soil Sample Requirements

Yes	No	N/A	**Requirement**
			1. Soil samples shall be taken at the proposed subgrade elevation and shall represent the soil of the subgrade.
			2. All boring depths shall extend a minimum of three (3) feet below the proposed subgrade elevation.
			3. The boring locations shall not exceed a distance of 500 ft. between borings, with a minimum of two (2) borings per roadway.
			4. If more than one soil type is encountered in the boring, they shall be logged and tested separately.
			5. All design shall be based on the worst soil encountered from the standpoint of subgrade support.
			6. All subgrade shall have a minimum of ninety-five percent compaction at ± 2% of optimum moisture content to a depth of twelve inches.
			7. The geotechnical report must demonstrate the adequateness of the structural section.

D. Contact Information (Must be included on front page of report)			
Yes	**No**	**N/A**	**Requirement**
			1. Development/Project Name
			2. Location/Address
			3. Firm Name
			4. Submitted By
			5. Contact Person
			6. Contact Phone Number
			7. Submittal Date In Date order of 1st, 2nd, 3rd, etc. submittal
			8. Date Approved
C. Geotechnical Report Requirements and Format			
Yes	**No**	**N/A**	**Requirement**
			1. The geotechnical report must be prepared by a professional engineer, whose expertise is geotechnical engineering registered in the State of Colorado.
			2. The report must be submitted to the City Engineer for review and approval prior to the final approval of any construction drawings.
1. Report Format			
			1. Title page with project address
			2. 8 ½" x 11" report, bound or in a folder
			3. Dated, checked, signed and sealed by a professional engineer
			4. Original and revision dates
2. Soils Information			
			1. Boring locations on site plan
			2. Boring logs
			3. Gradation tests/Atterberg limits
			4. Compaction tests
			5. Percent swell (If percent swell exceeds 1.5%, the report shall include the proposed methods(s) to deal with swelling soil characteristics)
			6. Soil classification (AASHTO)
			7. Problem areas on the site
			8. Groundwater levels
			9. Trenching restrictions
3. Construction Methods			
			1. Retesting after rough grading
			2. Construction sequence
			3. Lift thickness
			4. Recommendations for planned construction

PAVEMENT DESIGN REPORT CHECKLIST

The City of Longmont requires a pavement design report for all proposed construction within City Easements or Rights-of-Way. The report is to include information necessary to determine the characteristics of soils encountered within project limits and make recommendations on how to deal with problem areas. The pavement design report may be included in the geotechnical report.

REPORT REQUIREMENTS

A. Contact Information (Must be included on front page of report)

Yes	No	N/A	Requirement
			1. Development/Project Name
			2. Location/Address
			3. Firm Name
			4. Submitted By
			5. Contact Person
			6. Contact Phone Number
			7. Submittal Date In Date order of 1st, 2nd, 3rd, etc. submittal
			8. Date Approved

B. General

Yes	No	N/A	Requirement
			1. The pavement design report must be prepared by a professional engineer, registered in the State of Colorado, whose expertise is geotechnical engineering.
			2. The report must be submitted to the City Engineer for review and approval prior to the final approval of any construction drawings.

C. Format

Yes	No	N/A	Requirement
			1. Title page with project address and approval block
			2. 8 ½" x 11" report, pdf
			3. Dated, checked, signed and sealed by a professional engineer
			4. Original and revision dates

D. Soils Information

Yes	No	N/A	Requirement
			1. Boring locations on site plan
			2. Boring logs
			3. Gradation tests/Atterberg limits
			4. Compaction tests
			5. Percent swell (If percent swell exceeds 1.5%, the report shall include the proposed methods(s) to deal with swelling soil characteristics)
			6. Soil classification (AASHTO)
			7. Problem areas on site
			8. Groundwater levels
			9. Trenching restriction

E. Design Criteria			
Yes	**No**	**N/A**	**Requirement**
			1. Roadway classification
			2. Forecast traffic volumes
			3. Construction traffic forecast
			4. 18 KIP EDLA or DTN (Proof roll criteria)
			5. Serviceability Index
			6. Regional factor

F. Pavement Criteria			
Yes	**No**	**N/A**	**Requirement**
			1. Weighted structural number
			3. Design R value
			4. Subgrade properties
			5. Base course
			6. Pavement
			7. Alternatives

G. Construction Methods			
Yes	**No**	**N/A**	**Requirement**
			1. Retesting after rough grading
			2. Paving sequence
			3. Lift thickness
			4. Recommendations for planned construction
			5. Construction traffic control plan

TRANSPORTATION IMPACT STUDIES

This document outlines the policies and requirements for the preparation of Transportation Impact Studies (TIS) for development proposals in the City of Longmont. These requirements exist to ensure consistent traffic analysis practices for developments being considered.

The responsibility for evaluating the traffic impacts associated with a proposed development rests with the applicant. The applicant is responsible for retaining a qualified transportation professional to provide an accurate and complete accounting of probable traffic impacts related to the proposed development. All transportation impact studies should be signed and stamped by a Professional Engineer.

The City of Longmont Planning and Public Works staff are responsible for review of transportation impact studies to ensure that the study is completed accurately and in accordance with these requirements.

1. WHEN IS A TRANSPORTATION IMPACT STUDY REQUIRED?

A. Unless waived by the City Engineer, the City requires a TIS for any new development proposal that could potentially have a significant impact (as determined by the City) on the transportation system. Any of the following may be considered significant impacts:

(1) Daily trip generation is projected to be 500 or more vehicles,

(2) Peak hour trip generation is projected to be 50 more vehicles,

(3) Traffic from a development will impact adjacent residential neighborhoods,

(4) Driveway impacts on public streets related to turning movements or signal timing/progression,

(5) Significant citizen concern due to expected traffic impacts.

B. TIS may also be required when a previously approved development changes or expands in such a way that the approved access to the site is affected or trip generation estimates increase by more than 20% over the original estimates.

C. A TIS may need to be updated or redone in its entirety for unapproved development applications with large time gaps between submittals as determined by the City Engineer. Field counts must be considered current (less than a year old) at the time of review or approval.

D. A TIS may also be required for each phase of a large phased development. In this situation, an overall TIS would be completed for the overall proposal followed by an addendum prior to the development of each phase.

2. TRANSPORTATION IMPACT STUDY PREPARATION AND REVIEW PROCESS

A. The Developer is responsible for contacting the Planning Division before a development application is submitted to determine if a TIS will be required. The need for a TIS will be determined as part of the pre-application conference with the DRC.

B. Prior to the commencement of the TIS, a pre-submittal meeting must be held between the City and the transportation professional retained by the developer to discuss the scope of the study and the requirements for the study content and format. The pre-submittal meeting is intended to provide a firm base of cooperation and communication between the City, the developer, and the transportation consultant. At a minimum, topics discussed at such meetings will include study area, proposed land uses, trip generation, trip distribution, traffic projection year(s), intersections requiring analysis, street sections requiring analysis, signal timing assumptions, and background traffic assumptions. The requirements for transportation study requirements are included in this document.

C. If the study fails to comply with the technical requirements and the scope of the study outlined in the pre-submittal meeting, the Developer will be advised in writing through the City's normal development review process. A study must be submitted and accepted by the City before the City Planning and Zoning Commission schedules the project for consideration.

D. The City will review the transportation impact study in conjunction with the Development Review Committee (DRC) schedule. The draft study and original SYNCHRO files must be submitted with the initial DRC material for review if the DRC schedule is to be maintained. If the study is required for a project that is not involved with the DRC review process, the City will review the draft study within 15 working days of the date of submittal. If study revisions are needed, the City will normally review the revised study within 10 working days of submittal. A longer review period will be necessary if the Colorado Department of Transportation (CDOT) or other agencies are involved in the review process.

3. REQUIREMENTS FOR TRANSPORTATION IMPACT STUDIES

A. Study Purpose and Site Description – The study shall include a brief description of the development application proposal (i.e. annexation, rezoning, subdivision, site plan application etc.) It shall also include a brief description of the development proposal including the site location, the size of the land parcel, general terrain features, the types of land uses being proposed and the proposed access points.

B. Study Area – The boundaries of the study area will be based on engineering judgment and an understanding of existing traffic conditions surrounding the site. The limits should be agreed upon at the pre-submittal meeting with staff. The boundaries of the study area shall be based on the size and extent of the proposed development and its relation to significant streets and intersections. Large developments may require a study area extending beyond one mile due to the magnitude of potential impacts. As a minimum, the study area will include:

(1) Adjacent streets

(2) Adjacent arterial/arterial or arterial/collector intersections, including, at minimum, all signalized intersections within a ½-mile radius of the site

(3) Site access points

(4) Internal roads

(5) A vicinity map that shows the site and the study area boundaries in relation to the surrounding transportation system must be included in the study. All arterial and collector streets in the study area and access points to the site should be shown on the map.

(6) Key intersections in the study area that will be analyzed in the study shall be identified at the pre-submittal meeting. The key intersections should be identified on the map.

C. Study Horizons – Three study horizons are required for analysis: The current conditions, short term and long term.

(1) The current (existing) conditions should be analyzed to establish a baseline of traffic conditions.

(2) The short-term horizon represents the planned opening year of the project. Both a background analysis and analysis with the project completed should be completed to assess the short-term impacts of the project. Assumptions about street improvements not associated with the study project in the short term should be based on the projects shown in the City's Capital Improvement Program or projects that have already been financially obligated to a developer.

(3) The long-term planning horizon represents conditions at 80% build out of the Longmont Planning Area as shown in the Longmont Area Comprehensive Plan (LACP). For Land uses in compliance with the LACP

this analysis should be completed using forecast volumes and roadway improvements as shown in the LACP. For land uses that are not in compliance with the LACP analyses for both the adopted land uses in the LACP and the proposed land uses should be completed so that the impact of the land use change can be evaluated.

(4) When an overall transportation impact study is completed for a phased development the study shall look at all three study horizons. Addenda for each phase of development should only look at the current conditions and the short-term horizons.

D. Analysis Time Periods – Normally, the analysis time periods will be the weekday a.m. and p.m. peak hours. Under some circumstances, the City may require analyses to occur at other times as appropriate.

E. Existing/Base Conditions

(1) Existing and Proposed Land Uses – A complete description (including a map) of the existing land uses in the study area as well as their current zoning, shall be included in the study. In addition, the future uses of all vacant land within the study area that may be developed within the projection year of the project must be identified. For the short-term horizon only land where development applications have been approved should be considered as developed within the projection year. For the long-term horizon, land uses shown in the LACP should be assumed as developed within the projection year.

(2) Existing and Proposed Transportation System – The study shall describe the existing roadways and intersections in the study area including the road geometry and intersection traffic control. For the short-term horizon, assumptions about road improvements not related to the development shall be based on the City's Capital Improvement Program and on improvements already financially obligated to a developer. For the long-term horizon, all improvements shown in the LACP within the study area should be assumed.

(3) Existing Traffic – Current a.m. and p.m. peak hour traffic volumes shall be obtained for the roadways and intersections within the study area. "Current" means counts less than a year old. A map or series of maps of the existing roadway network shall be prepared showing the existing conditions and volume counts including lane geometry, traffic control, access points, turning movement volumes and calculated peak hour factors.

(4) Background Traffic – For the short-term horizon, background traffic shall be the sum of existing traffic volumes plus the addition of traffic from any not yet built but approved developments in the study area plus background traffic growth. Background traffic growth should be calculated from historical 24-hour volume counts in the City of Longmont in the vicinity of the proposed development. Staff will provide this information when it is available. The annual percentage of background traffic growth should be agreed upon at the pre-submittal meeting.

a. For the long-term horizon, background traffic shall be based on the most recent traffic forecasts from the City's long-range transportation model.

b. Maps of both the short-term and long-term roadway network shall be prepared showing the projected conditions and projected volume counts including lane geometry, traffic control, access point, a.m. and p.m. peak hour turning **movement volumes and calculated peak hour factors.**

F. Site Related Traffic

(1) Trip Generation – A summary table listing each type of land use, the size or amount involved, the trip generation rates used and the resultant total trips must be provided. Trip generation rates shall be calculated using data contained in the latest edition of the Institute of Transportation Engineers' (ITE) Trip Generation Manual or from a local trip generation study following procedures prescribed in the ITE Trip Generation Manual. If a local trip generation study is used to determine the trip generation rate,

documentation of the trip generation study and the resulting rate should be included in an appendix of the transportation impact study.

(2) The ITE Trip Generation Manual presents data on trip generation rates in various formats. A weighted average trip generation rate is shown. Also, when possible, a regression equation is presented that defines the line representing "best fit" of the data. Trip generation rates should be determined as outlined below.

a. Use Regression Equation when:

- A regression equation is provided,
- The independent variable is within range of data and either the data plot has a least 20 points, or
- The R2 is greater than or equal to 0.75, equation falls within the data cluster in the plot and the standard deviation is greater than 110% of the weighted average rate.

b. Use the Weighted Average Rate when:

- At least three data points,
- Independent variable is within range of data,
- Standard deviation is less than or equal to 110% of the weighted average rate,
- R2 is less than 0.75 or no equation provided,
- Weighted average rate falls within data cluster plot.

c. Collect Local Data when:

- Study site is not compatible with ITE land use code definition,
- Only 1 or 2 data points; preferably when five or fewer data points,
- Independent variable does not fall within range of data,
- Neither weighted average rate line or fitted curve fall within data cluster at size of development.

(3) Trip making reduction factors may be used after first generating trips at full ITE rates. These factors fall into two categories: those that reassign some portion of generated trips to the background stream of traffic, and those that remove or move generated trips. In all cases, the underlying assumptions of the ITE Trip Generation rates must be recognized and considered before any reductions are claimed.

a. The first category is when trips to the proposed development currently exist as part of the background traffic stream, referred to as pass-by trips. Pass-by percentages identified by ITE or in other industry publications may typically be used. But, the source of the percentages must be identified and the City must approve use. Pass-by traffic must continue to be assigned to site driveways and access points, but is not additive to the background traffic stream. An appendix that illustrates the assignment of pass-by trips must be included in the report.

b. The second category for adjustments is for internal site trips, transit use, and transportation demand management (TDM) actions. Reductions of these types may be allowed if analytic support is provided to show how the figures were derived. The City must approve any reductions that are claimed. Optimistic assumptions regarding transit use and TDM actions will not be accepted unless accompanied by specific implementation proposals that will become a condition of development approval. Such implementation proposals must have a high expectation of realization within a 3-year period after project initiation.

(4) Trip Distribution – The percentage of trips to/from the proposed development to/from destinations in the region must be clearly shown graphically in the new report. The consultant shall be responsible for estimating trip distribution. Marketing studies, sub-area transportation studies, documented existing

traffic patterns and professional judgement may be used to make trip distribution assumptions. Whatever method(s) are used, the procedures and rationale used should be fully explained and documented in the study.

Different trip distribution assumptions can be used for different land uses in mixed-use developments. If more than one set of distribution assumptions are made they should be shown on separate graphics.

(5) Trip Assignment – Site generated traffic shall be assigned to the street system according to the trip distribution percentages determined in the previous step. The traffic assignment must be clearly shown graphically in the report.

G. Analysis and Identification of Impacts

(1) The project impacts shall be determined through an analysis procedure that follows the sequence of tasks outlined below:

a. Assessment of existing conditions,

b. Assessment of short term background conditions,

c. Assessment of short term conditions with the planned land use shown in the LACP for the land being proposed for development (this task is only needed when the proposed development is requesting a land use amendment),

d. Assessment of short term conditions with the proposed development,

e. Assessment of long term background conditions,

f. Assessment of the long-term conditions with the proposed development when a land use amendment is being requested.

(2) Highway Capacity Analysis – Assessment techniques for existing conditions, short-term background and short term with the development will include a capacity and level of service (LOS) analysis for the key intersections identified in the study area during the identified analysis time periods. For signalized intersections, the analyses shall be completed using the operational analysis methodology shown in the latest edition of the Highway Capacity Manual published by the Transportation Research Board. Both volume to capacity ratio (v/c) ration and level of service for each movement shall be reported in a table or diagram for each signalized intersection analyzed. The overall intersection level of service shall also be reported. The City of Longmont's benchmark for traffic congestion states that all signalized intersections should be maintained at overall LOS D or better. In addition, the benchmark requires that all movements that have 5% or more of the total entering intersection volume should be maintained at LOS D or better and have a volume to capacity ratio less than 1.0. Therefore, any signalized intersections or movements at signalized intersections that exceed these thresholds should be noted. The capacity and level of service analysis at signalized intersections shall be performed using the following assumptions:

a. Peak hour factors should be calculated on an approach-by-approach basis from the turning movement count data collected for the analysis,

b. Right turn on red should not be considered unless specific data documenting the percentage of turns on red is collected,

c. Unless approved by the City at the pre-submittal meeting all arrival types shall be assumed to be type 3 as defined in the Highway Capacity Manual,

d. Signal controller unit extension should be assumed to be 3.0 for through movements and 2.0 for left turn movements unless otherwise approved by the City,

e. Startup lost time should be assumed to be 2.0 seconds unless otherwise approved by the City,

f. Extension of effective green should be assumed to be 3.0 seconds unless otherwise approved by the City,

g. Traffic signal timing parameters for the existing conditions will be the actual signal timing in effect unless determined otherwise by the City. Traffic signal timing parameters for the short-term background conditions and the short-term conditions with the development will use signal cycle lengths between 80 and 120 seconds. Cycle lengths and individual green intervals will be calculated to provide the least overall intersections delay while maintaining all movements below benchmark thresholds whenever possible. Clearance intervals shall be the actual times currently in effect for all scenarios analyzed. Where different signal phasing from the existing is used for the analysis, this change shall be noted in the list of traffic impacts. Where traffic signals are part of a coordinated signal system or where proposed new signals are within a half mile of another signal the cycle lengths used for analysis should be the same at all intersections analyzed.

h. Saturation flow rate will be assumed to be 1900 pcphgpl.

i. Lane widths should be assumed to be 12 ft. wide unless other data shows otherwise.

j. 2% trucks should be assumed for all movements unless approved otherwise by the City.

k. Saturation flow adjustment factors should be as per the Highway Capacity Manual.

l. Where dual left turns exist or are proposed they shall be assumed to operate in a protected-only mode.

m. Free running right turns that are not affected by the signal timing should be excluded from the analysis.

(3) Level of service analysis for unsignalized intersections shall be done in accordance with the methodology for unsignalized intersections in the latest edition of the Highway Capacity Manual. The results of the unsignalized intersection analysis should be shown in the table or diagram used for signalized intersection results. The following assumptions should be used for the analysis of unsignalized intersections:

a. Duration of analysis period is assumed to be .25 hour,

b. Peak hour factors should be calculated on an approach-by-approach basis from the turning movement count data collected for the analysis,

c. 2% trucks should be assumed for all movements unless approved otherwise by the City,

d. Saturation flow rate will be assumed to be 1700 pcphgpl,

e. Critical gap and follow up time shall be in accordance with the values given in the Highway Capacity Manual.

(4) Assessment techniques for both long-term background and long term with the proposed development will require analysis using the planning methodology for signalized intersections and the unsignalized intersection methodology for unsignalized intersections as outlined in the latest edition of the Highway Capacity Manual. The condition (i.e. under capacity, near capacity, over capacity, etc.) for signalized intersections and the level of service for unsignalized intersections should be reported in a table or diagram.

a. The following assumptions shall be used for the long-range signalized intersection analysis:

b. A peak hour factor of 0.9 shall be used

c. Cycle lengths between 80 and 120 seconds shall be used

d. Assumptions for the long-range unsignalized intersection analysis shall be the same as for the short-term analysis.

(5) Access Evaluation – Assessment techniques for existing conditions, short-term background, short term with the development, long-term background and long term with the development will also include an evaluation of each proposed access point. Accesses should be considered intersections and included in the level of service/capacity analysis described above.

a. Safety is the top priority at access points. The City has developed standards for the spacing and design of access points to provide optimum safety. Accesses should be reviewed to ensure compliance with City (and CDOT if on a State Highway) standards. Proposed access points that do not meet the pertinent standards should be noted.

b. In addition, all access points should be evaluated to determine what auxiliary lanes are required in accordance with City standards and State Highway Access Code (where applicable).

(6) Evaluation of Signal Progression in Coordinated Signal Systems – According to City Standards, intersections with the potential for signalization should be spaced no closer than one half mile. If a development proposes an access or intersection that is projected to be signalized and is less than a half mile from other signals or other planned signals a progression analysis shall be conducted to demonstrate that a new signal can be installed without negatively impacting progression.

a. The analysis shall consider all existing signals or possible future signals within one mile in each direction from the proposed signal location. On existing coordinated arterials, it must be demonstrated that the existing bandwidth in each direction can be maintained with the new signal installed. Where a new coordinated system will occur as a result of the new signal it must be demonstrated that a bandwidth of at least 45% can be achieved in each direction unless otherwise directed by the City. The following assumptions shall be used for the progression analysis:

- A cycle length between 80 and 120 seconds should be used for analysis,
- Actual prevailing speeds on the arterial shall be used for travel speed in the analysis,
- Split assumptions shall be based on projected turning movement volumes and designed to maintain all movements with at least 5% or more of the total intersection traffic at LOS D or better and below v/c ratio of 1.0 in keeping with the City of Longmont Congestion Benchmark. Where pedestrian volumes are expected to be high (to be determined in the pre-submittal meeting), side street splits long enough to accommodate pedestrians shall be used assuming a 4.0 fps walking speed,

b. Where left turn arrows are anticipated, protected/permissive phasing should be assumed unless dual left turns are projected. Then, protected only left turn phasing should be assumed,

c. Lagging left turns will not be allowed for protected/permitted left turn phases,

d. Any access where the required bandwidth cannot be achieved should be noted. Any such access shall remain unsignalized and have turning movements limited by driveway design and/or median islands to prevent the need for signalization. Time-space diagrams shall be included in an appendix to the study.

(7) Other analysis required on a case-by-case basis – Where the City deems it appropriate, other types of analysis may be required in the transportation impact study. Other types of analysis may include by are not limited to: Sight distance evaluation, transit and TDM opportunities, pedestrian/bicycle needs, environmental evaluation and evaluation of neighborhood impacts.

4. IMPACT MITIGATION MEASURES

A. Summary of Analysis – A conclusions and recommendations chapter should be included in the transportation impact study.

(1) The results of the analysis should be summarized in this chapter. This summary should note all impacts to the transportation system and recommendations for site access, roadway improvements and travel demand strategies needed to maintain traffic flow safely and at a level of service in keeping with the City's congestion benchmark.

(2) In the event that the analysis indicates unsatisfactory levels of service or v/c ratio at any study intersection a description of proposed mitigation techniques or physical improvements to remedy deficiencies must be included.

(3) It should be noted if the recommended improvements are part of the City's Capital Improvement Program, are already financially obligated to another developer, or if there is currently no funding dedicated for the improvements.

(4) It is required that all improvements be presented in tabular format with information about which party is responsible for the improvement (applicant, City, CDOT, etc.) and when the improvement is anticipated to be completed.

B. Transportation Demand Management – If TCM measures are recommended to mitigate unsatisfactory traffic conditions a specific TDM Implementation Proposal shall be developed and presented to the City. If accepted, this Implementation Proposal will become a condition of approval of the land use action requested.

C. Evaluation of Proposed Improvements – If unsatisfactory levels of service or v/c ratios are predicted by the study and recommendations are made for mitigation. Additional analysis must be presented which demonstrates the effectiveness of the mitigation.

STATEMENT OF EXPECTED UTILITY NEEDS

Project Name & Location: _____

Date: _____

Developer: _____

Building Description _____

Code Section: International Plumbing Code, current edition as adopted by the City

DIRECTIONS

Attach fixture count and calculations for both the water and sewer demand. For developments with multiple buildings, complete one form for each building type with all applicable information filled in.

WATER DEMAND

Policy: Water meters and service lines shall be sized in accordance with the following table based on the current City adopted International Plumbing Code. If a combined domestic and irrigation meter are used, the higher water demand shall determine the water meter size.

Domestic Water Demand

Description	Existing Value (if any)	Proposed Value
Water Supply Fixture Units (wsfu)		
Flow Rate (gpm)		
Water Meter Size (in)		
Service Line Size (in)		
Velocity in Service Line (ft/s)		

Irrigation Water Demand

Description	Existing Value (if any)	Proposed Value
Irrigated Area (sf)		
Flow Rate (gpm)		
Water Meter Size (in)		
Service Line Size (in)		
Velocity in Service Line (ft/s)		

SANITARY SEWER DEMAND

Policy: Sanitary sewer service lines shall be sized in accordance with the following table based on the current City adopted International Plumbing Code.

Description	Existing Value (if any)	Proposed Value
Drainage Fixture Units		
Flow (gpm)[1]		
Sewer Service Pipe Diameter (in)		
Slope of Service Line (%) (2% min)		
Velocity (ft/s)		

[1] *Flow shall be calculated 70% of the estimated water demand based on IPC calculation for domestic water demand.*

ELECTRIC REQUIREMENTS

Policy: An (ECIF) Electric Community Investment Fee credit, will be given for an existing service and can be applied to an upgraded service at the same location.

Description	Existing Service (if any)	Proposed Service
Residential or Commercial (Res or Com)		
1 Phase or 3 Phase (1ph or 3ph)		
Voltage: (120/240v, 120/208v or 277/480v)		
Main Panel Rating (Amps)		
Main Buss Rating (Amps)		

CERTIFICATION STATEMENT

I hereby certify that the information provided in this Statement of Expected Utility Needs is accurate, meets the requirements of the _____ International Plumbing Code, and was prepared by myself or under my direct supervision.

Name	P.E. Number	Date	Stamp

UNDERDRAIN REPORT CHECKLIST

If an underdrain collection system is required for a project based on recommendations made in the geotechnical engineering report then an underdrain report shall be submitted for review and approval.

REPORT REQUIREMENTS

A. Title Page

Yes	No	N/A	Requirement
			1. Subdivision Name
			2. Address
			3. Property Owner & Property Jurisdiction
			4. Owner
			5. Engineer
			6. Submittal date and revision dates, as applicable

B. General Location and Description

Yes	No	N/A	Requirement
1. Name of Project			
			1. Site Vicinity Map
			2. Township, Range, Section, and ¼ Section
			3. Streets, roadways, and highways adjacent to the proposed project, or within the area served by the proposed underdrain collection system
			4. Names of adjacent developments and jurisdictions
2. Description of Property			
			1. Total developed area in acres
			2. Ground cover, vegetation, site topography and slopes
			3. NRCS Soils Classification Map and description
			4. Major and minor drainage ways

C. Existing Condition

Yes	No	N/A	Requirement
			1. Groundwater investigation results including test bores (data only valid btw Apr. and Oct)
			2. Recommendations for groundwater mitigation per the geotechnical engineering report
			3. Impacts on the groundwater based on the proposed underdrain design

D. Underdrain Design Criteria

Yes	No	N/A	Requirement
1. General			
			1. Proposed groundwater mitigation based on the geotechnical engineering report recommendations
			2. Information on any existing underdrain collection systems in the area
			3. Design concept for the proposed underdrain collection system including discharge location and access points
			4. Criteria selected to calculate and design the underdrain collection system
			5. Installation, size and materials for the proposed underdrain collection system

Yes	No	N/A	Requirement
			6. Underdrain exceptions, if required, ie: lift stations, and sump pumps with no underdrain collection system, etc.
			7. Underdrain main calculations, plans and details including engineered designs for exceptions
			8. Approval from existing underdrain collection system owner for connection of proposed system to the existing system is required
			9. All tables, figures, charts, drawings, etc. that were used in design of underdrain collection system that are included in the appendix of the report
2. Additional Permitting Requirements			
			1. General Purpose Water Well Permit from Colorado Department of Water Resources

E. Underdrain Maintenance

Yes	No	N/A	Requirement
			1. Ownership and maintenance responsibilities of all structures, underdrain main, sump pumps or lift stations, if any, and the underdrain service lines from the main to the buildings
			2. The Owner/Homeowners Association (HOA) will be responsible for maintenance and repairs for the underdrain collection system and outfall at discharge locations including erosion protection. Reference Underdrain Construction notes in Appendix B

F. Conclusion

Yes	No	N/A	Requirement
1. Drainage Concept			
			1. Overall effectiveness of the proposed underdrain design to control groundwater
2. Exceptions			
			1. Identify provisions by section number for which exceptions will be requested, or have been approved
			2. Provide justification for each exception requested
3. Certification Statement			
			1. Include Certification Statement from a Registered Professional Engineer in the State of Colorado.

G. References

Yes	No	N/A	Requirement
			1. Reference all criteria, master plans, reports, or other technical information used in development of the concepts discussed in the underdrain report

H. Appendices

Yes	No	N/A	Requirement
1. Calculations, Exhibits & Details			
			1. Underdrain pipe sizing calculations and flow calculations at the specific design points including any existing flows contributing to the system
			2. Erosion control measure sizing calculations at discharge location
			3. Calculations and details for any proposed underdrain system facilities such as lift station, etc.
			4. Overall underdrain collection system map

2. Reference Information			
Yes	**No**	**N/A**	**Requirement**
			1. Copy of Geotechnical Report
			2. Copy of General Purpose Water Well Permit from Colorado Department of Water Resources
			3. Copies of all referenced materials or reports where pertinent sections are highlighted

WATER AND WASTEWATER PROJECT INFORMATION REPORT CHECKLIST

On commercial, industrial or mixed use developments over five(5) acres and residential developments over 50 acres or areas of limited capacity, the City Engineer may request a project information report to be submitted with the preliminary construction plans to analyze the ability to provide water and wastewater service to the proposed site

REQUIREMENTS

A. Report Information

Yes	No	N/A	Requirement
			1. The initial and ultimate area, in acres, to be developed.
			2. The estimated population densities and total population to be served.
			3. The estimated quality and quantity of any industrial waste to be discharged into the sanitary sewer.
			4. Design flow rates, average, maximum, and infiltration allowances for the sanitary sewer.
			5. If alternate methods of providing utility services are possible, the report shall give an evaluation of the alternative method.
			6. Estimated average daily water usage including landscaping.
			7. Estimated amount of water to be used by industrial and commercial facilities.
			8. Any other information that would affect the City's ability to service the new area, or any other information requested by the City Engineer.

APPENDIX E: ACCEPTANCE FORMS

E-1 RESERVED (RECORD DRAWINGS CHECKLIST)

E-2 RESERVED (PERMANENT STORMWATER CONTROL MEASURES CHECKLIST)

E-3 CONSTRUCTION ACCEPTANCE CHECKLIST

E-4 FINAL CONSTRUCTION ACCEPTANCE CHECKLIST

RESERVED
(PERMANENT STORMWATER CONTROL MEASURES CHECKLIST)

CONSTRUCTION ACCEPTANCE CHECKLIST

The following checklist is a non-exhaustive list of items that PWNR and other City Departments look for at the time of Construction Acceptance (CA) for Developer Projects. This list is to be used as a reference only. The items listed below may change on a case-by-case basis based on project specifics and requirements in the Public Improvement Agreement.

REQUIREMENTS

C = Complete **I** = Incomplete **N/A** = Not Applicable

A. Construction Acceptance General

C	I	N/A	Requirement
			1. Request from developer
			2. Punch List items / CA Denial Letter
			3. Issue CA
			4. Release security

B. Final Submittal – City of Longmont Planning

C	I	N/A	Requirement
			1. Common Area Landscaping
			2. Common Area Securities required prior to CA
			3. Homeowner Association Articles of Incorporation filed with State
			4. Recorded copy of covenants
			5. Copy of Design Guidelines
			6. Written verification of developer complies with private lot landscaping standards.
			7. Weed management for site area and landscaping
			8. Defects for all plant materials, landscape materials, workmanship and other appurtenances addressed per Section 605.08

C. Public Works Arterial ROW Landscaping

C	I	N/A	Requirement
			1. Concrete bike path
			2. Arterial ROW Landscaping - grading, plants, sod
			3. Arterial ROW Irrigation - pressure test, operation test
			4. Primary Greenway Landscape
			5. Primary Greenway Irrigation
			6. Irrigation Record Drawings: electronic and paper copy, any turn-over items

D. Public Works Water / Wastewater

C	I	N/A	Requirement
			1. Water mainline - looped & tested, valves, services, hydrants, trace wire (certified tested by Developer)
			2. Sewer mainline - services, manholes, testing, cleaning, camera
			3. Trench / repairs - compaction testing paving
			4. Irrigation Vaults set with meter and backflow

E. Public Works Streets and Drainage

C	I	N/A	Requirement
			1. Overlot Grading
			2. Paving, compaction testing
			3. Concrete sidewalk, curb &gutter, compaction, testing
			4. Storm Sewer Structures, mainline, laterals, manholes, testing
			5. Sand Filter (with detention) - grading, certification, restoration

C	I	N/A	Requirement
			6. Underground BMPs
			7. Signals, signs, striping and pavement marking
			8. Underdrain Certification
			9. Infrastructure Permit required for UD collection system in the public ROW
			10. Record drawings, electronic file and Mylar

F. LPC

C	I	N/A	Requirement
			1. Trench Repair, compaction testing
			2. Cable/conduit, routing, tracer wire
			3. Ground Sleeve, compaction, elevation, level
			4. Street Light Pole, compaction, plumb
			5. Payments, materials, close-out
			6. As-built drawings, trench line, equipment locations

FINAL ACCEPTANCE CHECKLIST

The following checklist is a non-exhaustive list of items that PW and other City Departments look for at the time of Final Construction Acceptance (FA) for Developer Projects. This list is to be used as reference only. The items listed below may change on a case-by-case basis based on project specifics and requirements in the Public Improvement Agreement.

REQUIREMENTS

C = Complete **I** = Incomplete **N/A** = Not Applicable

A. Final Acceptance – City Staff

C	I	N/A	Requirement
			1. Request from developer
			2. Punch List items / FA Denial Letter
			3. Coordinate Sewer camera inspection w/ Operations
			4. Concrete and asphalt inspection w/ Construction Inspection
			5. Drainage Certification and state infiltration information
			6. Coordinate Permanent Stormwater Control permitting with Stormwater Engineer
			7. Coordinate Private Improvements with Planning
			8. Issue FA
			9. Record FA

B. Final Acceptance – Developer / Contractor

C	I	N/A	Requirement
1. Storm Drainage			
			1. Check condition of inlets: no cracks, grout still in place, and cleaned out. Concrete adjacent to inlets not settled.
			2. Check pipes: clean and video, Infor link sent to City Project Manager.
			3. Check sewer manholes: cleaned and all grout in place or repaired.
			4. Check detention ponds: inlet and outlet structures must be clean, trickle channels must be clean and have no growth blocking the path to outlet.
			5. Check all trickle channels on site for condition and repair.
2. Concrete			
			1. Check all sidewalks curb and gutter, driveways, concrete alley ways, aprons and all other concrete in the right of way.
			2. Replace all concrete that is cracked, chipped, offset, settled, broken and replace or repair spall areas as needed.
3. Streets			
			1. Check all areas for patching. Prepare and edge mill for top lift paving.
			2. Manholes and valve boxes must be raised to final grade and top lift paving completed.
			3. Check striping on streets, parking stalls, stop bars and cross walks, or items called out on the project striping plan for completion.
			4. Check for visual obstructions to signs and remove obstruction if necessary.
			5. Check that all signs are installed according to the MUTCD and are in good condition.
4. Water			
			1. Fire hydrants need to be painted with City approved paint.
			2. Fire hydrants height needs to be adjusted to 20” from center of pumper nozzle to finished grade.
			3. Valve boxes need to be straight and centered on the valve nut.
			4. Valve boxes need to be adjusted to flush or 1/4 inch below finished asphalt grade.

C	I	N/A	Requirement
			5. Valve lids are required to be smooth concrete and knobby in asphalt.
			6. Tracer wire stations need to be in place and hooked up. Inspector to verify all utilities are traceable.
			7. All valve boxes need to be clean of dirt and debris.
			8. All curb stops need to be to grade.
			9. All water locations need a W placed at the back of concrete curb and gutter after replacement of broken curb and gutter or curbwalk.
5. Sewer			
			1. Contact the City of Longmont Water/Wastewater Division to have final video inspection of sewer main performed one month prior to requesting inspection for final acceptance.
			2. Adjust all manholes flush to 1/4 inch below final asphalt grade.
			3. Check that all manholes lids are centered over the opening in the manhole.
			4. Check that rubber-neck is trimmed flush with the inside of the manhole at all joints.
			5. Check for visible leakage in manholes and repair as needed.
			6. Check for missing steps in manholes and replace as needed.
			7. All sewer locations need an S placed at the back of concrete curb and gutter after replacement of broken curb and gutter or curbwalk.
6. Landscape & Irrigation			
			1. Weed management for site area and landscaping
			2. Completion of coverage for seeding areas per Section 603.08
			3. Full coverage for sodded areas per Section 604.08
			4. Defects for all plant materials, landscape materials, workmanship and other appurtenances addressed per Section 605.08

APPENDIX G: MISCELLANEOUS

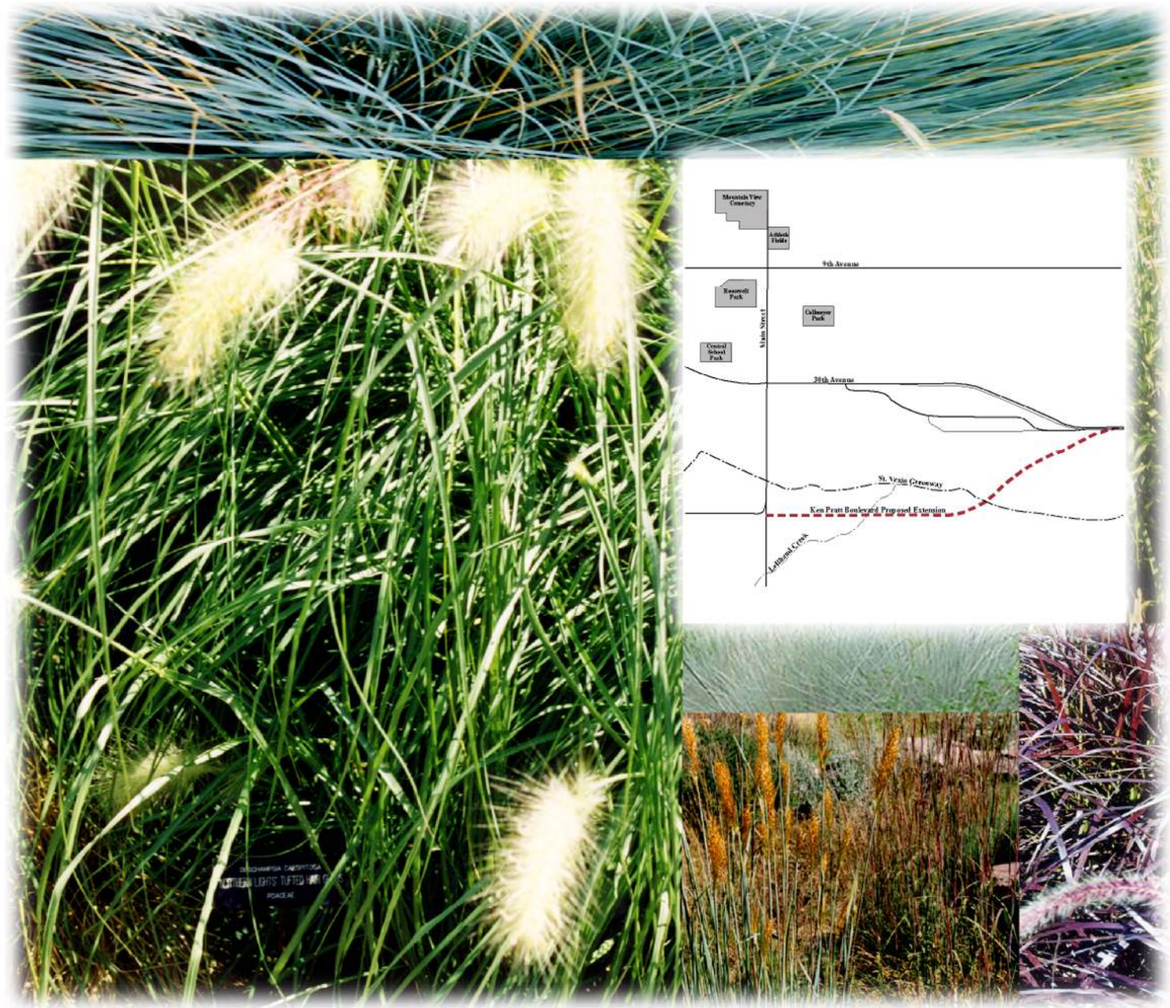
G-1 RESERVED

RESERVED

APPENDIX H: KEN PRATT BOULEVARD LANDSCAPING GUIDELINES

H-1 KEN PRATT BOULEVARD LANDSCAPING GUIDELINES

KEN PRATT BOULEVARD
LANDSCAPING GUIDELINES
ARTERIAL RIGHT OF WAY AND SCENIC ENTRY CORRIDOR



CREATED BY LONGMONT DEPARTMENTS OF:
Parks and Recreation
Public Works
Planning
Forestry

AND:
Carter::Burgess

MAY, 2002

KEN PRATT BOULEVARD
LANDSCAPING CONCEPTUAL ZONES

Landscaping along the Ken Pratt corridor is intended to set the precedent for formal streetscapes that respond to the natural surrounding landscape by limiting irrigation and using native and well-adapted plant species. From West to East the streetscape treatment will move from a formal, to a more indigenous landscape. The corridor has been divided into three zones, responding to land-use, density and natural characteristics. Each zone's plant quantities, species and maintenance result in an equitable cost. Continuity among zones will appear in the use of ornamental grasses and hawthornes which will punctuate median noses. The walk will meander and take full advantage of the Right-of-Way. All treatments should meet the Longmont Landscape requirements including the area from flow line to Right of Way (medians are not to be used to calculate landscape requirements).

MAIN STREET TO LEFTHAND CREEK ZONE A









ZONE A:

CONCEPT: Expand on Longmont Streetscape Standards by employing native and well adapted plant species and exceeding required quantities.

TOOLS:
- Large canopy shade trees spaced in a formal, double row
- Plant massings used to mitigate parking views
- Even grading within tree lawn
- Automatic, clock-activated irrigation system (per Longmont Design Standards) to irrigate all plant material within medians and between back of curb and Right-of-Way.

LEFTHAND CREEK TO ST. VRAIN ZONE B









ZONE B:

CONCEPT: Establish a juxtaposition between the traditional streetscape and western, prairie landscape.

TOOLS:
- Large canopy, shade trees used in intervals according to adjacent land use
- Occasional berming within tree lawn
- Automatic, clock-activated irrigation system (per Longmont Design Standards) to irrigate all plant material within medians and between back of curb and Right-of-Way.
- Native tree clusters to mimic adjacent natural features
- Native and ornamental grasses

ST. VRAIN TO COUNTY LINE ROAD ZONE C

ZONE C:

CONCEPT: Preserve fundamental aesthetic of wide, open, prairie-like landscape with tall grasses and occasional tree massings.

TOOLS:
- Cluster evergreen and native tree species
- Berming within tree lawn to highlight adjacent groundplane
- Automatic, clock-activated irrigation system (per Longmont Design Standards) to irrigate all plant material within medians and between back of curb and Right-of-Way. Irrigate less frequently as plantings are established.
- Large swaths of Colorado wildflowers
- Native and ornamental grasses

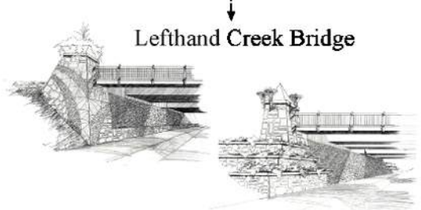




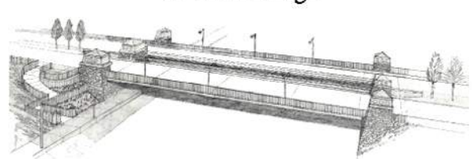




Lefthand Creek Bridge



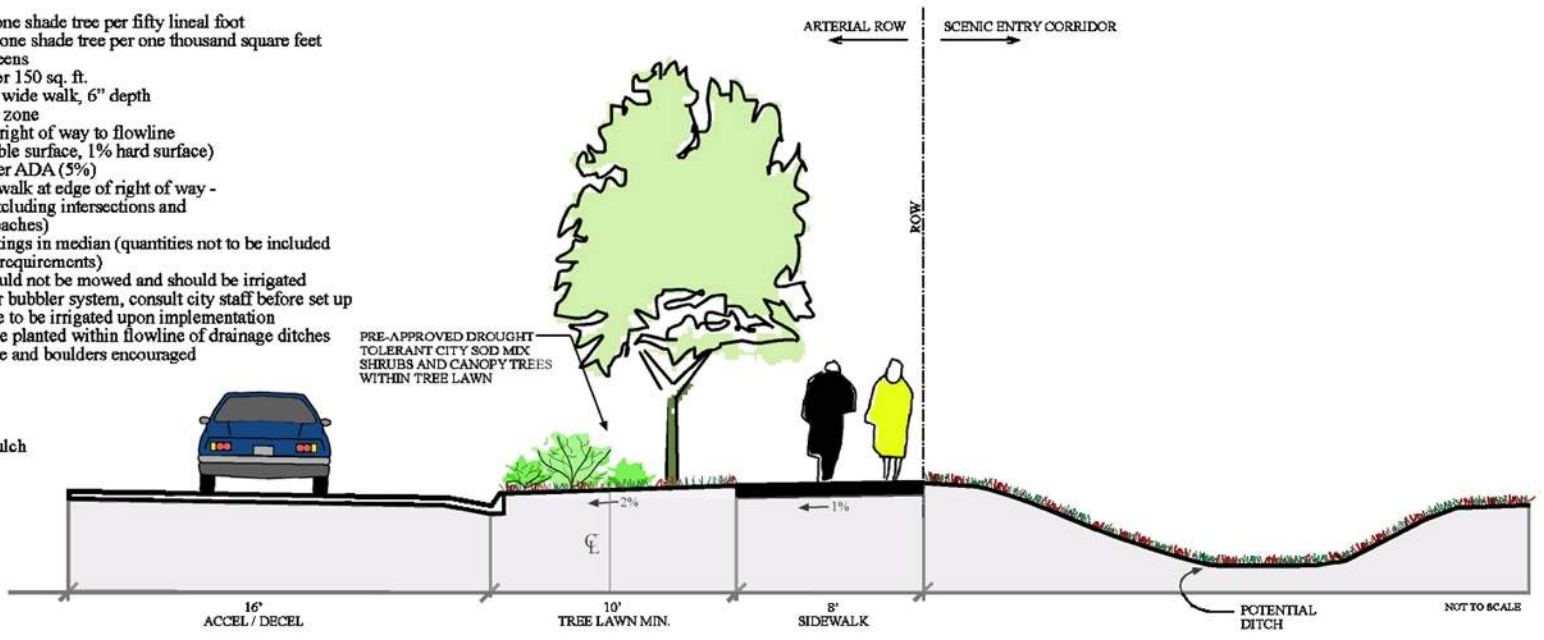
St. Vrain Bridge



KEN PRATT BOULEVARD
TYPICAL SECTIONS

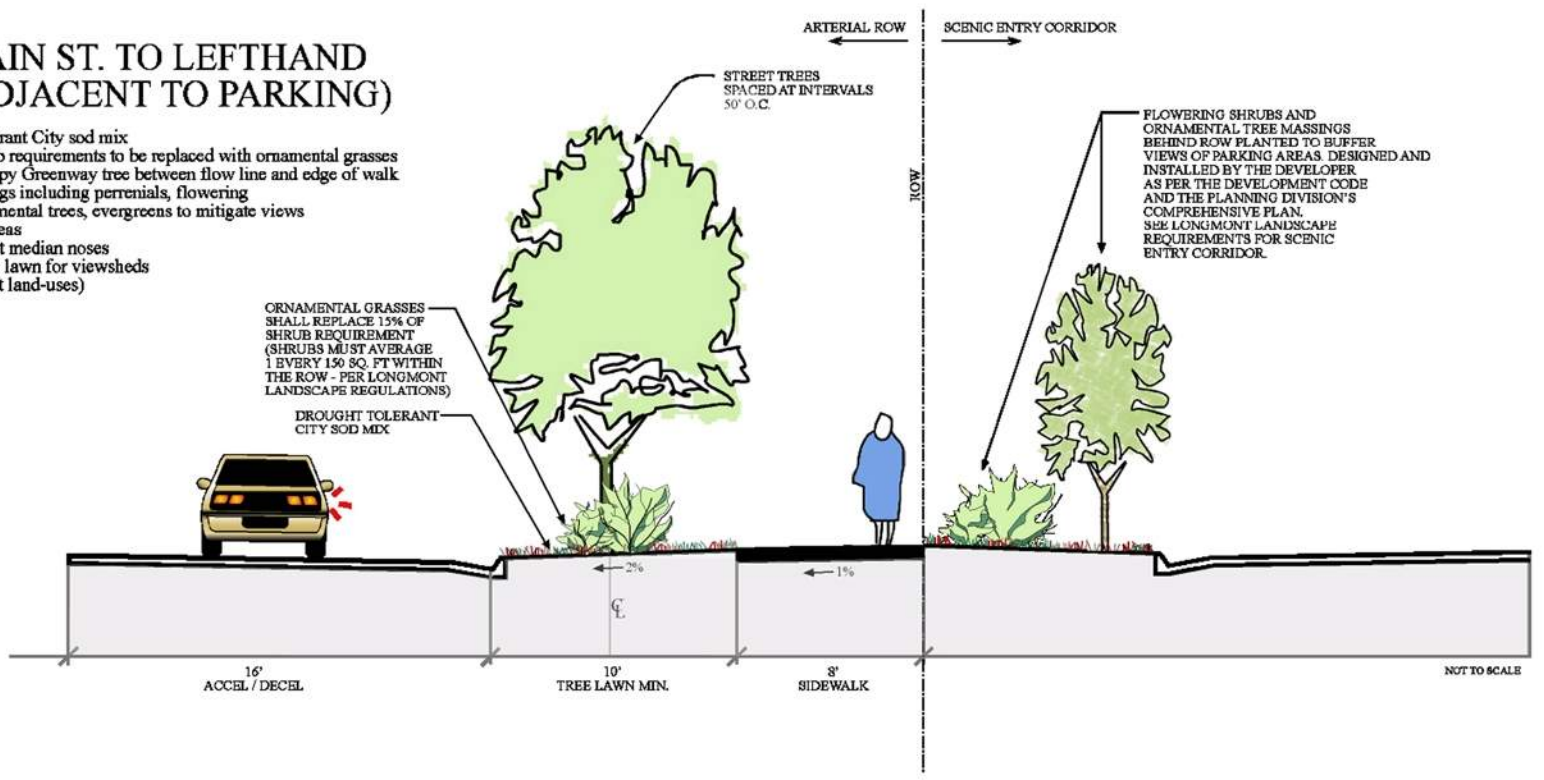
STANDARD ARTERIAL STREETSCAPE

- Minimum - one shade tree per fifty lineal foot
  Maximum - one shade tree per one thousand square feet
  25% Evergreens
- One shrub per 150 sq. ft.
- Minimum 8' wide walk, 6" depth
  with 2' clear zone
- Slopes from right of way to flowline
  (2% permeable surface, 1% hard surface)
- 1:20 grade per ADA (5%)
- Back of sidewalk at edge of right of way -
  detached (excluding intersections and
  bridge approaches)
- Include plantings in median (quantities not to be included
  in landscape requirements)
- Medians should not be mowed and should be irrigated
  with a drip or bubbler system, consult city staff before set up
- All landscape to be irrigated upon implementation
- No trees to be planted within flowline of drainage ditches
- Use of cobble and boulders encouraged
- Mulch:
  3" 50%
  4-6" 30%
  6-9" 20%
  No wood mulch



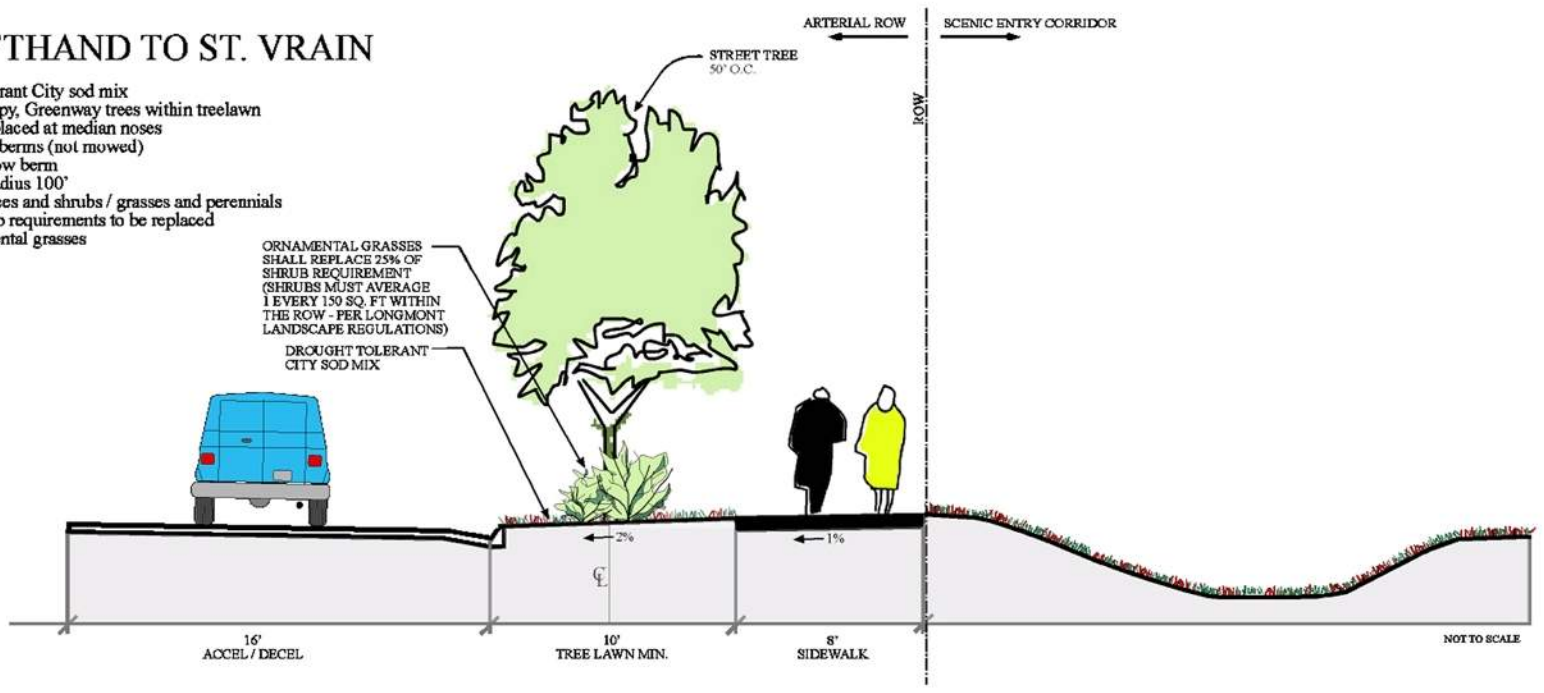
A. MAIN ST. TO LEFTHAND (ADJACENT TO PARKING)

- Drought tolerant City sod mix
- 15% of shrub requirements to be replaced with ornamental grasses
- Hardy, Canopy Greenway tree between flow line and edge of walk
- Plant massings including perrenials, flowering
  shrubs, ornamental trees, evergreens to mitigate views
  to parking areas
- Hawthorns at median noses
- Break in tree lawn for viewsheds
  (per adjacent land-uses)



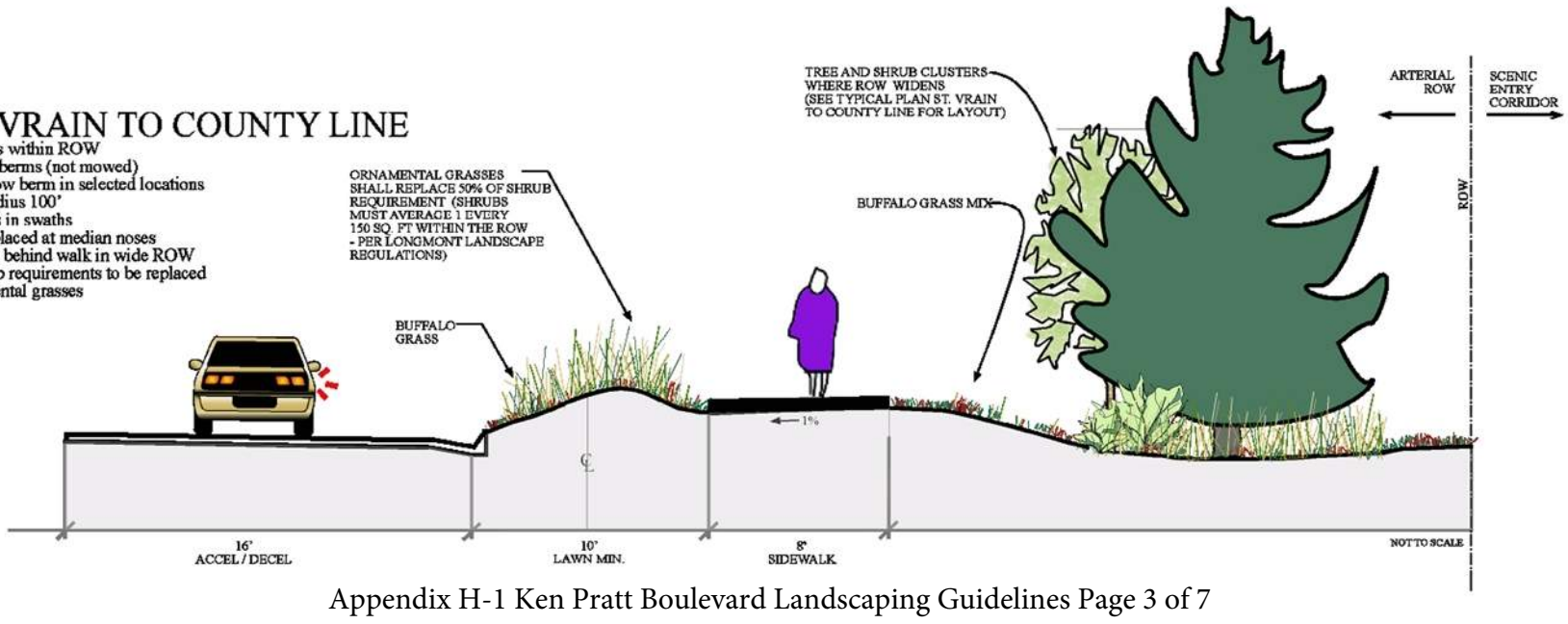
B. LEFTHAND TO ST. VRAIN

- Drought tolerant City sod mix
- Hardy, Canopy, Greenway trees within treelawn
- Hawthorns placed at median noses
- 3:1 periodic berms (not mowed)
- Walk to follow berm
- Min. walk radius 100'
- Swaths of trees and shrubs / grasses and perennials
- 25% of shrub requirements to be replaced
  with ornamental grasses



C. ST. VRAIN TO COUNTY LINE

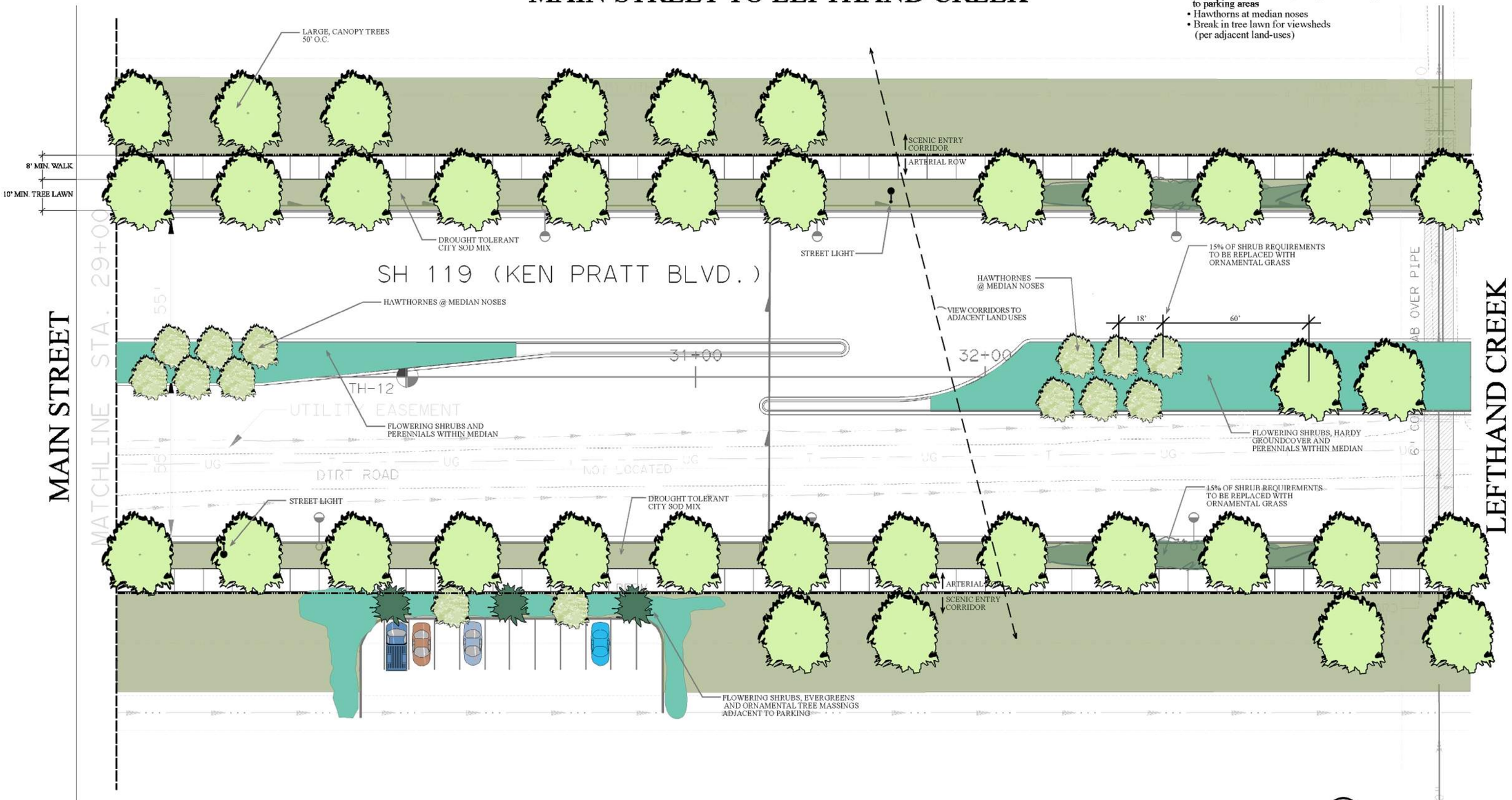
- Buffalo grass within ROW
- 3:1 periodic berms (not mowed)
- Walk to follow berm in selected locations
- Min walk radius 100'
- Wild flowers in swaths
- Hawthorns placed at median noses
- Tree clusters behind walk in wide ROW
- 50% of shrub requirements to be replaced
  with ornamental grasses



KEN PRATT BOULEVARD
TYPICAL PLAN
MAIN STREET TO LEFTHAND CREEK

A. MAIN ST. TO LEFTHAND

- Drought tolerant City sod mix
- 15% of shrub requirements to be replaced with ornamental grasses
- Hardy, Canopy Greenway tree between flow line and edge of walk
- Plant massings including perrenials, flowering shrubs, ornamental trees, evergreens to mitigate views to parking areas
- Hawthorns at median noses
- Break in tree lawn for viewsheds (per adjacent land-uses)

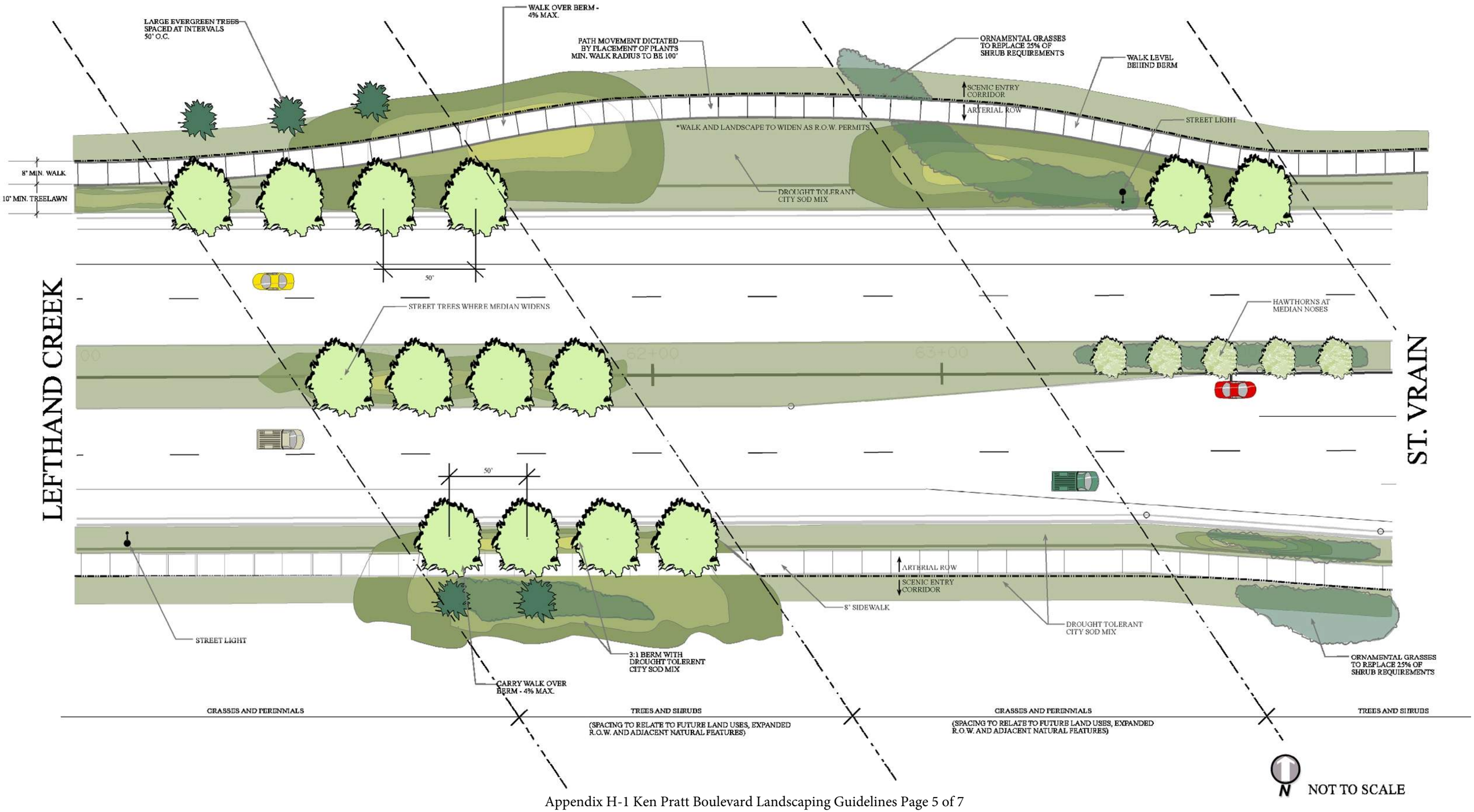


N NOT TO SCALE

KEN PRATT BOULEVARD
TYPICAL PLAN
LEFTHAND CREEK TO ST. VRAIN

B. LEFTHAND TO ST. VRAIN

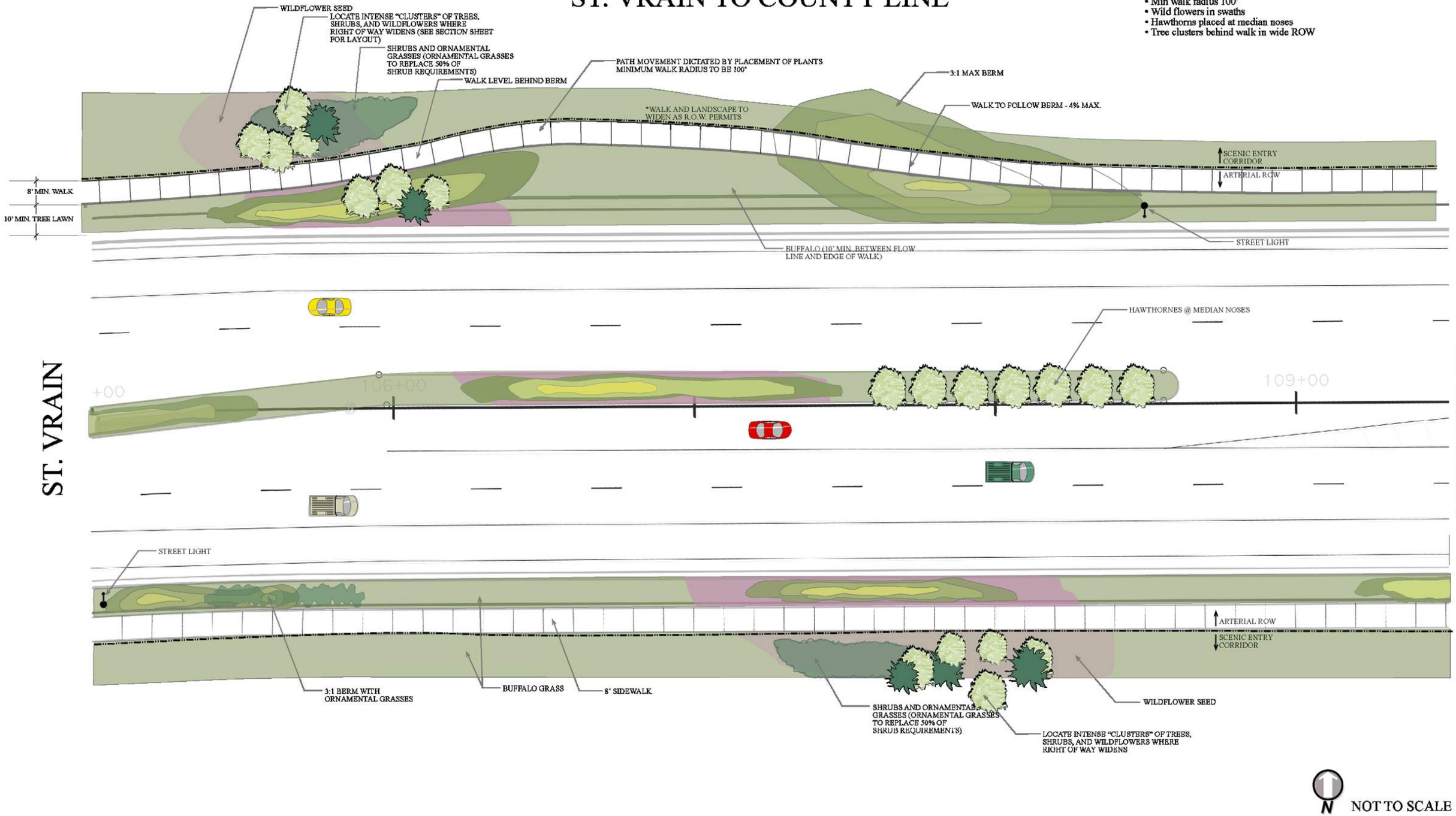
- Drought tolerant City sod mix
- Hardy, Canopy, Greenway trees within treelawn
- Hawthorns placed at median noses
- 3:1 berms (not mowed)
- Walk to follow berm
- Min. walk radius 100'
- Swaths of trees and shrubs / grasses and perennials
- 25% of shrub requirements to be replaced with ornamental grasses



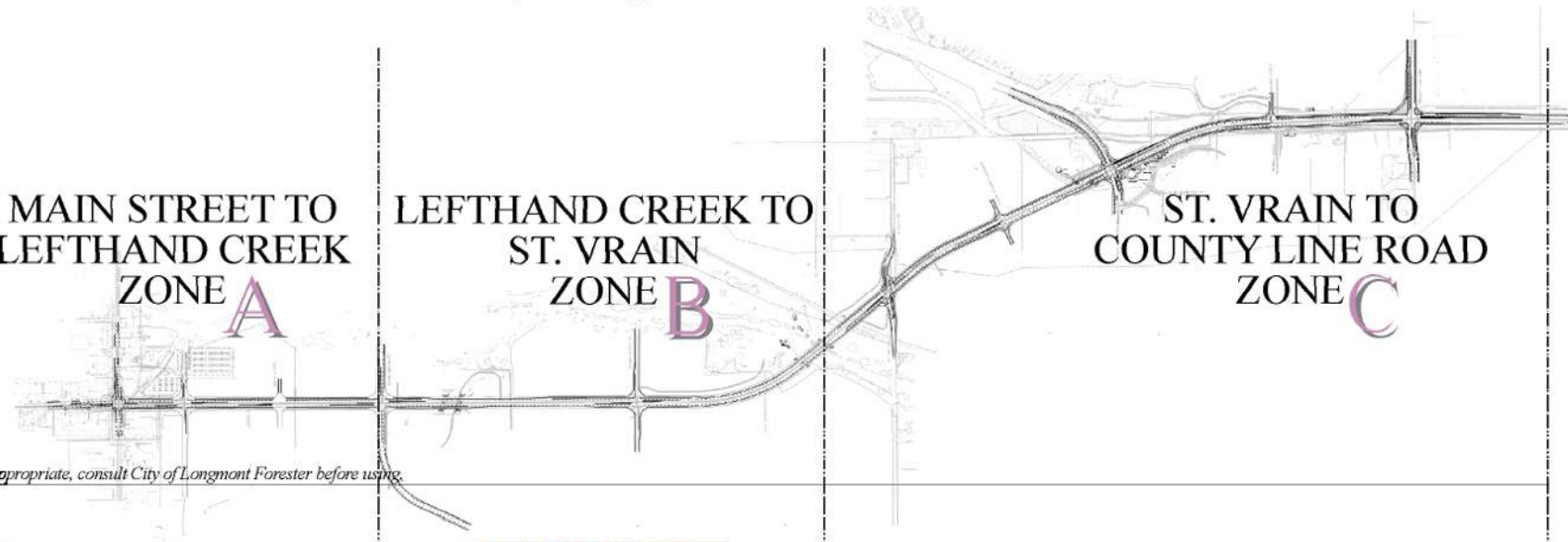
KEN PRATT BOULEVARD
TYPICAL PLAN
ST. VRAIN TO COUNTY LINE

C. ST. VRAIN TO COUNTY LINE

- Buffalo Grass
- 3:1 berms (not mowed)
- 50% of shrub requirements to be replaced withornamental grasses
- Walk to follow berm in selected locations
- Min walk radius 100'
- Wild flowers in swaths
- Hawthorns placed at median noses
- Tree clusters behind walk in wide ROW



KEN PRATT BOULEVARD
PLANT LIST



Plant species are recommendations, other species may be appropriate, consult City of Longmont Forester before using.

	MAIN STREET TO LEFTHAND CREEK ZONE A	LEFTHAND CREEK TO ST. VRAIN ZONE B	ST. VRAIN TO COUNTY LINE ROAD ZONE C
Median Plantings			
• Hawthorn - Cockspur *inermis*, toba (used at median noses)	•	•	•
▪ Canopy, Street trees - match tree used at treelawn (used in wide median areas)	▪	▪	
• Curl-leaf Mountain Mahogany	•	•	•
• Gray Rabbitbrush	•	•	•
▪ Fernbush	▪	▪	•
▪ Creeping Juniper	▪	▪	
• Blue Woolly Speedwell in from Main St. to St. Vrain	•	•	
• Pink Ice Plant from St. Vrain to County Line Rd.			•

Hawthorns punctuate the medians and offer continuity. Their leaf and berry color provide interest throughout the majority of the corridor.



Parking Mitigation Trees			
• Maple - tatarian	•	•	
• Buckthorn	•	•	
▪ Hawthorne - thornless Cockspur *inermis*	▪	▪	
▪ Pinon Pine	▪	▪	
• Bakeri Spruce	•	•	
• Spring Snowcrab	•	•	
• Linden - Redmond	•	•	
• Bradford Pear	▪	▪	



The parking area plantings are meant to screen views into the parking lot by layering plant material from perennials and grasses (2 ft. and under), to shrubs (between 2' and 6'), and to trees (varying height and canopy).

Canopy Street Trees			
• Chinkapin Oak	•		
• Shumard Oak	•		
▪ Oak - White Swamp Oak	▪	▪	
▪ Oak - burr		▪	
• Linden - Glenleven		•	
• Pitmore Ash	•	•	



The majority of the streetscape trees, the canopy greenway trees, aim to provide shade and continuity along the bike path. Their scale and rythmic planting provide an element of formality.

Flowering Shrub			
• Blue Mist Spirea	•	•	
▪ Scotch Broom	▪	▪	
▪ Rose Locust	▪		•
▪ Common Lilac	▪		
▪ Compact Burning Bush	▪		
• Cistena Plum	•	•	•
▪ Creeping Juniper	▪	▪	
▪ Fernbush	▪	▪	

Shrubs will be used thoughout the entire corridor in medians and between flow line and edge of walk. Shrubs will provide screening and interest at periodic intervals. A contrast between grasses and shrubs should be implied with the use of color, a variance in height and an assortment of soft and rough textures.





Perennials			
• Basket-of-Gold	•	•	
• Blanketflower	•		
• Daylily	•	•	
▪ Red Valerian	▪		
• Orange Milkweed	•	•	
• Bluebell	•	•	
• Blue Flax	•		
▪ Penstemon	▪		

Medians, treelawns, and parking lot screening will contain perennials. Their use will provide color, and intricacies to largerswathes of plant material.



Ornamental Grasses			
• Sideoats Grama Grass	•	•	•
▪ Karl Foerster Feather Reed Grass		▪	•
• Blue Oat Grass	•	•	•
▪ Purple Fountain Grass			•
• Miscanthus Grass			•
• Blue Avena		•	•

Ornamental grasses should be used as accents. Used en masse, these grasses should add a soft texture and movement to the corridor. Their modest hues of green should compliment the adjacent natural features.



Native Turf Grasses			
▪ Drought Tolerant City Sod Mix (see Longmont Streetscape Standards) - from Lefthand to St. Vrain	▪	▪	
• Buffalograss - from St. Vrain to County Line			•



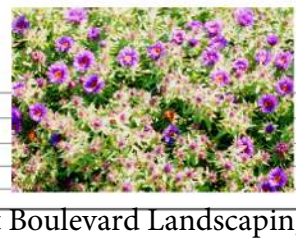
Native turf grasses should provide texture and act as a backdrop for the other plants. They should be used as an example of ground cover which is durable, drought tolerant and attractive.

"Clusters"			
▪ Cottonwood (water source) - Plains and lanceleaf		▪	•
• Hawthorne (water source)			•
• Serviceberry - Autumn Brilliant (water source)		•	•
▪ Cherry - Montmorency (water source)			•
• Willow - Prairie Cascade (water source)			•
• Bristlecone Pine (dryland)			•
• Burr Oak (dryland)			•
• Hackberry (dryland)		•	•
▪ Pinon Pine (dryland)		▪	•
• Gamble Oak (dryland)			•
• Ponderosa Pine (dryland)		•	•
• Austrian Pine (water source)		•	•



Areas where the ROW widens should incorporate planting areas to help reduce the feeling of vastness of an empty landscape. These areas will include both deciduous and evergreen trees and shrubs. When adjacent to existing water ways, plant groupings may mimic that aesthetic. Plants designated as dryland or water source should be planted accordingly.

Colorado Wildflowers			
▪ Showy Daisy			•
▪ Purple Dome Aster			•
• Lupine			•
• Fringed Gromwell			•
• Prince's Plume			•
• Phlox			•



Swaths of wildflowers will accent the zone from St. Vrain to County Line Road. These areas will provide bursts of color and contrast the texture of the smooth grasses.

APPENDIX I: APPROVED MATERIALS LISTS

I-1 RESERVED (TRAFFIC SIGNALS APPROVED MATERIALS LIST)

I-2 RESERVED (APPROVED MATERIALS LIST SECTION 200 – TRANSPORTATION)

I-3 RESERVED (APPROVED MATERIALS LIST SECTION 400 – WASTEWATER COLLECTION)

I-4 RESERVED (APPROVED MATERIALS LIST SECTION 500 – WATER DISTRIBUTION)

I-5 RESERVED (APPROVED MATERIALS LIST SECTION 600 – PARKS)

I-6 APPROVED MATERIALS LIST SECTION 700 – LPC

RESERVED (TRAFFIC SIGNALS APPROVED MATERIALS LIST)

RESERVED
(APPROVED MATERIALS LIST SECTION 200 – TRANSPORTATION)

RESERVED
(APPROVED MATERIALS LIST SECTION 600 – PARKS)

All materials shall meet the requirements of the City of Longmont's Public Improvement Design Standards and Construction Specifications.

1. SPECIFICATION FOR METER HOUSINGS 200 AMPS OR LESS SINGLE-PHASE

A. General

(1) Description: Socket, Meter, 5 Terminal, 200 Amp, Continuous Duty Bypass required

(2) Unit of Measure: Each

(3) Use: Mounting watt-hour meters for residential and commercial revenue metering

(4) Recommended dimensions for individual meter sockets used in underground installations shall be: up to 200 amp – 19" height by 13" width

B. Standards

(1) All sockets shall have a lever-operated bypass and shall be constructed in accordance with and conform to the following ANSI (American National Standards Institute) publications.

(2) Meter socket bypass lever shall be constructed of metal.

(3) Two piece lids are not allowed unless combination meter main equipment is being used.

(4) Meter sockets shall have ringless style covers with latch capable of accommodating City seal and lock mechanism.

(5) Meter sockets shall be suitable for outdoor installation, i.e. weatherproof (NEMA 3R,IP,14, or equivalent)

C. Construction

(1) Meter sockets shall be constructed of galvanized steel, 16-gauge minimum. Non- metallic or aluminum enclosures are not acceptable

(2) Cover shall be of the one piece ringless type, equipped with a suitable devise for closing and sealing with padlock type seals.

(3) Finish shall be bonderized with light neutral gray baked enamel.

(4) Knockout for load carrying cable shall be concentric type.

(5) The general construction of the socket shall provide protection to personnel against accidental contact with energized elements of the meter and socket; and shall provide protection to the electrical components against adverse environmental weather conditions.

(6) All three wire sockets, both single-phase and network, shall have a fifth jaw installed at the 9 o'clock position.

D. Electrical

(1) The neutral terminal shall be electrically bonded to the enclosure by a bolted or riveted connection.

(2) A bonding jumper in the form of a separate screw, strap, or other means shall bond the enclosure to the grounded (neutral) conductor using a #4 AWG copper jumper.

(3) The following are pre-approved products:

a. Milbank part number: Z911531-AC

b. Durham part number: ARPO I074

c. Landis and Gyr #HQ Block, part number: 64 560-1

2. SPECIFICATIONS FOR 320 CLASS, NEMA 3R, IP, 14 OR EQUIVALENT METER HOUSING

A. 400 amp K-Base meter housings are not acceptable

B. General

(1) Socket, Meter, Self-Contained, 120/240 or 120/208 volt, single-phase, rated for up to 320 amps (continuous duty) shall have jaw-clamping, lever-operated bypass mechanism that can operate as a continuous duty bypass device.

(2) 320 class meter sockets shall be equipped with anti-inversion clips that prevent normal width terminal blades from being installed in a 320 class socket. All three wire sockets, both single-phase and network, shall have a fifth terminal installed at the 9 o'clock position.

(3) Two piece lids are not allowed, unless combination meter main equipment is being used. Recommended dimensions for individual meter sockets used in underground installations shall be:

320 amp – 26.5" height by 13" width

C. Standards

(1) Meter sockets should be constructed of galvanized steel, 16-gauge minimum. Non- metallic or aluminum enclosures are not acceptable.

(2) Meter sockets shall be suitable for outdoor installation, i.e. weatherproof (NEMA 3R, IP, 14, or equivalent).

(3) 320 class meter sockets shall be equipped with anti-inversion clips that prevent normal width terminal blades from being installed in a 320 socket.

(4) ANSI C12.7 American National Standard Requirements for Watt-hour Meter Sockets dated 1993 or latest revision.

D. Construction

(1) Sockets shall be constructed of 16 gauge (minimum) galvanized sheet steel.

(2) Cover shall be equipped with a suitable device for closing and sealing with padlock type seals.

(3) Finish shall be bonderized with light neutral gray baked enamel.

(4) Knockout for load carrying cable shall be concentric type.

(5) The general construction of the socket shall provide protection to personnel against accidental contact with energized elements of the meter and socket; and shall provide protection to the electrical components against adverse environmental weather conditions.

E. Electrical

(1) The neutral terminal shall be electrically bonded to the enclosure by means of a bolted or riveted connection.

APPENDIX C: REPORT TEMPLATE AND CHECKLISTS

C-1 RESERVED (DRAINAGE REPORT CHECKLIST)

C-2 ELECTRIC SERVICE REQUEST FORM

C-3 EXCEPTION REQUEST FORM

C-4 RESERVED (GEOTECHNICAL REPORT CHECKLIST)

C-5 RESERVED (PAVEMENT DESIGN REPORT CHECKLIST)

C-6 RESERVED (TRANSPORTATION IMPACT STUDY)

C-7 STATEMENT OF EXPECTED UTILITY NEEDS

C-8 RESERVED (UNDERDRAIN REPORT CHECKLIST)

C-9 RESERVED (WATER AND WASTEWATER PROJECT INFORMATION REPORT CHECKLIST)

APPENDIX D: STORMWATER QUALITY

SEE LONGMONT STORM DRAINAGE CRITERIA MANUAL

APPENDIX E: ACCEPTANCE FORMS

E-1 RESERVED (RECORD DRAWINGS CHECKLIST)

E-2 RESERVED (PERMANENT STORMWATER CONTROL MEASURES CHECKLIST)

E-3 CONSTRUCTION ACCEPTANCE CHECKLIST

E-4 FINAL CONSTRUCTION ACCEPTANCE CHECKLIST

APPENDIX F: FLOODPLAIN INFORMATION

SEE LONGMONT STORM DRAINAGE CRITERIA MANUAL

APPENDIX G: MISCELLANEOUS

G-1 RESERVED

APPENDIX H: KEN PRATT BOULEVARD LANDSCAPING GUIDELINES

H-1 KEN PRATT BOULEVARD LANDSCAPING GUIDELINES

APPENDIX I: APPROVED MATERIALS LISTS

I-1 RESERVED (TRAFFIC SIGNALS APPROVED MATERIALS LIST)

I-2 RESERVED (APPROVED MATERIALS LIST SECTION 200 – TRANSPORTATION)

I-3 RESERVED (APPROVED MATERIALS LIST SECTION 400 – WASTEWATER COLLECTION)

I-4 RESERVED (APPROVED MATERIALS LIST SECTION 500 – WATER DISTRIBUTION)

I-5 RESERVED (APPROVED MATERIALS LIST SECTION 600 – PARKS)

I-6 APPROVED MATERIALS LIST SECTION 700 – LPC