

ORDINANCE NO. 15-20

AN ORDINANCE OF SOUTH OGDEN CITY, UTAH, AMENDING RECENTLY ADOPTED PUBLIC WORKS STANDARDS / SPECIFICATIONS; MAKING NECESSARY LANGUAGE CHANGES TO THE PUBLIC WORKS STANDARDS / SPECIFICATIONS TO EFFECT THOSE CHANGES; AND ESTABLISHING AN EFFECTIVE DATE FOR THOSE CHANGES.

Section 1 - Recitals:

WHEREAS, SOUTH OGDEN City ("City") is a municipal corporation duly organized and existing under the laws of Utah; and,

WHEREAS, the City Council finds that in conformance with Utah Code ("UC") §10-3-717, and UC §10-3-701, the governing body of the city may exercise all administrative and legislative powers by resolution or ordinance; and,

WHEREAS, the City Council finds that in conformance with UC §10-3-717, and UC §10-3-701, the governing body of the city has previously adopted revised Public Works Standards / Specifications; and,

WHEREAS, the City Council finds that certain typographical errors were made to the previously adopted revised Public Works Standards / Specifications; and,

WHEREAS, the City Council finds that it is in the public interest to correct those typographical errors in the Public Works Standards / Specifications ("Standards"); and,

WHEREAS, the City Council finds that Public Works Standards / Specifications should also be amended and updated by correcting those typographical errors; and,

WHEREAS, the City Council finds that the changes herein should be effective upon passage of this Ordinance; and,

WHEREAS, the City Council finds that the public safety, health and welfare is at issue and requires action by the City as noted above;

NOW THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF SOUTH OGDEN CITY, UTAH that

The Document Entitled "City of South Ogden Public Works Standard Drawings, Details and Technical Specifications & The Public Works Standard Drawings & Details" Of March 2015, As Now Amended, From Wasatch Civil Consulting Engineering, As Herein Amended As Set Out In **Attachment "A"**, Are Adopted And Are Incorporated Fully Herein By This Reference.

Section 2 - Repealer of Conflicting Enactments:

All orders, ordinances and resolutions regarding the changes enacted and adopted which have been adopted by the City, or parts, which are in conflict with this Ordinance, are, to the extent of such conflict, repealed, except this repeal shall not be construed to revive any act, order or resolution, or part, repealed.

Section 3 - Prior Ordinances and Resolutions:

The body and substance of any and all prior Ordinances and Resolutions, with their specific provisions, where not otherwise in conflict with this Ordinance, are reaffirmed and readopted.

Section 4 - Savings Clause:

If any provision of this Ordinance shall be held or deemed or shall be invalid, inoperative or unenforceable such reason shall not have the effect of rendering any other provision or provisions invalid, inoperative or unenforceable to any extent whatever, this Ordinance being deemed the separate independent and severable act of the City Council of South Ogden City.

Section 5 - Date of Effect

This Ordinance shall be effective on the 4th day of August, 2015, and after publication or posting as required by law.

DATED this 4th day of August, 2015

SOUTH OGDEN, a municipal corporation

by: _____
Mayor James F. Minster

Attested and recorded

Leesa Kapetanov
City Recorder

ATTACHMENT “A”

ORDINANCE NO. 15-20

An Ordinance Of South Ogden City, Utah, Amending Recently Adopted Public Works Standards / Specifications; Making Necessary Language Changes To The Public Works Standards / Specifications To Effect Those Changes; And Establishing An Effective Date For Those Changes.

04 Aug 15

CITY OF SOUTH OGDEN

PUBLIC WORKS STANDARD DRAWINGS, DETAILS AND TECHNICAL SPECIFICATIONS

PART 1 - TECHNICAL SPECIFICATIONS

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2	Permit Requirements for Work in the Public Way
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6	Excavation and Backfill for Pipelines
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3	Street Intersection & Monument Details
4	Typical Pedestrian Access Ramp & Curb Details
5	Cul-De-Sac Details
6	Fire Hydrant and Water Service Connections
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8	Pressure Reduction and Air/Vacuum Relief Stations
9	Sanitary Sewer Connection Details & Trench Section

10	Sanitary Sewer Lateral Details & Cleanout
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12	Double & Single Catch Basin Details
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15	Fencing details
16	Street Light Details
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SECTION 1

GENERAL IMPROVEMENT PLAN REQUIREMENTS

- 1.1 SCOPE:** This section defines the general requirements for improvements to be built by a Contractor working within the public way.

The required improvements located in rights of way owned by South Ogden City shall include street improvements in front of all property along all dedicated streets to a connection with existing improvements of the same kind or to the nearest existing improvements. Design must provide for future extension to adjacent properties or as required by the City Engineer. All water lines, sewer lines, and any other buried conduit shall be installed to the boundary lines of the property being developed.

- 1.2 CONSTRUCTION DRAWINGS:** Complete and detailed construction plans and drawings of improvements shall be submitted to the City for the review by the City Engineer prior to receiving final plan approval and prior to commencing construction. No construction shall be started until plans have been checked and approved by the City Engineer.

- 1.3 STANDARDS FOR CONSTRUCTION DRAWINGS:** The following instructions are for the purpose of standardizing the preparation of drawings to obtain uniformity in appearance, clarity, size, and style. These plans and designs shall meet the standards defined in the specifications and drawings hereinafter outlined. The minimum information required on drawings for improvements is as follows:

- A. All drawings and/or prints shall be clear and legible and conform to good engineering practice drawn with ink. Size of drawings shall be 24 x 36 inch with 1/2 inch border on top, bottom and right sides, left side 1-1/2 inches.
- B. In general, the following shall be included on drawings:
 - 1. North arrow (plan)
 - 2. Scale and elevations referenced to an approved datum
 - 3. Stationing and elevations for profiles
 - 4. Title block to include:
 - a. Name of City
 - b. Project title
 - c. Name and contact information of the Owner/Developer
 - d. Name of engineer or firm preparing drawings with license number, P.E. stamp and signature
- C. Curb and gutter, drains and drainage structures, sidewalks and street surfacing drawings shall show:

1. Scale: 1" = 20',30',40' or 50' horizontal; 1" = 2',3',4', 5', or 10' vertical
2. Both plan view and centerline profile must be shown. Where steep cross slopes exist, profiles for each side of the street may be required to be shown.
3. Flow direction and type of cross drainage structures at intersections with adequate flow line elevations
4. Bench Mark (B.M.) Location and elevation
5. Typical cross-section for all street sizes and variations
6. Street survey monument locations (if required by the City Engineer)
7. Plan and Profiles shall indicate design and/or existing ground elevations a minimum of 200 feet beyond the limits of the proposed project

D. Sanitary and Storm Sewer drawings shall show:

1. Scale: 1" = 20',30',40' or 50' horizontal; 1" = 2',3',4', 5', or 10' vertical (may be shown on street drawings)
2. Location, size and slope of mains
3. Manhole size, location and flow line elevation
4. Type of pipe
5. B.M. location and elevation

E. Culinary Water drawings shall show:

1. Scale: 1" = 20',30',40' or 50' horizontal; (may be shown on street drawings)
2. Size and location of water mains, valves and hydrants and minimum cover
3. Location of service laterals
4. Type of pipe

F. Irrigation Water drawings shall show:

1. Scale: 1" = 20',30',40' or 50' horizontal; 1" = 2',3',4', 5', or 10' vertical (may be shown on street drawings)
2. Location, size and slope of irrigation pipe
3. Clean out and control box locations
4. Location of service laterals
5. Type of pipe
6. B.M. location and elevation

G. Each set of plans shall be accompanied by a separate sheet of details for special structures which are to be constructed and are not covered by the City Standards. All structures shall be designed in accordance with the minimum South Ogden City Standards.

H. Separate drawings of elements of the South Ogden City Standards shall not be required to be redrawn and submitted with the construction drawings unless the

specific deviations from the standards are requested for approval. However, the construction drawings shall refer to the specific items of the Standards that are to be incorporated into the work.

- I. Once the project are in their final state, two sets of the final construction plans shall be submitted in duplicate to the City Engineer where they will be stamped as approved. One set will be retained by the City and the other will be returned to the Subdivider, Developer, Contractor or Project Manager. A copy of the approved plans shall be kept available at the construction site. In addition to the mylar construction plans, the developer's engineer shall provide the City Engineer with electronic files of the final plat and improvement plans in an "Auto CAD" format. Prior to final acceptance by the City, the subdivider, developer, contractor or project engineer shall submit to the City Public Works Department a set of "as constructed" drawings for permanent City file record.
- 1.4 PRECONSTRUCTION CONFERENCE:** A preconstruction conference shall be held only after the City Engineer has approved and signed the construction plans. Unless otherwise allowed, a preconstruction conference must be held before any excavation or other work is begun in the project. The preconstruction conference will include: (a) City Engineer; (b) The Project Developer or Project Manager; (c) all Contractors and Subcontractors involved with installing the project improvements; (d) representatives of affected South Ogden City Departments; (e) representatives of local utility companies as may be requested by South Ogden City. Items pertaining to the construction and inspection of the Project improvements will be discussed.
- 1.5 INSPECTIONS:** All construction work involving the installation of improvements as part of the project shall be subject to inspection by the City. It shall be the responsibility of the person responsible for construction to insure that inspections take place where and when required. The frequency of inspections is at the discretion of South Ogden Public Works.
- 1.6 REQUEST FOR INSPECTION:** Requests for inspections shall be made to the City Public Works Department by the person responsible for the construction. Requests for inspection shall be made a minimum of one (1) working day prior to the commencing of the work.
- 1.7 CONSTRUCTION COMPLETION INSPECTION:** An inspection shall be made by the City Engineer or authorized representative after all construction work is completed. Any faulty or defective work shall be corrected by the persons responsible for the work within a period of thirty (30) days of the date of the City Engineer's or authorized representative's Inspection Report defining the faulty or defective work.
- 1.8 CONSTRUCTION TESTING:** All in-place density testing shall be performed by a materials testing laboratory that is certified by the State of Utah, and paid for by the Property Owner, Developer, Contractor or Project Manager. All costs associated with testing (i.e.

compaction, asphalt extractions, gradations, asphalt densities, and concrete test cylinders shall be provided by and paid for directly by the Property Owner, Developer, Contractor or Project Manager.

- 1.9 APPROVAL BY CITY ENGINEER:** All references within these specifications to the “City Engineer” shall be construed to refer to “The City Engineer or his duly authorized representative.”
- 1.10 DRAWINGS:** All references within these specifications to “The Drawings” shall mean the City approved construction drawings or the South Ogden City Public Works Standards and Technical Specifications as is applicable.
- 1.11 AMENDMENT PROCESS:** Whenever, in the opinion of the City Building Department, the City Engineer, or the Superintendent having jurisdiction, a literal enforcement of these regulations may work an undue hardship or a literal enforcement of the provisions may be unnecessary to meet the goals and standards of the City, the City may modify those standards in the following manner:

Modifications may be granted when there are practical difficulties involving carrying out the provisions of the Public Works Standards and Technical Specifications and a panel consisting of the City Engineer and the Public Works Director or his Representative determine that granting of a modification for an individual case will meet the goals and requirements of the City without unduly jeopardizing the public and the individual’s interest. The City shall first receive a written request for a modification to the standards from any interested party. Upon receipt of the request the panel of the individual discussed above shall find that a special individual reason makes the strict letter of the standard impractical, and shall find the modification is in conformance with the intent and purpose of the standards and shall find that such modification does not in any way lessen the integrity of the standards. When such findings of fact are made, the panel may grant such modification as it deems appropriate. The details of any action granted as modification by this panel shall be recorded and entered in the files of the City, with the specific reason for the granting of said modification.

- 1.12 GUARANTEE OF WORK:** The Developer shall warrant and guarantee (and post bond or other security) that the improvements constructed in the public way, and every part thereof, will remain in good condition for a period of 1 year, after the date of conditional acceptance by the City, and agrees to make all repairs to and maintain the improvements and every part thereof in good condition during the time with no cost to the City.

It is further agreed and understood that the determination for necessity of repairs and maintenance of the work rests with the City Engineer. His decision upon the matter shall be final and binding upon the Developer, and the guarantee hereby stipulated shall extend to and include, but shall not be limited to, the street improvements (base and pavement), all pipes,

joints, valves, backfill and compaction, as well as the working surface, curbs, gutters, sidewalks, and other accessories that are, or may be affected by the construction operations. Whenever, in the judgment of the City Engineer, said work shall be in need of repairs, maintenance, or rebuilding, he shall cause written notice to be served to the individual in responsible charge of the construction, and thereupon the responsible individual shall undertake and complete such repairs, maintenance or re-construction. If the responsible individual fails to complete the repairs or submit a plan for approval to show how and when the repairs will be completed within 30 days from the date of the service of such notice, the City Engineer may have such repairs made, and the cost of such repairs shall be paid by the responsible individual together with 25 percent in addition thereto as and for stipulated damages for such failure to make the repairs.

~ END OF SECTION ~

SECTION 2

PERMIT REQUIREMENTS FOR WORK IN THE PUBLIC WAY

- 2.1 PURPOSE OF INTENT:** The purpose of this section is to describe South Ogden City's Department of Public Work's policies for issuing permits and to control any excavation and construction operations in the public way in the City. All contractors and utility companies proposing to construct, repair or replace any facility within the public way, shall contact the Public Works Department and complete all permit requirements prior to commencing proposed work as outlined in this section.

Work by utility companies and contractors in constructing facilities in new subdivision streets shall be required to obtain a "No Fee Permit" and will be subject to City inspection and compliance with all applicable technical specifications.

2.2 POLICIES:

- A. Permittee must be licensed with the State of Utah: it is the policy of South Ogden City that contractors desiring to perform work in the City's public way shall be properly licensed in the State of Utah. The acceptable licenses include:

TYPE OF WORK		LICENSE			
1.	Any type of concrete work	E100	B100	R100	S260
2.	Paving		E100	S400	
3.	Landscaping	E100	S330		
4.	Buried gas, telephone, water,				
5	irrigation and power lines	E100	S390	S140	
6.	Sanitary sewer and storm drains		E100	S210	S216 S390
7.	Asphalt Patching	E100	S400		
8.	Trenching	E100	S310		
9.	Highway Sign Installation	E100	S440		
10.	Manhole Covers	E100	S210	S390	S410
11.	Paint Striping Highways		E100	S300	

Note: A license shall not be required by the City when the permittee is a public utility company

- B. Policy for determining when "permit waivers" can be granted: working within the public way without a permit is a violation unless the permit is waived by the Public Works Department. Waivers can be granted by the Public Works Department when any of the following conditions occur:

1. When routine maintenance work which is being done by City, State or Public Utility Personnel does not involve excavations in the City's public way, i.e., crack sealing, street resurfacing and repair, snow plowing, sanding, sweeping, garbage collection, storm drain cleaning, green waste pickup, above grade work, etc.
 2. When a permittee allows other contractors or utility companies to perform work in the permitted trench limits.
 3. When utilities must be relocated or adjusted in conjunction with a City sponsored project provided the utility work is being accomplished within one week of the time the City or its contractor is scheduled to begin construction at that location and provided the work is coordinated and approved by the City's Public Works Department.
- C. Policy for issuing no fee permits: the Public Works Department reserves the right to issue "no fee permits" for work in the public way when the following conditions are met:
1. When abutting property owners are repairing or replacing in kind any existing public facilities such as drive approaches, curb, gutter, or sidewalk.
 2. When utility companies are doing excavation work and such work is required in conjunction with a City project, and the work is required to be accomplished prior to the execution of the Public Works Department contract.
 3. When the City is repairing or maintaining public way facilities such as curbs, gutters, cross drains, storm drains, traffic facilities, driveway, sidewalk, etc., and such work requires excavation.
 4. When frames and lids in paved surfaces are raised or lowered providing the work does not disturb the underlying road base material.
- D. Policy for revoking "Permit Waivers" and "No Fee Permits:" "Permit Waivers" and "No Fee Permits" will be revoked by the Public Works Department if the work is defective or requires action or supplemental inspection by the Public Works Department. In the revocation proceedings, the Public Works Department shall serve written notice which defines the problems encountered and the time (at least one day) the permittee has to correct the problem. If the work is not satisfactorily completed within the time specified, the "Permit Waiver" or the "No Fee Permit" shall be revoked. The permittee will be required to secure a Fee Permit before proceeding to complete the work.

- E. Policy for completion of work by City and liability for costs: If the work is unduly delayed by the permittee, or if the public interests so demand, the Public Works Department shall have authority to complete the permit work. The Public Works Department shall do the work only after written notice has been given to the permittee and the permittee fails to respond to the Public Works Department's request. The actual cost of such work incurred by the City, including a fifteen percent (15%) overhead charge, shall be paid by the permittee.
- F. Policy for extending permit construction time limits: Subject to the Public Works Department's approval, permits which expire may be extended by paying a permit extension fee. The length of the extension as determined by the permittee, shall be subject to the approval of the Public Works Department.

2.3 GENERAL CONDITIONS:

- A. Utility drawing requirements: Whenever the work involves the extension, placement or the relocation of a utility facility, two (2) copies of the drawings shall be provided for the Public Works Department which detail the Location and type of the proposed facility. Work involving maintenance of existing facilities or placement of laterals does not require a drawing.
- B. Permit: When the work is in progress, the permittee shall have at the work site a copy of the permit and his contractor's license number.
- C. Emergency Work: Maintenance of pipelines or facilities in the public way may proceed without a permit when emergency circumstances demand the work be done immediately provided a permit could not reasonably and practicably have been obtained beforehand. In the event that emergency work is commenced on or within any public way of the City, the Public Works Department shall be notified within one-half hour from when the work commences or as soon as possible from the time the work is commenced. Contact shall be made to the City's "on call" personnel. If emergency work is commenced during off business hours, the Public Works Department will be notified within one (1) hour of the start of work on the first regular business day of which City offices are open after such work commences, and, at the discretion of the Public Works Department, a permit may be issued which shall be retroactive to the date when the work was begun. Before commencing and while conducting emergency work, all necessary safety precautions for the protection of the public and the direction and control of traffic shall be taken. None of the provisions of these regulations are waived for emergency situations except for the prior permit requirement.
- D. Street excavation in winter: Excavation of City streets during the winter months (herein defined as November 1 to April 1) will be allowed only if the work is a new

service connection, required maintenance or emergency, or otherwise approved by the Public Works Department. Permanent patching of the City streets excavated in the winter may be delayed until April 1, or later with the following provisions: Within five working days from the completion of the excavation the permittee installs/maintains a 2" thick (minimum) temporary winter asphalt surface until such time as the permanent asphalt surface is installed; if no winter asphalt is available, the permittee shall provide/maintain a temporary untreated base course surface until such time as the temporary winter asphalt surface is installed.

- E. Existing utilities: All projects shall be "Blue Staked" prior to construction. The contractor shall use extreme caution to avoid a conflict, contact or damage to existing utilities, such as power lines, sewer lines, storm drains, street lights, telephone lines, television lines, water lines, gas lines, poles or other appurtenances during the course of construction of this project. Any such conflict, contact or damage shall be immediately communicated to said utility company and the Public Works Department.
- F. Preconstruction photographs or video records of existing public way improvements: The permittee may secure pictures of the conditions of the existing public way improvements such as curbing, sidewalk, landscaping, asphalt, surfaces, etc. In the event that public way improvements are damaged and no photographs or video records are taken, the Public Works Department will assume the correction of the damage is the responsibility of the permittee.
- G. Construction and Excavation Testing: All in-place density testing shall be performed and paid for by the Permittee.

2.5 EXCAVATION OPERATIONS:

- A. Utility Locating: Before commencing excavation operations, the permittee shall call "Blue Stakes" at 1-800-662-4111.
- B. Traffic control devices such as construction signs, barricades flaggers and cones must be in place before excavation begins.
- C. Protection of paved surfaces outside of excavation area: In order to avoid unnecessary damage to paved surfaces, backhoes, outriggers, tracked equipment or any other construction equipment that may prove damaging to asphalt, shall use rubber cleats or paving pads when operating on or crossing said surfaces.
- D. Open trench limits: Open trenches will be limited to one block at a time or 660 feet, whichever is less.

2.6 ENVIRONMENTAL CONTROL:

- A. Dust and debris: The permittee or contractor shall keep dust and debris controlled at the work site at all times. If necessary, wet down dusty areas with water and provide containers for debris. The City Engineer, Public Works Director, or his representatives reserve the right to shut down the work or issue a citation if dust is not controlled.
- B. Noise: The permittee or contractor shall keep neighborhood free of noise nuisance. The South Ogden Public Works Department shall be authorized to impose restrictions on work done within residential areas that include limits on work in the early morning as well as work in the late evening or night time.
- C. Cleanup: The permittee or contractor shall remove all equipment, material, barricades and similar items from the right-of-way. Areas used for storage of excavated material will be smoothed and returned to their original contour. Vacuum sweeping or hand sweeping shall be required when the Public Works Department makes a determination that other cleaning equipment is ineffective.

2.7 GUARANTEES:

- A. Street Maintenance: After completion of the work, the permittee shall exercise reasonable care in inspecting for and immediately repairing and making good any injury or damage to the public and private facilities resulting from defective work done under the permit. The obligation of the permittee to inspect and repair work done under the permit shall continue for a period of two years (2 years) following completion of said work, or in the event of repairs thereto, two years (2 years) from the date of said repairs.

Before commencing the work, the permittee shall identify any damaged public facilities in the vicinity of the work following completion. Upon notice from the Public Works Department, permittee shall immediately repair any injury or damage to the public and private facilities as a result of the work done under the permit. In the event such repairs are not made by the permittee within forty-eight hours (48 hrs.) after notice, the Public Works Department is hereby authorized to make such repairs and charge all costs including fifteen percent (15%) overhead charge to the permittee. By acceptance of the permit, the permittee agrees to comply with the above.

- B. City's Protective Liability Insurance: The permittee shall indemnify and hold the City harmless from and against any and all liability, damages, claims, demands, costs and expenses of whatsoever nature, including court costs and counsel fees, arising from or growing out of any injury to or death of any person or persons, whomsoever, or for loss of or damage to any property whatsoever, (including loss or damage to the tools, plant, or equipment of the permittee) resulting directly or indirectly from the carrying

on of the work herein specified, and to that end will purchase on the City's behalf, City's Protective Liability Insurance with limits of \$100,000.00 for injury to or death of one person, and \$300,000.00 for one accident; and Property Damage Liability Insurance within limits of \$100,000.00 for each accident and \$100,000.00 aggregate.

- 2.8 ENFORCEMENT:** Violators of these regulations of working within the Public way shall be subject to the provisions of the applicable South Ogden Ordinances and Public Works Standards.

~ END OF SECTION ~

SECTION 3

EARTHWORK

- 3.1 GENERAL:** This section defines the requirements for excavation and backfill for structures, construction requirements for embankments and fills, and subgrade preparation for pavements and other surface improvements.
- 3.2 EXCAVATION FOR STRUCTURES:** All structures shall be founded on undisturbed original subsoil. All unauthorized excavation below the specified structure subgrade shall be replaced with concrete monolithic with that of the slab above or with crushed stone or coarse gravel compacted to 95% of maximum dry density as measured by ASTM D-1557 in lifts not to exceed 10".
- 3.3 BACKFILL AROUND STRUCTURES:** Subgrade soil for all concrete structures, regardless of type or location, shall be firm, dense, thoroughly compacted and consolidated; shall be free from mud. Coarse gravel or crushed stone may be used for subsoils reinforcement if satisfactory results can be obtained thereby. All subgrade soil that is unsuitable for backfilling shall be removed and replaced with gravel or crushed stone. The finished elevation of any subsoil reinforced in this manner shall not be above the subgrade elevation. After completion of foundation footings and walls and other construction below the elevation of the final grades, and prior to backfilling, all forms shall be removed and the excavation shall be cleaned of all trash and debris. Material for backfilling shall consist of excavated material or borrow of sand, gravel, or other suitable material, and shall be placed in layers not exceeding 10 inches in uncompacted thickness. Each layer shall be compacted by hand or machine tampers or by other suitable equipment to a density equal to 95% of maximum dry density as measured by ASTM D-1557.
- 3.4 CONSTRUCTION OF EMBANKMENTS AND FILLS:** Unsuitable materials that occur in the foundations for embankments and fills shall be removed by clearing, stripping, and/or grubbing. Where suitable materials occur, after stripping, the subgrade soil shall be scarified to a depth of not less than 6 inches, and the loosened material shall be moistened and compacted as hereinafter specified for each layer. All materials in embankments and fills shall be placed, moistened, and compacted as provided in the following paragraphs.
- A. When the embankment or fill exceeds the amount of excavation, sufficient additional material shall be obtained from borrow pits provided by the Contractor. All material proposed to be imported shall be subject to the review and approval of the City Engineer or his representative prior to start of hauling operations.
- B. The materials used for embankment and fill construction shall be free from sod, grass, trash, rocks larger than 10 inches in diameter, and all other material unsuitable for construction of compacted fills.

- C. Grading of completed embankments and fills shall bring the surfaces to a smooth, uniform condition with final grades being within 0.1 foot of the design grade. In no case shall embankment slopes have a steeper horizontal to vertical slope of 3:1.

3.5 COMPACTING EARTH MATERIALS: The material shall be deposited in horizontal layers having a thickness of not more than 10 inches after being compacted as specified in this Section; provided that, when mechanical equipment is used for placing and compacting the material on a sloping foundation, the layers may be placed parallel to the foundations. The distribution of materials shall be such that the compacted material will be homogenous and free from lenses, pockets, or other imperfections.

During compaction operations the material shall have the optimum moisture content required for the purpose of compaction, and the moisture content shall be uniform throughout the layers, insofar as practicable. Moistening of the material shall be performed at the site of excavation, but such moistening shall be supplemented as required by sprinkling at the site of construction. If the moisture content is more than optimum for compaction, the compaction operations shall be delayed until such time as the material has dried to the optimum moisture content. When the material has been conditioned as hereinbefore specified, the backfill or embankment shall be compacted as follows.

- A. Under Roadways and extending one foot beyond the proposed curb line, the fill or embankment material shall be compacted to a density equal to not less than 95% of maximum dry density as measured by ASTM D-1557.
- B. Under Sidewalk and Drive Approaches, the fill or embankment material (to at least one foot each side of the edge of the slab) shall be compacted to a density equal to not less than 95% of maximum dry density as measured by ASTM D-1557.
- C. Other Fills and Embankments not listed above shall be compacted to a density equal to not less than 85% of maximum dry density as measured by ASTM D-1557.

3.6 ROAD SUBGRADE PREPARATION: In both cut and fill areas the paving subgrade shall be either undisturbed soil or shall be scarified to a depth of 8 inches and compacted to the equivalent of 95% of maximum dry density as measured by ASTM D-1557. No rocks larger than 2 inches in diameter, organic material, soft clay, spongy material, or other deleterious material will be permitted on this scarified subgrade layer. Rough subgrades shall be shaped and graded to within a tolerance of 0.10 foot of design grade, and drainage shall be maintained at all times.

During the rolling operation, moisture content of the subgrade layer shall be maintained at not less than 97% or more than 105% of optimum moisture content. Rolling shall be continued until the entire roadbed is compacted to the specified density to a minimum depth of 8 inches.

~ END OF SECTION ~

SECTION 4

BITUMINOUS PAVING

4.1 GENERAL: This section covers the requirements for bituminous surface paving on roads. All streets shall be surfaced in accordance with the following specifications, unless otherwise specified by the City Engineer.

- A. 10 inch minimum compacted thickness of untreated base course gravel over prepared subgrade. When subgrade soils have a C.B.R. (California Bearing Ratio) less than 10, additional gravel base shall be required as dictated by a pavement design approved by the City Engineer. Alternate designs may be considered if submitted by a registered geotechnical engineer.
- B. 3 inch minimum compacted thickness of plant mix bituminous surface course.
- C. UDOT Type C Bituminous Seal Coat, Slag Type B or C Chip and Seal or Type II or III Slurry Seal Coat as directed by the City Engineer.
- D. When a geotextile fabric is required on subgrade for stabilization and/or separation purposes, the fabric shall be approved by the City Engineer.

These pavement thicknesses shall be considered as City Standards and necessary to provide sufficient stability. The designer and/or developer may submit an alternative pavement design based on a detailed soils analysis for approval by the City Engineer which may modify pavement thicknesses, but in no case shall the bituminous surface course be less than 3" thick and the untreated base course less than 4" thick.

4.2 UNTREATED BASE COURSE: Untreated Base course for all streets shall consist of select material, either natural or crushed, and shall be graded to either one of the following:

1 Inch Gradation

<u>Sieve Size</u>	<u>Ideal Gradation (Percent Passing)</u>	<u>Ideal Gradation (Tolerance)</u>
1 inch	100	0
½ inch	85	+/- 6
No. 4 sieve	55	+/- 6
No. 16 sieve	31	+/- 4
No. 200 sieve	9	+/- 2

3/4 Inch Gradation

<u>Sieve Size</u>	<u>Ideal Gradation (Percent Passing)</u>	<u>Ideal Gradation (Tolerance)</u>
3/4 inch	100	0
3/8 inch	85	+/- 7
No. 4 sieve	61	+/- 6
No. 16 sieve	33	+/- 5
No. 200 sieve	9	+/- 2

The material shall be deposited and spread in a uniform layer, without segregation of size, with such depth that when compacted the layer will have the required thickness as stated above.

Each layer shall be compacted for the full width and depth. Alternate blading and rolling will be required to provide a smooth even and uniformly compacted course true to cross section and grade. Places inaccessible to rolling shall be compacted with mechanically operated hand tampers.

The gravel base course shall be compacted to not less than 95% maximum dry density as determined by ASTM D-1557. During rolling operation, moisture content of the base course layer shall be maintained at not less than 97% or more than 105% of optimum moisture content. Surfaces shall be true to the established grade with the thickness being not less than 1/4 inch from the required layer thickness and with the surface elevation varying not more than 3/8 inch in ten feet from the true profile and cross section.

- 4.3 BITUMINOUS SURFACE COURSE:** Over the dry, dust-free compacted base course, the Contractor shall place and compact a bituminous surface course. The surface course shall consist of a mixture of mineral aggregate and binder.

- A. MATERIALS: Gradation of aggregate shall conform to the following:

3/4 Inch Gradation

<u>Sieve Size</u>	<u>Ideal Gradation (Percent Passing)</u>	<u>Ideal Gradation (Tolerance)</u>
3/4 inch	100	0
3/8 inch	80	+/- 11
No. 4 sieve	50	+/- 8
No. 16 sieve	24	+/- 7
No. 50 sieve	15	+/- 6
No. 200 sieve	6	+/- 2

The Contractor shall establish a mix gradation, and the amount of bituminous material shall be subject to the approval of the City Engineer and shall meet the requirements of the gradation selected. Regardless of the bituminous content, there shall not be more than 3% voids in the aggregate.

The bituminous material for the surface course shall be AC-10 asphalt cement conforming to the requirements of ASTM M20 - 60 or an approved City Engineer equal.

The bituminous surface course shall be mixed at a mixing plant and spread and compacted on the prepared base in conformance with the lines and dimensions shown on the plans and in accordance with these Specifications.

If possible, traffic shall be kept off the completed surface for a minimum period of 24 hours, or as directed by a representative of South Ogden Public Works Department or City Engineer.

- 4.4 BITUMINOUS TACK COAT:** Prior to placement of bituminous material, all exposed vertical facings on curb and existing pavement shall receive a thorough asphalt tack coat. The Contractor shall provide a clean surface free of all mud, dirt, or debris that would prevent the tack coat from bonding to the existing asphalt surface.

Bituminous tack coat shall be applied at a rate of 0.08 gal/per square yard. Care shall be exercised to prevent over spraying on finish concrete surfaces. The temperature of the bituminous mix shall be between 250° F and 325° F when being placed.

Bituminous tack coat shall be CSS-1 in accordance with the material requirements specified by the most current version of the Utah Department of Transportation Specifications for Road and Bridge Construction. Care should be taken to provide an CSS-1 asphalt material that is uniform in appearance with a consistency that shows no foaming when heated to the specified loading temperature. The Contractor shall handle the material in a manner that would prevent cross contamination with other asphalt types or grades of material.

Pressure distribution equipment shall be capable of spraying the AC-10 tack coat asphaltic binder at the prescribed temperature and application rate. It shall be adjustable to give a uniform spray pattern over the entire width of application. No drilling or skipping shall be permitted. Care shall be taken to protect existing structures (i.e. signs, guard rails, barriers, etc.) from being spattered or marred during the spraying process. When directed by the Project Engineer, the Contractor may be required to perform preliminary test application at an off-site area to ensure proper distributor performance.

- 4.5 CONSTRUCTION METHODS AND EQUIPMENT:** The methods employed in performing the work, all equipment, tools and machinery, and other appliances used in handling the materials and executing the work shall be the responsibility of the Contractor. The Contractor shall make such changes in the methods employed and in the equipment used

as are necessary whenever the bituminous material being produced does not meet the specifications herein established.

- 4.6 SPREADING AND COMPACTION:** The bituminous mixture shall be spread with self-propelled, mechanical spreading and conditioning equipment capable of distributing at least a 12-foot width. The mixture shall be spread and struck off in such a manner that the finished surface shall result in a uniform, smooth surface. The longitudinal joints in succeeding courses shall be offset at least 6 inches transversely to avoid a vertical joint through more than one course. Compacted surface course lifts shall be limited to a maximum of 3". Prior to placement of bituminous material, all exposed vertical facings on curb and existing pavement shall receive a thorough asphalt tack coat. Tack coat shall be in compliance with the specifications of this section.

After the mixture has been spread, the surface shall be rolled in a longitudinal direction, commencing at the outside edge or lower side and proceeding to the higher side. Each pass of the roller shall overlap the proceeding pass at least one-half the width of the roller. Rolling shall continue until 95% of the laboratory density, as determined in accordance with ASTM Designation D-1559 (Marshall Test), for the bituminous mixture being used has been obtained. Rolling operations shall be conducted in such a manner that shoving or distortion will not develop beneath the roller.

The surface of the pavement, after compaction, shall be uniform and true to the established crown and grade. When tested with a 10 foot straight-edge placed parallel to the centerline of the pavement, the surface of the pavement at any point shall not deviate from the lower edge of the straight-edge by more than one-eighth of an inch. All high and low spots shall be remedied immediately by removing the wearing course material over the affected areas and replacing it with fresh, hot wearing course and surface finish material and immediately compacting it to conform with surrounding area.

- 4.7 WEATHER LIMITATIONS:** No bituminous surface course shall be placed when the temperature of the air or roadbed is 50° F or below, during rainy weather, when the base is wet, or during other unfavorable weather conditions unless approved by the City Engineer. No bituminous plant mix seal coat shall be placed when the temperature of the air or roadbed is less than 70° F, during rainy weather, when the pavement surface is wet, or during other unfavorable weather conditions as determined by the City Engineer.

- 4.8 BITUMINOUS SEAL COAT:** Following installation of surface course, all completed asphalt areas shall receive seal coat as directed by South Ogden Public Works or the City Engineer. Seal coat shall consist of Type II or Type III emulsified asphalt slurry seal, preferably a minimum of 12 months after bituminous paving or as directed by the City Engineer. On some high-traffic collector or arterial roads, the City Engineer may require a Type C chip seal with flush coat instead of a slurry seal. A notice must be distributed to every home and/or business at least 24 hours before the seal coat project begins. The notice must include the name of the Contractor, telephone number, the day or days of the construction and the latest hour of the day by which vehicles must be moved from the street.

4.9 SLURRY SEAL: The Type II or III emulsified asphalt slurry seal shall consist of a mixture of an approved emulsified asphalt, mineral aggregate, water, and specified additives, proportioned, mixed and uniformly spread over a properly prepared surface. The completed slurry seal shall leave a homogeneous mat which is firmly adhered firmly to the prepared surface, and shall have a friction-resistant surface texture throughout its service life.

A. **MATERIALS:** Materials used in the emulsified asphalt slurry seal mixture shall meet the following requirements:

1. **Emulsified Asphalt:** The emulsified asphalt shall be Grade CQS-1H or CSS-1H. Each load of emulsified asphalt from the manufacturer shall be accompanied by a Certificate of Analysis/Quality Assurance to verify product compliance with the specifications given herein.
2. **Mineral Aggregate:** The aggregate shall be manufactured crushed stone such as granite, slag, limestone, chat, or other high-quality aggregate, or combination thereof; aggregate shall be free from dirt, organic matter, clay balls, adherent films of clay, dust, or other objectionable matter. To assure the material is totally crushed, 100 percent of the parent aggregate will be larger than the largest stone in the gradation to be used. When tested according to the following, the aggregate shall meet these requirements:

AASHTO TEST NO.	ASTM TEST NO.	QUALITY	SPECIFICATION
AASHTO T176	ASTM D2419	Sand Equivalent	45 Minimum
AASHTO T104	ASTM C88	Soundness	15% Maximum using Na ₂ SO ₄ or 25% Maximum using MgSO ₄
AASHTO T96	ASTM C131	Abrasion Resistance	35% Maximum

3. When tested in accordance to AASHTO T27 (ASTM C136), AASHTO T2 (ASTM D75), and AASHTO T11 (ASTM C117), the mix design for Type III aggregate gradation (including the mineral filter) shall be within the following band:

Sieve Size	% Passing	Stockpile Tolerance
3/8" (9.5 mm)	100	+/- 5%
#4 (4.75 mm)	70 - 90	+/- 5%
#8 (2.36 mm)	45 - 70	+/- 5%
#16 (1.18 mm)	28 - 50	+/- 5%
#30 (600 mm)	19 - 34	+/- 5%
#50 (300 mm)	12 - 25	+/- 4%
#100 (150 mm)	7 - 18	+/- 3%
#200 (75 mm)	5 - 15	+/- 2%

4. If the tests show the material to be out of tolerance, the contractor will be given the choice to either remove the material or blend other aggregates with the stockpile material in order to meet the specified requirements. No field blending will be allowed. Materials used in blending must meet the quality test before blending and must be blended in a manner to produce a consistent gradation. This may require a new mix design. Screening shall be required at the stockpile if there are any problems created by having oversize materials in the mix. Sampling of the mineral aggregate and mineral filler shall conform to AASHTO T2 / ASTM D75 methods.
 5. Mineral Filler: The mineral filler shall be hydrated lime or Portland Cement (Type I - II) and shall be considered as part of the dry mineral aggregate.
 6. Set Control Additive: Set control additive shall be used to accelerate or retard the break and set of the slurry mixture. The quantity and type of set control additive, if required, shall be determined by the proposed mix design and conform to the applicable sections of ASTM D3910 and ISSA T102. Quantity of set control additive may be field adjusted if required, after approval of the City Engineer, to maintain consistent stability and workability of the slurry mixture.
 7. Water: Water for the slurry mixture shall be clear, potable, free from harmful soluble salts and contaminants, and shall be compatible with the mix design.
- B. MIX DESIGN: The Contractor shall submit a signed mix design covering the specific materials to be used on the project. After the mix design has been approved, no substitution will be permitted unless approved by the City Engineer. The component materials shall be within the following limits:

Description	Test Method	Requirements
Test On Emulsion		
Viscosity @ 77F, SFS sec.	AASHTO T59 ASTM D244	20 - 100
Residue by distillation, weight %	AASHTO T59 ASTM D244	60 (min)
Sieve Test	AASHTO T59 ASTM D244	0.10 (max)
Settlement, 24 hour, weight %	AASHTO T59 ASTM D244	1 (max)
Test On Residue		
Penetration @ 77F, 100 g, 5 sec.	AASHTO T49 ASTM D2397	40 - 90
Solubility in trichloroethylene, %	ASTM D2042	97.5 (min)
Ductility @ 77F, cm.	ASTM D113	40 (min)
Test On Slurry Seal Mixture		
Residual Asphalt, % of dry weight of aggregate		6.5 - 12
System Compatibility	ISSA T116	Pass
Mix Time @ 77F	ASTM D3910 ISSA T113	Controllable to 180 sec (min)
Consistency, flow	ASTM D3910 ISSA T106	2 - 3 cm
Set Time, minutes	ASTM D3910	30 (max)
Wet Cohesion, 30 minutes	ISSA T139	12 kg cm *
Wet Cohesion, 60 minutes	ISSA T139	20 kg cm *
Wet Track Abrasion Loss	ASTM D3910 ISSA T100	75 g./sf (max)
Wet Stripping	ISSA T114	90 (min)

* Cohesion values may be reported using "Mode of Rupture" evaluation detailed in ISSA T139.

- C. **CONSTRUCTION METHODS AND EQUIPMENT:** The methods employed in performing the work, all equipment, tools and machinery, and other appliances used in handling the materials and executing the work shall be the responsibility of the Contractor. The Contractor shall make changes in methods employed and in

equipment used as necessary whenever the slurry material being produced does not meet the requirements herein established.

The slurry seal shall be mixed and applied with a machine designed and manufactured to lay slurry seal with a minimum aggregate capacity of 8 cubic yards to reduce the number of transverse joints. The slurry seal mixing machine shall be a continuous flow mixing unit, capable of delivering accurately predetermined proportions of aggregate, asphalt emulsion, and required materials to a revolving spiraled multi-blade mixer and of discharging the thoroughly mixed product on a continuous basis. The mixing unit shall be capable of thoroughly blending all ingredients together without violent action. The mixing machine shall be equipped with an approved fines feeder that provides an accurate metering device or method of introducing a predetermined proportion of mineral filler to the aggregate. The fines feeder shall be used only when mineral filler is part of the mix design. The mixing machine shall be equipped with a water pressure system and fog type spray bar. The machine shall be capable of mixing materials at preset proportions regardless of the speed of the machine and without changing machine settings.

Each mixing unit to be used in performance of the work shall be calibrated prior to construction. Documentation of such calibrations should be available for review and be performed on an annual basis. The documentation shall include an individual calibration of each material at various settings which can be related to the machine metering device(s).

The mixture shall be spread uniformly by means of a conventional surfacing spreader box attached to the mixer and equipped to agitate and spread the material evenly throughout the box. A front seal shall be provided to insure no loss of the mixture at the road contact point. The rear seal shall act as final strike-off and shall be adjustable and shall prevent loss of slurry on varying grades and crown by adjustments to assure uniform spread. The spreader box and rear strikeoff shall be so designed and operated that a uniform consistency is achieved to produce a free flow of material to the rear strike-off. The spreader box shall have suitable means provided to side shift the box to compensate for variations in the pavement geometry, and shall be adjustable to widths from 8 to 15 feet to minimize the number of longitudinal joints. Broken slurry seal mixture shall not be allowed to collect in the spreader box or on the flexible strike-off. A burlap drag or other approved screed may be attached to the rear of the spreader box to provide a uniform, highly textured mat.

- D. **SURFACE PREPARATION:** Prior to application of the slurry seal, the existing pavement surface shall be cleaned of silt deposits, oil spots, vegetation, and loose or objectionable material. Traffic paint not tightly bonded to the surface shall be removed. Loose material in cracks and on the pavement surface shall be removed by sweeping and vacuuming operations. Water flushing may be required, but shall not be permitted in areas where considerable cracks are present in the pavement surface.

If water is used, cracks shall be allowed to dry thoroughly before slurry surfacing. The City Engineer shall approve the surface preparation prior to surfacing.

Manholes, valve boxes, drop inlets, and other service entrances shall be protected from the slurry seal by placing Fibreen Grade 208-SD-10 reinforced, waterproof, all-purpose paper or other suitable material approved by the City Engineer, and shall be noted as to their location prior to covering. The paper shall be held in place with spray glue and removed within 24 hours after the slurry seal has cured.

- E. APPLICATION: The slurry seal shall be of the desired consistency upon leaving the mixer. A sufficient amount of material shall be carried in all parts of the spreader at all times so that a complete coverage is obtained. Overloading of the spreader shall be avoided. No lumping, balling, or unmixed aggregate shall be permitted. No streaks, such as those caused by oversized aggregate, shall be left in the finished surface. If streaks, voids, or other undesirable conditions develop, the job will be stopped until the Contractor proves to the City Engineer that the situation has been corrected.

The slurry seal shall possess sufficient stability so that premature breaking of the material in the spreader box does not occur. The mixture shall be homogeneous during and following mixing and spreading. It shall be free of excess water and emulsion and free of segregation of the emulsion and aggregate fines from the coarser aggregate. Spraying of additional water into the spreader box will not be permitted.

Sufficient quantities of the slurry seal mixture shall be fed into the spreader box so that uniform and complete coverage of the pavement is obtained. The slurry seal machine shall be operated at such a speed that the slurry in the spreader box shall not exceed a total mixing time of 4 minutes and the volume shall remain essentially constant. The slurry seal shall be placed at a rate of 8 - 12 pounds per square yard using Type I gradation; 12 - 18 pounds per square yard using Type II gradation; 15 - 25 pounds per square yard using Type III gradation. The unit weight of the aggregate, the gradation of the aggregate, and the condition of the surface to which the slurry seal is applied may affect application rates.

- F. FINISHING: The Contractor shall have a foreman/supervisor on site during spreading of the slurry seal. The foreman/supervisor shall have experience with slurry seal and a working knowledge of the equipment, materials, and application procedures.

The longitudinal joint between adjacent lanes shall have no visible lap, pinholes, or uncovered areas. Thick application caused by overlapping shall be smoothed immediately with hand squeegees before the slurry seal mixture breaks. When possible, longitudinal joints shall be placed on lane lines. The Contractor shall provide suitable spreading equipment to minimize the number of longitudinal joints.

Overlays that occur at transverse joints shall be smoothed before the slurry seal mixture breaks, so that a uniform surface is obtained.

Care shall be taken to ensure straight lines along curbs and shoulders. No runoff on these areas will be permitted. Lines at intersections shall be kept straight and provide a good appearance. Approved hand squeegees, with burlap drags, shall be used to spread slurry in areas not accessible to the slurry spreader box. Care shall be exercised in leaving no unsightly appearance from handwork.

- G. CURING: Treated areas will be allowed to cure from 4 to 24 hours or until the treated pavement will not be damaged by traffic loading. The Contractor will protect the area for the full curing period with suitable barricades or markers. Areas damaged, as a result of insufficient curing, within 24 hours or prior to moving to a new location shall be repaired at the Contractor's expense.

The slurry seal shall be applied to alternating streets to allow sufficient time for the emulsified material to set and bond to the existing street. Traffic will not be allowed on the newly placed bituminous material until, in the opinion of the City Engineer, the bituminous material has sufficiently set and bonded or the material has been allowed to set and bond for a minimum of 4 hours to prevent damage by traffic loading. Areas subject to an increased rate of sharp-turning vehicles may require additional time to allow for a more complete cure of the slurry seal mat to prevent damage. Opening to traffic does not constitute acceptance of the work.

- H. QUALITY CONTROL: Suitable sized samples of aggregate, asphalt emulsion, and mineral filler shall be submitted, when requested by the City Engineer, for approval not less than 10 days prior to the beginning of construction. All samples of materials shall be supplied by the Contractor at his expense. Additional samples of materials shall be furnished as directed by the City Engineer during progress of the work.

The City Engineer will notify the Contractor immediately if any test fails to meet the requirements herein specified. If any two successive tests fail on the stockpile material, the job shall be stopped. If it is established that a satisfactory slurry seal mixture meeting the requirements specified herein cannot be produced from the materials furnished, the materials shall be rejected and the Contractor shall submit new samples. It is the responsibility of the Contractor, at his own expense, to prove to the City Engineer that the conditions have been corrected.

Slurry seal placement requires conscientious workmanship and shall be performed under careful supervision and inspection, employing only experienced workman. The Contractor shall provide supervision during all hours of slurry seal placement. Said supervision shall consist of a foreman with not less than two years as an equipment operator. The foreman and equipment operator should be conscientious and recognize immediately that the equipment or materials are not within the

prescribed tolerances. The foreman shall have the authority to stop on site production in the event that a quality slurry seal mixture is not being supplied, produced, or applied. Equipment operators should have completed competent training and have certification of such.

In the event that the slurry seal placed or being produced at the job site appears to have a questionable quality, the City Engineer may order the taking of suitable test samples to verify that the materials meet the requirements of this specification. Any retesting or slurry seal replacement required because of test failures shall be the responsibility of the Contractor.

- I. **WEATHER LIMITATIONS:** The slurry seal shall not be applied if either the pavement or air temperature is below 50°F and falling, but may be applied when both pavement and air temperatures are above 45°F and rising. No slurry seal shall be applied when there is danger that the finished product will freeze withing 24 hours of application, during rainy weather, when the pavement surface is wet, or during other unfavorable weather conditions as determined by the City Engineer. The air temperature shall be measured in the shade.
- J. **CLEAN-UP:** All material swept or blown onto sidewalks; trash; discarded slurry seal material; or other debris caused by construction activities shall be cleaned up and removed on a daily basis and legally disposed of at the Contractor's expense.

4.10 CHIP SEAL: The bituminous chip and seal coat consists of an applied course of an approved emulsified asphalt followed by a cover course of mineral aggregate spread over a properly prepared surface as directed by the City Engineer. The completed bituminous chip and seal coat shall be followed by a flushed seal coat to complete a homogeneous mat which is firmly adhered to the prepared surface, and shall have a friction-resistant texture throughout its service life.

- A. **MATERIALS:** Materials used in the bituminous chip and seal coat shall meet the following requirements:
 - 1. **Emulsified Asphalt:** The asphalt emulsion shall be LMCRS-2A. The latex modified cationic rapid set emulsion shall be derived from a base asphalt that meets the requirements of SHRP 58/28 base criteria prior to the 3% latex addition. Three one-liter samples should be held by the Contractor from each batch delivered to the site. Said samples will be tested for proper chemical content if emulsion does not perform satisfactorily.
 - 2. **Mineral Aggregate:** The aggregate shall be manufactured crushed stone such as granite, slag, limestone, chat, or other high-quality aggregate, or combination thereof; aggregate shall be free from dirt, organic matter, clay balls, adherent films of clay, dust, or other objectionable matter. To assure

the material is totally crushed, 100 percent of the parent aggregate will be larger than the largest stone in the gradation to be used.

The dry mineral aggregate shall be uniformly graded to the gradation limits specified below, when tested in accordance with AASHTO T 27 “Sieve Analysis of Fine and Course Aggregates” (UDOT Type "C" aggregate).

Sieve Size	UDOT Type B % Passing	UDOT Type C % Passing
½ inch	--	100
3/8 inch	--	70-90
No. 4	100	0-5
No. 8	85-100	0-3
No. 16	10-25	--
No. 50	0-5	--
No. 200	0-2	0-2

Acceptance of cover material with respect to gradation shall be based on the average gradation of five samples taken from a test lot of 5,000 tons. The samples shall be obtained from the stockpile prior to use. A test lot shall be obtained when the average gradation of the five samples is within the specified gradation band and when the number of individual samples in each test lot outside the gradation band does not exceed two, and when they are not outside the band by more than two percentage points on any one sieve.

The total amount of material passing the No. 200 sieve shall be determined by washing with water in accordance with AASHTO T 11 “Materials Finer Than 75mm (No. 200) Sieve in Mineral Aggregates by Washing.”

That portion of the aggregate retained on the No. 4 sieve shall be clean and free of clay coatings and shall have not less than 80 percent by weight, of particles with at least one clean mechanically fractured face, when tested in accordance with UDOT Materials Manual 8-929.

The aggregate shall have a percentage of wear not exceeding 30 when tested in accordance with AASHTO T 96 “Resistance to Abrasion of

Small Size Coarse Aggregate by Use of the Los Angeles Machine”, and shall have a weighted percent of loss not exceeding 10 percent by weight when subjected to five cycles of sodium sulfate and tested in accordance with AASHTO T 104 “Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.” The aggregate shall be of such nature that when the particles are thoroughly coated with the bituminous material specified for the project not less than 90 percent of the coating shall be retained when tested in accordance with UDOT Materials Manual 8-945.

The maximum dry unit weight of the mineral aggregate shall not exceed 100 pounds per cubic foot when measured according to the loose weight determination as described in AASHTO T 19 “Unit Weight and Voids in Aggregate” and the moisture content shall be determined according to ASTM D2216.

3. Emulsified Flushed Seal Coat: The emulsified asphalt flushed coat seal shall be Grade CQS-1H or CSS-1H. The emulsified flush coat material shall be diluted two parts concentrate to one part water by the supplier or manufacturer before being delivered to the site. Each load of emulsified asphalt from the manufacturer shall be accompanied by a Certificate of Analysis/Quality Assurance to verify product compliance with the specifications given herein.
4. Water: Water for the bituminous flush coat mixture shall be clear, potable, free from soluble salts and contaminants, and shall be compatible with the specified mix design.

- B. CONSTRUCTION METHODS AND EQUIPMENT: Prior to application of the bituminous chip and seal coat, the existing pavement surface shall be cleaned of silt deposits, oil spots, vegetation, and loose or objectionable material. Traffic paint not tightly bonded to the surface shall be removed. Loose material in cracks and on the pavement surface shall be removed by sweeping and vacuuming operations. Water flushing may be required, but shall not be permitted in areas where considerable cracks are present in the pavement surface. If water is used, cracks shall be allowed to dry thoroughly before chip and seal coat surfacing. The City Engineer shall approve the surface preparation prior to surfacing.

Manholes, valve boxes, drop inlets, and other roadway maintenance access structures shall be protected from the bituminous asphalt emulsion by placing suitable material approved by the City Engineer, and shall be noted as to their location prior to covering. The approved protection material shall be held securely in place and removed within 24 hours after the chip and seal coat has cured.

Existing roadway striping should be adequately marked using reflective tabs prior to the commencement of chip and seal operations. All roadway striping marker placement should be coordinated with the Street Superintendent.

- C. **APPLICATION:** The bituminous asphalt material shall be placed in accordance with UDOT Standard Specifications. Bituminous material shall be placed with a distributor equipped with a hydrostatic system and full circulating spray bar to spray emulsion. The emulsion shall be spread constant and evenly across the roadway surface. Distribution equipment shall be self-propelled and shall possess sufficient power to maintain a constant and uniform speed; and shall be equipped with a thermometer well, adjustable spray bar and positive shut-off valves. Distribution equipment shall also be equipped with devices such as gauges, charts or meters to provide accurate and rapid determination and control of bituminous asphalt material being applied per square yard of surface. Distribution equipment shall also provide a means to control the rate of uniform application of material ranging from 0.45 to 0.48 gallons per square yard of surface; to a width of 12 feet. The Contractor shall distribute bituminous asphalt material at a rate sufficient to adequately coat 50 to 70% of the cover aggregate as determined by the City Engineer. If streaks, puddles, voids, or other undesirable conditions develop, the work will be stopped until the Contractor demonstrates to the satisfaction of the City Engineer that the situation has been corrected.

Cover aggregate shall be placed by means of a spreader box, which can be adjusted to uniformly spread cover material at the required rate per square yard, as required and as directed by the City Engineer. Cover aggregate shall be placed at a rate of approximately 20 to 25 pounds per square yard. Loose cover aggregate shall be hand broomed, as required, to distribute the material uniformly over the surface.

Cover material shall be rolled using pneumatic-tire rollers in a longitudinal direction. Compaction equipment shall have at least two front rollers and one rear finish roller. Contractor shall apply sufficient compaction effort to thoroughly embed cover aggregate into the bituminous asphalt emulsion.

Chip and seal surface shall be cleaned of all dirt, sand, dust, loose chips and other objectionable materials to the satisfaction of the City Engineer within 24 hours of applying the chip and seal coat. Bituminous flush coat shall then be applied at a rate of 0.12 gallons per square yard. Traffic should be diverted off the newly flushed surface until the bituminous material has set sufficiently to prevent tracking or pick-up.

- D. **FINISHING:** The Contractor shall have a foreman/supervisor on site during placement of bituminous chip and seal coat. The foreman/supervisor shall have experience with chip and seal and a working knowledge of the equipment, materials, and application procedures.

The longitudinal joint between adjacent lanes shall have no visible lap, pinholes, or uncovered areas. Thick application caused by overlapping shall be smoothed. Longitudinal joints within 6 inches of the traffic lane line location or within 12 inches of the center of the center of a traffic lane should be offset away from the wheel path. Construct the meet lines with no skips or voids between adjacent passes. Avoid a double thickness of material. Overlays that occur at transverse joints shall be smoothed before the slurry seal mixture breaks, so that a uniform surface is obtained.

Care shall be taken to ensure straight lines along curbs and shoulders. Street ends and intersections shall be masked off to provide straight transition lines. No runoff on these areas will be permitted. Care shall be exercised in leaving no unsightly appearance from handwork.

- F. **QUALITY CONTROL:** Suitable sized samples of the aggregate and the asphalt emulsion shall be tested and the results shall be submitted to the City Engineer for approval not less than ten (10) days prior to the beginning of construction. All samples of materials shall be supplied by the Contractor at his expense. Additional samples of materials shall be furnished as directed by the City Engineer during progress of the work.

The City Engineer will notify the Contractor immediately if any test fails to meet the requirements herein specified. If any two successive tests fail on the stockpile material, the job shall be stopped. If it is established that a satisfactory chip and seal mixture meeting the requirements specified herein cannot be produced from the materials furnished, the materials shall be rejected and the Contractor shall submit new samples. It is the responsibility of the Contractor, at his own expense, to prove to the City Engineer that the conditions have been corrected.

Bituminous chip and seal placement requires conscientious workmanship and shall be performed under careful supervision and inspection, employing only experienced workman. The Contractor shall provide supervision during all hours of chip and seal placement. Said supervision shall consist of a foreman with not less than two years as an equipment operator. The foreman and equipment operator should be conscientious and recognize immediately that the equipment or materials are not within the prescribed tolerances. The foreman shall have the authority to stop on site production in the event that a quality chip and seal surface is not being supplied, produced, or applied. Equipment operators should have completed competent training and have certification of such.

In the event that the chip and seal placed or being produced at the job site appears to have a questionable quality, the City Engineer may order the taking of suitable test samples to verify that the materials meet the requirements of this specification. Cost of all laboratory testing of such samples shall be the

responsibility of the Owner. Any retesting or slurry seal replacement required because of test failures shall be the responsibility of the Contractor.

- G. CURING & PROTECTION: Treated areas will be allowed to cure from 4 to 24 hours or until the treated pavement will not be damaged by traffic loading. The Contractor will protect the area for the full curing period with suitable barricades or markers. Areas damaged, as a result of insufficient curing, within 24 hours or prior to moving to a new location shall be repaired at the Contractor's expense.

The bituminous chip and seal shall be applied to alternating streets to allow sufficient time for the emulsified material to set and bond to the existing street. Traffic will not be allowed on the newly placed bituminous material until, in the opinion of the City Engineer, the bituminous material has sufficiently set and bonded or the material has been allowed to set and bond for a minimum of 4 hours to prevent damage by traffic loading. Areas subject to an increased rate of sharp-turning vehicles may require additional time to allow for a more complete cure of the chip and seal mat to prevent damage. Opening to traffic does not constitute acceptance of the work.

Chips shall be swept or otherwise removed from the roadway prior to allowing uncontrolled traffic to traverse the roadway. Bituminous flushed seal coat shall be applied to the roadway within 24 hours of placing chips.

- H. WEATHER LIMITATIONS: No chip seal coat shall be placed when the temperature of the air or roadbed is less than 70° F, during rainy weather, when the pavement surface is wet, or during other unfavorable weather conditions as determined by the City Engineer. Application of chip and seal coat following the last day of August must be approved by the City Engineer prior to application. The application of any chip and seal coat must be guaranteed by the Contractor or Developer for one year. The air temperature shall be measured in the shade.
- I. CLEAN-UP: All material swept or blown onto sidewalks; trash; discarded asphalt material; or other debris caused by construction activities shall be cleaned up and removed on a daily basis and legally disposed of at the Contractor's expense.

~ END OF SECTION ~

SECTION 5

PORTLAND CEMENT CONCRETE

- 5.1 GENERAL:** This section of the specifications defines materials to be used in all Portland cement concrete work and requirements for mixing, placing, finishing, and curing.
- 5.2 MATERIALS:** Materials used in Portland cement concrete and reinforcing of Portland cement concrete shall meet the following requirements.
- A. CEMENT: Portland cement shall be Type II or as approved by the City Engineer and shall comply with the Standard Specification for Portland Cement, ASTM C-150.
 - B. AGGREGATES: Concrete aggregates shall conform to Tentative Specifications for Concrete Aggregates, ASTM C-33.
 - C. WATER: Water used in mixing concrete shall be clean and free from oil, acid, salt, injurious amounts of alkali, organic matter or other deleterious substances.
 - D. ENTRAINED AIR: An air-entraining agent shall be used in all concrete exposed to the weather. The agent shall conform to ASTM Standard Specification D-175 and C-260.
 - E. ADMIXTURES: No admixture (except calcium chloride) will be permitted to be used in Portland cement concrete unless such use is specifically authorized by the City Engineer. Calcium chloride shall conform to ASTM Standard Specification D-98.
 - F. REINFORCED STEEL: All bar material used for reinforcement of concrete shall be grade 60 steel conforming to the requirements of ASTM Designation A-615 and shall be deformed in accordance with ASTM Designation A-305.
 - G. WELDED WIRE FABRIC: Welded wire fabric for concrete reinforcement shall conform to the requirements of ASTM A-185.
- 5.3 CONCRETE MIX:** For the purpose of practical identification, concrete has been divided into three classes: Class A, B, and C. Basic requirements and use for each class are as defined below:

Class	Minimum Cement (sacks/yd ³)	Minimum 28-day Strength (psi)	Primary Use
A	6-1/2	4,000	Reinforced Structural Concrete
B	6	3,500	Sidewalk, curb, gutter, cross gutter, pavement, unreinforced footings and foundations
C	5	2,500	Thrust blocks, anchors, mass concrete

All concrete mixes shall also comply with the following requirements.

- A. **AGGREGATES:** The maximum size of the aggregate shall not be larger than one-fifth of the narrowest dimension between forms within which the concrete is to be cast, nor larger than three-fourths of the minimum clear spacing between reinforcing bars or between reinforcing bars and forms. For unreinforced concrete slabs, the maximum size of aggregates shall not be larger than one-fourth the slab thickness.
- B. **WATER:** Sufficient water shall be added to the mix to produce concrete with the minimum practicable slump. The slump of mechanically vibrated concrete shall not exceed 4 inches. No concrete shall be placed with a slump in excess of 5 inches. The maximum permissible water-cement ratio (including free moisture on aggregates) shall be 5 and 5 3/4 gallons per bag of cement respectively for Class A and B air entrained concrete.
- C. **ENTRAINED AIR:** The air-entraining agent shall be added as liquid to the mixing water by means of mechanical equipment capable of accurate measurement and control. Air content for air-entrained concrete shall comply with the following:

Course Aggregate Size (inches)	Air Content (%)
1-1/2 to 2-1/2	5 ± 1
3/4 or 1	5 ± 1
3/8 or 1/2	7 ± 1

- D. **CALCIUM CHLORIDE:** Calcium chloride may be added as an accelerator with prior approval of the City Engineer during cold weather, with maximum amount being two pounds per sack of cement.

- 5.4 FORMS:** Forms shall be substantially built and adequately braced so as to withstand the liquid weight of concrete. All linings, studding, walling and bracing shall be such as to prevent bulging, spreading, or loss of true alignment while pouring and displacement of concrete while setting. Metal forms shall be used for curb and gutter work unless otherwise specified by the City Engineer. All edge forms for sidewalk pavements, curbs, and gutters shall be of sufficient rigidity and adequately braced to accurately maintain line and grade. Prior to concrete placement, all forms shall be lightly coated with oil to prevent concrete adhesion to form material. Forms for curved sections shall be so constructed and placed that the finish surface of walls and edge of sidewalks, curbs, and gutters will not deviate appreciably from the arc of the curve. Exposed vertical and horizontal edges of the concrete in structures shall be chamfered by the placing of moldings in the corners of the forms.
- 5.5 JOINTS:** Joints shall be provided for sidewalk and curb and gutter as follows:
- A. **SIDEWALKS:** Shall have scribed joints at intervals of 4 feet which joints shall be approximately 1/16 inch wide and be a minimum of 1/4 of the total slab thickness. Expansion joints are to be placed at 48 foot intervals (min.) or wherever new sidewalks ajoin existing sidewalks, driveways or aprons.
 - B. **CURB AND GUTTER:** Shall be cut into lengths of 10 feet by the use of 1/8 inch steel division plates of the exact cross section of the curb and gutter when constructed by hand methods. Curb and gutter constructed with a lay down machine shall be hand scribed with joints which shall be approximately 1/16 inch wide and be approximately 1/4 of the total curb thickness.
- 5.6 REINFORCEMENT AND EMBEDDED ITEMS:** Reinforcing steel shall be lean and free from rust, scale, paint, grease, or other foreign matter which might impair the bond. It shall be accurately bent and shall be tied to prevent displacement when concrete is poured. Reinforcing steel shall be held in place by only metal or concrete ties, braces, and supports, no steel shall extend from or be visible on any finished surface and shall have a minimum of 1-1/2 inch concrete cover. The Contractor shall use concrete chairs for holding the steel away from the subgrade, and spreader or other type bars for securing the steel in place. The spreader bars shall be not less than 3/8 inch in diameter.
- 5.7 PREPARATIONS:** Before batching and placing concrete, all equipment for mixing and transporting the concrete shall be cleaned, all debris and ice shall be removed from the places to be occupied by the concrete, forms shall be thoroughly wetted (except in freezing weather) or oiled, and masonry filler units that will be in contact with concrete shall be adequately coated (except in freezing weather), and the reinforcements shall be thoroughly cleaned of ice or other coatings. Water shall be removed from spaces to receive concrete.

When placing concrete on earth surfaces, the surfaces shall be free from frost, ice, mud, and water. When the subgrade surface is dry soil or pervious material, it shall be sprayed

with water immediately before placing of concrete or shall be covered with waterproof sheathing paper or a plastic membrane. No concrete shall be placed until the surfaces have been inspected and approved by the City Engineer or City Public Works Inspector.

- 5.8 CONCRETE MIXING:** All concrete shall be ready-mixed and delivered in accordance with ASTM C-94. The concrete shall be mixed until there is a uniform distribution of the materials. Sufficient water shall be used in mixing concrete to produce a mixture which will flatten and quake when deposited in place, but not enough to cause it to flow. Sufficient water shall be used in concrete in which reinforcement is to be embedded, to produce a mixture which will flow sluggishly when worked and which, at the same time, can be conveyed from a mixer to the forms without separation of the coarse aggregate from the mortar. In no case shall the quantity of water used be sufficient to cause the collection of a surplus in the forms or exceed the maximum allowable slump.

- 5.9 DEPOSITING:** Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to re-handling or flowing. The concrete placing shall be carried on at such a rate that the concrete is at all times plastic and flows readily into the corners of forms and reinforcing bars. No concrete that has partially hardened or been contaminated by foreign material shall be deposited in the work, nor shall re-tempered concrete be used. No concrete shall be dropped more than 3 feet. Concrete delivered to the job site having a temperature which exceeds 90° F shall not be placed. Concrete cooling methods during hot weather will be approved by the City Engineer.

All concrete in structures shall be vibrator compacted during the operation of placing and shall be thoroughly worked around reinforcement and embedded fixtures and into the corners of the forms.

- 5.10 PLACING CONCRETE IN COLD WEATHER:** No concrete shall be poured where the air temperature is lower than 40° F at a location where the concrete cannot be covered or protected from the surrounding air. When concrete is poured below a temperature of 35° F the ingredients of the concrete shall be heated so that the temperature of the mixture shall not be less than 50° or more than 100° F. Before mixing, the heated aggregates shall not exceed 125° F and the temperature of the heated water shall not exceed 175° F. Cement shall not be added while the temperature of the mixed aggregates and water is greater than 100° F. When there is likelihood of freezing during the curing period, the concrete shall be protected by means of an insulating covering and/or heating to prevent freezing of the concrete for a period of not less than 7 days after placing. Concrete shall not be placed on frozen soil.

Equipment for protecting concrete from freezing shall be available at the job site prior to placing concrete. Particular care shall be exercised to protect edges and exposed corners from freezing. In the event heating is employed, care shall be taken to insure that no part of the concrete becomes dried out or is heated to temperatures above 90° F. The housing, covering, or other protection used shall remain in place and intact at least 24 hours after the artificial heating is discontinued. Combustion heaters shall not be used during the

first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases which contain carbon dioxide.

- 5.11 FINISHING:** All concrete finish work shall be carefully performed and shall produce a top quality visual appearance as is common to the industry. After the concrete for slabs has been brought to the established grade and screened it shall be worked with a magnesium float and then given a light broom finish. In no case shall dry cement or a mixture of dry cement and sand be sprinkled on the surface to absorb moisture or hasten hardening. Surface edges of all slabs shall be rounded to a radius of 1/2 inch.

After concrete has been poured in curb and gutter forms it shall be puddled and spaded so as to insure a thorough mixture, eliminate air pockets, and create uniform and smooth sides. Before the concrete has thoroughly set and while the concrete is still green, the forms shall be removed and the front and top sides shall be finished with a flat or steel trowel to make a uniform finished surface. Wherever corners are to be rounded, special steel trowels shall be used while the concrete is workable and the corners constructed to the dimensions specified.

The top and face of the curb and also the top of the apron on combined curb and gutter must be finished true to line and grade and without any irregularities of surface noticeable to the eye. The gutter shall not hold water to a depth of more than 1/4 of an inch, nor shall any portion of the surface or face of the curb or gutter depart more than one-fourth 1/4 of an inch from a straight edge 10 feet in length, placed on the curb parallel to the center line of the street nor shall any part of the exposed surface present a wavy appearance.

- 5.12 PROTECTION:** As soon as the concrete has hardened sufficiently to prevent damage, the finished surface shall be protected for curing using one of the following ways:
- A. Ponding of water on the surface or continuous sprinkling.
 - B. Application of absorptive mats such as 3 inch of cured hay, clean straw or fabric kept continuously wet.
 - C. Application of 2 inches of moist earth or sand uniformly distributed on the surface and kept saturated by spraying with water.
 - D. Application of light colored waterproof plastic materials, conforming to "Specifications for Waterproof Sheet Materials for Curing Concrete" ASTM C-171, placed and maintained in contact with the surface of the concrete.
- 5.13 CURING AND SEALING:** Exposed concrete shall be receive an application of a curing compound, conforming to "Specifications for Liquid Membrane - Forming Compounds for Curing Concrete" ASTM C-309. The compound shall be light in color and shall be applied in accordance with the manufacturers recommendations immediately after any

water sheen, which may develop after finishing has disappeared from the concrete surface.

The freshly finished surface shall be protected from hot sun and drying winds until it can be sprinkled or covered as above specified. The concrete surface must not be damaged or pitted by rain. The Contractor shall provide and use, when necessary, sufficient tarpaulins to completely cover all sections that have been placed within the preceding 12 hours.

The Contractor shall erect and maintain suitable barriers to protect the finished surface. Any section damaged from traffic or other causes occurring prior to its official acceptance, shall be repaired or replaced by the Contractor at his own expense in a manner satisfactory to the City Engineer. Defective concrete conditions or surfaces shall be removed, replaced, or repaired as directed to meet the approval of the City Engineer.

- 5.14 CONCRETE TESTING:** The City Engineer may order the taking of concrete test cylinders to check required compressive strengths. In place concrete may be cored for testing. Unless otherwise specified, the cost of all required laboratory testing shall be the responsibility of the Subdivider/Developer, Contractor or ready-mix supplier. All concrete delivered to the job site shall be accompanied by a ticket specifying bag mix, air content, etc. Said tickets shall be given to the City Public Works Inspector who may field check slump, temperature and air entrainment compliance.

~ END OF SECTION ~

SECTION 6

EXCAVATION AND BACKFILL FOR PIPELINES

- 6.1 GENERAL:** The work covered by this specification consists of furnishing all labor, tools, materials, equipment, and in performing all operations in connection with the excavation, trenching, and backfilling for underground pipelines and appurtenances.
- 6.2 CONTROL OF GROUNDWATER:** Trenches shall be kept free from water during excavation, fine grading, pipe laying and jointing, and pipe embedment operations in an adequate and acceptable manner. Where the trench bottom is mucky 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, such groundwater shall be lowered to the extent necessary to keep the trench free from water and the trench bottom stable when the work within the trench is in progress. The discharge from trench dewatering shall be conducted to natural drainage channels, gutters, or drains. Surface water shall be prevented from entering trenches.
- 6.3 EXCAVATION FOR PIPELINES:** Excavation for pipelines shall follow lines parallel to and equidistant from the location of the pipe centerline. Trenches shall be excavated to the depths and widths required to accommodate the construction of the pipelines, as follows:
- A. **EXCAVATION DEPTH:** Except in ledge rock, cobble rock, stones or water-saturated earth, mechanical excavation of trenches shall not extend below an elevation 4 inches above the bottom of the pipe after placement in its final position. All additional excavation necessary for preparing of the trench bottom shall be made manually. Excavation shall not be carried below the grade shown on the drawings. Any unauthorized excavation made below grade for any reason shall be backfilled in accordance with these specifications.
 - B. **BEDDING:** Excavation for trenches in ledge rock, cobble rock, stones, mud, or other material unsatisfactory for pipe foundation shall extend to a depth of at least 4 inches below the bottom of the pipe. A bedding of special material shall be placed and thoroughly compacted with pneumatic or mechanical tampers in 4 inch thick lifts to provide a smooth, stable foundation. Special foundation material shall consist of suitable earth materials free from roots, sod, or organic matter.
 - C. **BASE GRAVEL:** Where unstable earth is encountered in the excavation at the grade of the pipe, a minimum of 12 inches below grade will be removed and backfilled with crushed rock or gravel to provide a stable subgrade.
 - D. **TRENCH WIDTH:** Unless otherwise permitted by the City Engineer, the maximum width of trench, measured at the top of the pipe, shall be as narrow as possible.

- E. **SERVICE LATERALS:** Excavation for pipelines under existing curb and gutter, concrete slabs or sidewalks shall be open cut. In no case shall tunneling be allowed. At the option of the City Engineer, jacking or other approved trenchless methods under permanent facilities may be allowed based on his direction. Backfill of open cut areas shall be restored as specified in Section 6.7.

- 6.4 GRAVEL FOUNDATION FOR PIPE:** Wherever the sub grade material does not afford a sufficiently solid foundation to support the pipe and superimposed load, where water must be drained to maintain a dry trench bottom for pipe installation, and at other locations as previously defined, the sub grade shall be excavated to the specified depth and replaced with crushed rock or gravel. Gravel for pipe foundation shall be clean, crushed rock or gravel conforming to the following gradation:

Screen	% Passing
1-1/2"	100
No. 4	5

The gravel material shall be deposited over the entire trench width in 6 inch maximum layers; each layer shall be compacted by tamping, rolling, vibrating, spading, slicing, rodding, or by a combination of two or more of these methods. In addition, the material shall be graded to produce a uniform and continuous support of the installed pipe.

- 6.5 BLASTING:** Blasting will not be allowed except by special permission of the City Engineer. When the use of blasting is necessary, the Contractor shall use utmost care not to endanger life or property. The Contractor shall be licensed to do the work and shall comply with all laws, ordinances, and applicable safety code requirements and regulations relative to the handling, storage, and use of explosives and protection of life and property, and he shall be fully responsible for all damage attributable to his blasting operations. Signals warning persons of danger shall be given before any blast. Suitable weighted plank coverings of timber mats shall be provided to confine all materials lifted by blasting within the limits of the excavation or trench. Seismic instrumentation shall be provided by the contractor as required by the City Engineer.

Excessive blasting or overshooting will not be permitted, and any material outside the authorized cross section which may be shattered or loosened by blasting shall be removed at the Contractor's expense. The City Engineer shall have authority to order any method of blasting discontinued which leads to overshooting or is dangerous to the public or destructive to property or to natural features.

- 6.6 SHEETING, BRACING, AND SHORING OF EXCAVATIONS:** Excavation shall be sheeted, braced, and shored as required to support the walls of the excavations to eliminate sliding and settling and as may be otherwise required to protect the workmen and existing utilities, structures, and improvements. All such sheeting, bracing, and

shoring and side slopes shall comply with the requirements of the Utah State Industrial Commission and OSHA. All damage resulting from lack of adequate sheeting, bracing and shoring shall be the responsibility of the Contractor and the Contractor shall accomplish all necessary repairs or reconstruction resulting from such damage.

- 6.7 BACKFILLING:** Backfill shall be carefully placed around and over pipes and shall not be permitted to fall directly on a pipe from such a height or in such a manner as to cause damage. In these specifications the process of preparing the trench bottom to receive the pipe and the backfilling on each side of the pipe to a level over the top of the pipe is defined as bedding. Bedding requirements are as defined in the South Ogden Public Works Standard Drawings and in the Specifications for each pipe type. Backfill around the pipe to the level indicated in the Standard Drawings shall not contain rocks more than 2 inches in diameter and shall be free from sod, vegetation, and other organic or deleterious materials. Trench backfilling above the level of the pipe bedding shall normally be accomplished with native excavated materials and shall be free from rocks larger than 4 inches in diameter.

- 6.8 COMPACTION OF BACKFILL:** Compacted backfill shall be placed by means of pneumatic tire rollers, hoe packs or other mechanical tampers of a size and type approved by the City Engineer. The backfill in all utility trenches shall be compacted according to the requirements of the materials being placed. Under pavements or other surface improvements the in-place density shall be a minimum of 95% of laboratory standard maximum dry density as determined by ASTM D-1557. In shoulders and other areas the in-place density shall be a minimum of 90% of laboratory standard maximum dry density, as determined by the same laboratory method. A City approved testing laboratory shall provide in-place density tests at various depths throughout the trench backfill. In-place density tests shall be taken every 200 lineal feet of trench section, per 2 vertical feet (mainline and service laterals) unless otherwise directed by the City Engineer. A copy of all in-place density tests shall be delivered to the City Public Works Department for review and approval. Any portion of the trench backfill which does not meet the minimum compaction requirements of this section, shall be removed, re-compacted and retested at the cost of the Contractor until passing tests are obtained.

The material shall be placed at a moisture content such that after compaction the required relative densities will be produced; also, the material shall be placed in lifts which, prior to compaction, shall not exceed 12 inches (8 inch maximum lifts in the pipe bedding section) or as recommended by the project soils engineer. Prior to compaction, each layer shall be evenly spread and moistened, if required, as approved by the project soils engineer. Approval of equipment, thickness of layers, moisture content, and compactive effort shall not be deemed to relieve the Contractor of the responsibility for attaining the specified minimum relative densities. The Contractor, in planning his work, shall allow sufficient time to make tests for relative densities for the approval of the City Engineer.

- 6.9 IMPORTED BACKFILL MATERIAL:** In the event the native excavated materials appear to be very difficult to compact or are unacceptable as backfill in the opinion of the City Engineer, the Contractor shall furnish and install imported granular material. Unless otherwise approved by the City Engineer, this granular material shall pass a 3 inch square sieve and shall not contain more than 15% of material passing a 200 mesh sieve, and shall be free from sod, vegetation, and other organic or deleterious materials.

~ END OF SECTION ~

SECTION 7

CONCRETE PIPE

- 7.1 GENERAL:** This section covers the requirements for pipe materials and installation of concrete pipe. Concrete pipe may be used for storm drainage systems, irrigation piping and sanitary sewer (If the proposed sewer line is 21 inches in diameter or greater). The minimum size for concrete pipe in drainage systems is 15 inches in diameter or as approved by the City Engineer.
- 7.2 PIPE MATERIALS:** Selection of the appropriate concrete pipe design strength shall be according to the Concrete Pipe Design Manual (American Concrete Pipe Association, latest edition). The following minimum standards shall apply:
- A. **Reinforced Concrete Pipe:** All reinforced concrete pipe used in the construction shall be of the rubber gasket type, bell and spigot joint design, conforming to the requirements of the latest revision of ASTM Designation C-76. Pipe class shall be as shown on the approved drawings. If pipe class is not shown, Class III pipe shall be used. The minimum joint length of all pipe provided shall be 7-1/2 feet, or as approved by the City Engineer.
 - B. **Non-reinforced Conc. Pipe:** All non-reinforced concrete pipe shall be of the rubber gasket type bell and spigot joint design conforming to the latest revision of ASTM Designation C-14 - Class 3.
 - C. **Bell and Spigot Joints:** Bell and spigot joints, including rubber gaskets, shall conform to the requirements of the latest revision of ASTM Designation C-443. The Pipe joint shall be so designed as to provide for self centering, and when assembled, to compress the gasket to form a watertight seal. The gasket shall be confined in a groove on the spigot, so that pipe movement or hydrostatic pressure cannot displace the gasket.
- 7.3 PIPE LAYING:** All pipe installation shall proceed upgrade on a stable foundation, with joints closely and accurately fitted. Rubber gaskets shall be fitted properly in place, and care shall be taken in joining the pipe units to avoid twisting of gaskets. Joints shall be clean and dry, and a joint lubricant as recommended by the pipe supplier shall be applied uniformly to the mating joint surfaces to facilitate easy positive joint closure.

Pipe shall be installed with uniform bearing under the full length of the barrel, with suitable excavations being made to receive pipe bells.

Select material shall be compacted around the pipe to firmly bed the pipe in position. If adjustment of position of a pipe length is required after being laid, it shall be removed

and rejointed as for a new pipe. When laying is not in progress, the ends of the pipe shall be closed with a tight-fitting stopper to prevent the entrance of foreign material.

In addition to the above requirements, all pipe installation shall comply with the specific requirements of the pipe manufacturer and the American Concrete Pipe Association.

- 7.4 FOUNDATION FOR PIPE:** Wherever the subgrade material does not afford a sufficiently solid foundation to support the pipe and superimposed load, and where groundwater must be drained, the subgrade shall be excavated to such a depth as may be necessary and replaced with crushed rock or gravel compacted into place.

Gravel for concrete pipe foundation shall be clean crushed rock or gravel with 100% passing a 2 inch screen and 5% passing a No. 4 sieve.

The foundation material directly beneath the centerline of the pipe and extending one-sixth the pipe diameter on both sides of the centerline shall consist of loosely placed uncompacted bedding. Before preparing the foundation beneath the pipe, the trench bottom shall be excavated or filled and compacted to an elevation sufficiently above the grade of pipe so that, when completed, the pipe will be true to line and grade. Bell holes shall be excavated so that only the barrel of the pipe receives bearing from the trench bottom.

- 7.5 INSTALLATION REQUIREMENTS FOR LINE AND GRADE:** All concrete pipe shall be installed accurately to the defined line and grade with the following limits:

Variance from established line and grade shall not be greater than 1/16 inch per inch of pipe diameter in 10 feet, and not to exceed 1/2 inch in 10 feet, provided that such variation does not result in a level or reverse sloping invert; provided also that variation in the invert elevation between adjoining ends of pipe, due to non-concentricity of joining surface and pipe interior surfaces, does not exceed one sixty-fourth 1/64 inch per inch of pipe diameter, or 1/2 inch maximum.

- 7.6 PIPE BEDDING:** Pipe bedding is the material placed within the pipe bed zone as defined on the Public Works Standard Drawings. Pipe bedding shall conform to a Type 2 standard installation as defined by the Concrete Pipe Design Manual (American Concrete Pipe Association, latest edition).

All pipe sewers and drains shall be protected from lateral displacement and possible damage resulting from impact or unbalanced loading during backfilling operations by being adequately bedded. Pipe Bedding materials shall be loose earth, free from lumps; sand or gravel, free from rocks larger than 1-1/2 inch in any dimension; with all materials free from roots, sod, or other vegetable matter.

Pipe bedding materials placed below the spring-line of the pipe shall be deposited and compacted in layers not to exceed 8 inches in uncompacted depth. Granular pipe bedding materials consisting of rock or gravel may be placed in thicker lifts if the Contractor can demonstrate adequate consolidation and compaction of the bedding material. Deposition and compaction of bedding materials shall be done simultaneously and uniformly on both sides of the pipe. Compaction shall be accomplished with hand or mechanical compactors and vibrators. Compaction requirements for the pipe bedding materials below the spring line of the pipe shall conform to a Type 2 standard installation. Compaction of bedding materials above the spring line of the pipe shall be according to trench backfill requirements. All backfill in the pipe zone shall be placed in a manner that minimizes the risk of damage to the pipe.

In the event that trench materials are not satisfactory for pipe bedding, import pipe bedding material will be required. Import pipe bedding material below the spring-line of the pipe shall be graded as follows: 100% passing a 1 inch screen and no more than 5% passing a No. 4 sieve.

7.7 INSPECTIONS AND TESTS: As directed by the City Engineer and prior to acceptance by the City, the Contractor will be required to conduct and successfully pass an internal pipe inspection. Testing shall only be completed after installation of main lines, branch lines, and manholes. All testing shall be completed in the presence of the City Engineer or his representative. The cost of the internal pipe inspection shall be borne by the Contractor, Developer, or Project Manager. The internal inspection shall be completed as follows:

- A. Video Pipe Inspection: The Contractor or his representative (a qualified firm or individual agreed up on by the City Engineer and the Contractor) shall furnish labor, equipment, and materials, including camera and either digital media or video tape, and shall perform, in the presence of a City Representative, an recorded visual internal inspection of the completed pipe before it can be placed in service. Prior to the internal inspection, the pipeline being tested shall be flushed with clean water and allowed to free drain. The residual water shall not be removed in any way prior to the test. If all of the flushing water is removed, an amount of water shall be introduced into the farthest upstream manhole and will be allowed to flow through the newly installed pipes to expose potential low spots or “bellies”. The Contractor shall supply the City with a copy of the recorded inspection. The internal inspection results shall be subject to the approval by the City Engineer or authorized South Ogden City Public Works official. Any defects in the pipe or the pipe installation noted on the recorded internal inspection shall be corrected by the contractor and the repaired section shall be video inspected after the repair to verify that the defective section has been corrected.

As directed by the City Engineer, the contractor may also be required to conduct one or both of the tests indicated below. All testing shall be completed in the presence of the

City Engineer or his representative. The cost of all pipe testing shall be borne by the Contractor, Developer, or Project Manager.

- B. Infiltration Test: The Contractor shall furnish labor, equipment and materials, including pumps, and shall assist the City Representative in making infiltration tests of the completed sewer before it can be placed into service. The Contractor shall furnish and install the measuring weirs or other measuring devices. The length of line to be tested at any time shall be subject to the approval of the City Engineer. The maximum allowable infiltration shall not exceed 150 gallons per inch diameter per mile per 24 hours for all installed pipe. If pipe is used for sanitary sewer, no infiltration is allowed. If the quantity of infiltration is in excess of the maximum allowable, the leaking joints shall be repaired to the satisfaction of the City Engineer at the expense of the Contractor.
- C. Air Testing: The Contractor or his representative (a qualified firm or individual agreed upon by the City Engineer and the Contractor) shall furnish labor, equipment, and materials, including pumps and compressors, and shall perform, in the presence of the City Representative, air tests of the completed pipe before it can be placed in service. Each section of sanitary sewer pipeline between manholes shall be tested after all the service laterals (and plugs) have been installed. Each test section shall be pressurized to 4.0 psi. For the purpose of stabilizing the air pressure in each test section, the 4.0 psi pressure shall be maintained for a two-minute period. Each test section shall then be re-pressurized to 4.0 psi for a period of four minutes. The test section shall be accepted if, after four minutes, the pressure gauge indicates 3.5 psi or greater. Failure of the Contractor's testing equipment to properly function shall render the test unacceptable. All faulty sections of pipe line shall be repaired and retested until the minimum air testing requirements have been met.

- 7.8 SEWER LATERAL CONNECTIONS:** All sewer lateral connections into new sewer mains shall be through pre-formed wye connections. All connections into existing sewer line shall be done with a sewer tapping machine and as shown on the City Standard Drawings. The Contractor shall furnish all materials and perform all labor to tap the existing main and install the required tapping saddle. In some cases the City Engineer or Public Works director may allow inserta-tee lateral connections in place of pre-formed wye connections. Inserta-tees shall be installed according to the manufacturers recommendations.

~ END OF SECTION ~

SECTION 8

PVC PLASTIC SEWER PIPE

- 8.1 GENERAL:** This section covers the requirements for PVC plastic sewer pipe. PVC plastic sewer pipe may be used in sanitary sewers and laterals.
- 8.2 MATERIALS:** PVC plastic sewer pipe shall be made of compound conforming to ASTM D-1784 with a cell classification of 13364-B and a minimum tensile modular of 500,000 psi. PVC sewer pipe must meet all the dimensional, chemical, and physical requirements outlined in ASTM D-3034, and shall have a maximum SDR of 35.0 for diameters from 4 inches to 15 inches. Pipe diameters from 18 to 21 inches shall conform to ASTM F-679. Pipe shall be supplied in 20-foot laying lengths and carry the IAPMO UPC Seal of Approval. SDR and laying length may be modified as conditions dictate when approved by South Ogden Public Works or the City Engineer. PVC sewer pipe shall be installed according to the requirements of ASTM D-2321 and the manufacturer's requirements. Sanitary sewer pipe shall be "green" in color.
- 8.3 JOINTS:** Joints for PVC plastic sewer pipe shall be of the rubber gasket bell and spigot type, and the rubber gaskets shall conform to ASTM D-1869.
- 8.4 FITTINGS:** Fittings shall be made of PVC plastic conforming to ASTM D-1784, have a cell classification as outlined in ASTM D-3034, and carry the IAPMO UPC Seal of Approval.
- 8.5 PIPE LAYING:** All pipe installation shall proceed up grade on a stable foundation with joints closely and accurately fitted. Manufacturers' installation requirements shall be rigidly observed.

Rubber gaskets shall be fitted properly in place and care shall be taken in joining the pipe units to avoid twisting of gaskets. Joints shall be clean and dry and a joint lubrication, as recommended by the pipe supplier, shall be applied uniformly to the mating jointing surfaces to facilitate easy positive joint closure.

Pipe shall be installed with uniform bearing under the full length of the barrel with suitable excavations being made to receive pipe bells. Select material shall be compacted around the pipe to firmly bed the pipe in position. If adjustment of position of a pipe length is required after being laid, it shall be removed and rejointed as for a new pipe. When laying is not in progress, the ends of the pipe shall be closed with a tight-fitting stopper to prevent the entrance of foreign material.

In addition to the above requirements, all pipe installation shall comply to the specific requirements of the pipe manufacturer.

8.6 FOUNDATION FOR PIPE: Wherever the subgrade material does not afford a sufficiently solid foundation to support the pipe and superimposed load, it shall be excavated to such depth as may be necessary and replaced with crushed rock compacted into place. Gravel foundation material for pipe shall be placed only when, and to the depth, requested by the Engineer or as specified on the Drawings. Gravel for PVC pipe foundations shall be clean crushed rock or gravel with 100% passing a 1 inch screen, a maximum of 5% passing a No. 4 sieve, and no more than 5% passing the #200 sieve or other granular material as approved by the City Engineer.

8.7 INSTALLATION REQUIREMENTS FOR LINE AND GRADE: All sewer pipe shall be installed accurately to the defined line and grade with the following limits:

Variance from established line and grade shall not be greater than 1/32 of an inch per inch of pipe diameter and not to exceed ½ inch, provided that such variation does not result in a level or reverse sloping invert; provided also, that variation in the invert elevation between adjoining ends of pipe, due to non-concentricity of joining surface and pipe interior surfaces, does not exceed 1/64 inch per inch of pipe diameter, or one-half ½ inch maximum.

8.8 PIPE BEDDING: Pipe bedding is the material placed within the pipe bed zone as defined on the Public Works Standard Drawings. All pipe bedding materials, placement, and compaction shall conform to recommendations of the pipe manufacturer. All pipe shall be protected from lateral displacement and possible damage resulting from impact or unbalanced loading during backfilling operations by carefully compacting suitable pipe bedding material (native or imported as approved by the City) in the pipe zone.

Pipe bedding material shall consist of select granular backfill material or satisfactory material free from rocks 1-1/2 inches or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer, whichever is smaller. Extra fine sand, clay, silt or large soil lumps shall not be allowed as pipe bedding. Backfill shall be placed in layers not exceeding 10 inches loose thickness and then carefully and uniformly compacted to 95% of ASTM D-1557 density using hand or mechanical compactors and vibrators. Granular pipe bedding materials consisting of rock or gravel may be placed in thicker lifts if the Contractor can demonstrate adequate consolidation and compaction of the bedding material. Backfill above the pipe bed zone shall be placed in accordance with requirements for excavation and backfill of trenches.

In the event that native trench materials are not satisfactory for pipe bedding, import bedding materials will be required. Import bedding shall consist of granular material graded as follows: 100% passing a 1 inch screen and no more than 5% passing a No. 4 sieve or other granular material as approved by the City Engineer.

8.9 TESTS: As directed by the City Engineer and prior to acceptance by the City, the Contractor will be required to conduct and successfully pass an internal pipe inspection.

Testing shall only be completed after installation of main lines, branch lines, and manholes. All testing shall be completed in the presence of the City Engineer or his representative. The cost of the internal pipe inspection shall be borne by the Contractor, Developer, or Project Manager. The internal inspection shall be completed as follows:

- A. INTERNAL PIPE INSPECTION: The Contractor or his representative (a qualified firm or individual agreed up on by the City Engineer and the Contractor) shall furnish labor, equipment, and materials, including camera and either digital media or video tape, and shall perform, in the presence of a City Representative, an recorded visual internal inspection of the completed pipe before it can be placed in service. Prior to the internal inspection, the pipeline being tested shall be flushed with clean water and allowed to free drain. The residual water shall not be removed in any way prior to the test. If all of the flushing water is removed, an amount of water shall be introduced into the farthest upstream manhole and will be allowed to flow through the newly installed pipes to expose potential low spots or “bellies”. The Contractor shall supply the City with a copy of the recorded inspection. The internal inspection results shall be subject to the approval by the City Engineer or authorized South Ogden City Public Works official. Any defects in the pipe or the pipe installation noted on the recorded internal inspection shall be corrected by the contractor and the repaired section shall be video inspected after the repair to verify that the defective section has been corrected.

As directed by the City Engineer, the contractor may also be required to conduct one or all of the tests indicated below. All testing shall be completed in the presence of the City Engineer or his representative. The cost of all pipe testing shall be borne by the Contractor, Developer, or Project Manager.

- B. INFILTRATION TEST: The Contractor shall furnish labor, equipment and materials, including pumps, and shall assist the City Representative in making infiltration tests of the completed sewer before it can be placed into service. The Contractor shall furnish and install the measuring weirs or other measuring devices. The length of line to be tested at any time shall be subject to the approval of the City Engineer. The maximum allowable infiltration shall not exceed 150 gallons per inch diameter per mile per 24 hours for all installed pipe. If pipe is used for sanitary sewer, no infiltration is allowed. If the quantity of infiltration is in excess of the maximum allowable, the leaking joints shall be repaired to the satisfaction of the City Engineer at the expense of the Contractor.
- C. AIR TESTING: The Contractor or his representative (a qualified firm or individual agreed upon by the City Engineer and the Contractor) shall furnish labor, equipment, and materials, including pumps and compressors, and shall perform, in the presence of the City Representative, air tests of the completed pipe before it can be placed in service. Each section of sanitary sewer pipeline

between manholes shall be tested after all the service laterals (and plugs) have been installed. Each test section shall be pressurized to 4.0 psi. For the purpose of stabilizing the air pressure in each test section, the 4.0 psi pressure shall be maintained for a two-minute period. Each test section shall then be re-pressurized to 4.0 psi for a period of four minutes. The test section shall be accepted if, after four minutes, the pressure gauge indicates 3.5 psi or greater. Failure of the Contractor's testing equipment to properly function shall render the test unacceptable. All faulty sections of pipe line shall be repaired and retested until the minimum air testing requirements have been met.

- D. **PIPE DEFLECTION TEST:** The Contractor or his representative (a qualified firm or individual agreed upon by the City Engineer and the Contractor) shall furnish labor, equipment and materials to perform a pipe deflection test in the presence of a City Representative. Those performing this test shall pass a pipe mandrel or other approved devices through the completed pipe sections to determine the degree of pipe deflection in the PVC pipe. Testing for pipe deflection in PVC pipe cannot be performed until the completed pipe section has been installed for a minimum period of 30 days complete with the total anticipated backfill height over the pipe sections being tested. Pipe deflection testing shall be considered passing when all tested pipe sections show a pipe deflection not exceeding 5% of the pipe diameter. The contractor shall provide the City with a copy of all pipe deflection results. Any excessive deflections in the completed pipe section shall be corrected by the contractor and the repaired section shall be retested after the repair to verify that the defective section has been corrected.

- 8.10 SEWER LATERAL CONNECTIONS:** All sewer lateral connections into new sewer mains shall be through pre-formed wye connections. All connections into existing sewer line shall be done with a sewer tapping machine and as shown on the South Ogden Public Works Standard Drawings. The Contractor shall furnish all materials and perform all labor to tap the existing main and installed the required tapping saddle. In some cases, the City Engineer may allow inserta-tee lateral connections. Inserta-tees shall be installed according to the manufacturers recommendations.

~ END OF SECTION ~

SECTION 9

SEWER MANHOLES

- 9.1 GENERAL:** Manhole bases may be either precast or cast-in-place unless otherwise specified. Precast manhole bases shall have pipe inverts, a neoprene boot with strap for each pipe connecting to the manhole, and a minimum of 6 inches of compacted gravel base under the manhole. Cast-in-place pipe connections may also be utilized as outlined on the drawings. Where sewer lines enter manholes, the invert channels shall be smooth and semi-circular in cross section, conforming to the details shown on the Standard Drawings. Changes of direction of flows within the manholes shall be made with a smooth curve with as long a radius as possible. The floor of the manhole outside the channels shall be smooth and slope toward the channel at not less than ½ inch per foot.

The connecting boots shall be made of neoprene compound meeting ASTM C-443 Specifications. The boot shall have a wall thickness of ¾ inch. The boot shall either be “cast-in-place” in the precast base or attached to the precast base by means of an internal expanding band. When the boot is attached to the precast base, a watertight seal between the boot and the precast base must be accomplished. An external band shall be supplied and used to clamp and seal the boot to the pipe. The band shall be made of 300 series non-magnetic corrosion-resistant steel. After the band has been placed, it shall be completely coated with a bituminous material approved by the City Engineer.

All junction manholes with three or more pipes located in the base shall be 60 inch inside diameter. All manholes with the mainline size being 12 inch diameter or larger shall be 60 inch inside diameter. All other manholes shall be 48 inch inside diameter. Free drop inside the manholes is not permitted.

- 9.2 STEPS:** If required by South Ogden City Public Works, steps for precast manholes and cast-in-place vaults shall be polypropylene coated steel steps with 1'-0" maximum spacing.
- 9.3 JOINTS:** Joints shall be cement mortar, or an approved mastic or rubber gasket, or an approved combination of these types. Manhole and vault joints shall be water tight. Mortar joints shall be completely filled and shall be smooth and free from surplus mortar on the inside of the manhole or vault. Mortar and mastic joints between precast rings shall be full-bedded in jointing compound and shall be smoothed to a uniform surface on both the interior and exterior of the manhole. Installation of rubber gasket joints between precast rings shall be in accordance with the recommendations of the manufacturer.
- 9.4 FRAMES AND COVERS:** Unless otherwise indicated by the City Engineer, the frames and covers shall be so set that the top of the cover will be flush with finished pavement grade or 2 inches higher than finished grade in unpaved areas. Each cover shall contain 1 pick hole but shall not contain air vent holes. The cover shall be marked “SEWER”.

~ END OF SECTION ~

SECTION 10

DUCTILE IRON PIPE

- 10.1 GENERAL:** This section covers the requirements for ductile iron pressure pipe materials and installation.
- 10.2 MATERIALS:** Ductile iron pipe shall conform to all requirements of AWWA C151, “Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand Lined Molds, for Water or Other Liquids.” Pipe shall be Class 51.
- 10.3 JOINTS:**
- A. **MECHANICAL JOINTS:** All mechanical joints shall meet the requirements of AWWA C110 and C111. All gasket surfaces shall be smooth and free from imperfections. Gaskets shall conform to tests in accordance with specifications and shall be less than one year old.
 - B. **PUSH-ON-JOINTS:** All push-on joints shall meet the requirements of AWWA C111. Gaskets shall be free from defects and less than one year old.
 - C. **LUBRICANTS:** All Lubricants shall be non-toxic and have no deteriorating effects on gasket materials. It shall not impart taste to water in a pipe. It shall conform in every way to ANSI 21.11.
 - D. **FLANGED JOINTS:** Flanged joints shall be bolted firmly with machine, stud or cap bolts of proper size. Flanges may be cast integrally with the pipe or may be screwed on threaded pipe. Flanges shall be faced and drilled and of proper dimensions for size and pressure required. All flanges shall meet requirements of AWWA C110 and C115.
 - E. **BOLTS AND NUTS:** Unless otherwise specified, shall be made of the best quality refined iron or steel and have clean, well-fitted threads. Bolts will be provided with standard hexagonal nuts and standard hexagonal heads. Bolts shall be of the diameter required for each flange, and, when installed, shall be length so that no more than 3/8 inch or less than 1/8 inch extends past face of nut. Gaskets shall be 1/16 inch thick, made of best quality sheet gasket material or equal. A gasket for each flanged joint of proper size, ring type or full face as shown on the drawings.
 - F. **COMPRESSION JOINTS:** Compression joints shall be mechanical joint sleeve, Rockwell 441, Rockwell 912 Flange adaptor or approved equal.
- 10.5 PIPE LAYING:** Ductile iron pipe shall be laid as specified in AWWA C-600, except as modified herein and in Special Conditions.

- A. **FITTINGS:** Tees, elbows and crosses, and reducers shall be used for changes in direction and outlets, as shown on the drawings.
- B. **ANCHORS:** Anchors and thrust blocks shall be placed at valves, elbows, tees, etc., or as directed by the City Engineer.
- C. **JOINT FITTING AND LUBRICATION:** All ductile iron pipe installation shall proceed on a stable foundation with joints closely and accurately fitted. Joints shall be clean and dry and a joint lubricant, as recommended by the pipe supplier, shall be applied uniformly to the mating joint surfaces to facilitate easy, positive joint closure.
- F. **ALIGNMENT:** Each pipe shall be laid true to line and grade and in such a manner as to form a close concentric joint with adjoining pipe and to prevent sudden offsets to the flow line.
- G. **PROTECTION AND CLEANING:** As work progresses, the interior of the pipe shall be cleared of dirt and superfluous materials of every description. Where a cleaning after laying is difficult because of small pipe size, a suitable swab or drag shall be kept in the pipe and pulled forward past each joint immediately after jointing has been completed. Trenches shall be kept free from water until pipe jointing has set and pipe shall not be laid when condition of the trench weather is unsuitable for such work. At all times when work is not in progress, all open ends of the pipe and fittings shall be securely closed to the satisfaction of the South Ogden City Public Works or the City Engineer so that no water, earth, or other substance will enter the pipe or fittings.

10.7 GRAVEL FOUNDATION: Wherever the subgrade material does not afford a sufficiently solid foundation to support the pipe and superimposed load and where groundwater must be drained, the subgrade shall be excavated to such depth as may be necessary and replaced with crushed rock or gravel compacted into place. Gravel for ductile iron pipe foundations shall be clean, crushed rock or gravel with 100% passing 2 inch screen and 5% passing a No. 4 sieve or other granular material as approved by the City Engineer.

10.8 PIPE BEDDING: All pipes shall be protected from lateral displacement and possible damage resulting from impact or unbalanced loading during backfilling operations by being adequately bedded.

A groove shall be excavated in the bottom of the trench to receive the bottom quadrant of the pipe. Before preparing the groove, the trench bottom shall be excavated or filled and compacted to an elevation sufficiently above the grade of the pipe so that, when completed, the pipe will be true to line and grade. Bell holes shall be excavated so that only the barrel of the pipe receives bearing from the trench bottom.

Pipe bedding materials placed at any point below the midpoint of the pipe shall be deposited and compacted in layers not to exceed 6 inches in uncompacted depth. Depositions and compaction of bedding materials shall be done simultaneously and uniformly on both sides of the pipe. Compaction shall be accomplished with hand or mechanical compactors. All bedding materials shall be placed in the trench with hand tools or other approved methods in such a manner that they will be scattered alongside the pipe and not dropped into the trench in compact masses. Bedding materials shall be loose earth, free from lumps; sand materials free from roots, sod, or other vegetative matter.

In the event trench materials are not satisfactory for pipe bedding, modified bedding will be required. Modified bedding shall consist of placing compacted granular material on each side of and to the level of 12 inches above the top of the pipe. Modified bedding material shall be graded as follows: 100% passing a 1 inch screen and 5% passing a No. 4 sieve or other granular material as approved by the City Engineer.

10.9 CORROSION PROTECTION: In areas where corrosive soils may be present, the City Engineer may require either C900 PVC pipe or ductile iron pipe installed with encasement wrap of polyethylene plastic wrap for the entire length of the pipeline materials, including all fittings and valves, in accordance with the manufacturer's specifications. Polyethylene encasement wrap shall consist of one or more wraps of sheet polyethylene plastic to produce a minimum thickness of 8 mils over all surfaces. The wrap shall be sufficiently loose so that it will contact all surfaces without tension after backfilling. The wrap shall extend one foot over adjacent surfaces. The overlap at edges of the plastic shall be a minimum of one foot and the laps shall be secured in place. Ends of the wrap shall be secured by circumferential bands on 1 inch wide polyethylene plastic tape applied under light tension.

Where required, all compression couplings, mechanical joints, flanged joints, and valves exposed to soil shall be wrapped with 8 mil thick polyethylene film adhesive tape equal to Polyken No. 900 or Scotchrap No. 50. The tape shall be installed to adhere securely to both the pipe and polyethylene. Enough film shall be used to overlap the adjoining pipe a minimum of 1 foot.

Valves shall be wrapped by bringing the wrap on the adjacent pipe over the bells of flanges of the valve and sealing with the adhesive tape. The valve bodies are then wrapped with a flat sheet of the film passed under the valve bottom and brought up around the body to the stem and fastened in place with the adhesive tape.

All fittings that require concrete blocking should be completely wrapped prior to pouring the concrete thrust block.

Polyethylene wrap shall be protected from the sun and weathering prior to use. Care shall be exercised during backfilling of the protected areas to prevent puncturing the film. The bottom of the trench shall be shaped to give substantially uniform circumferential support of the lower third of each pipe.

10.10 PIPE SIZES: If the size of any piping is not clearly evident in the drawings, the Contractor shall request instructions from the City Engineer as to the proper sizing. Any changes resulting from the Contractor's failure to request clarification shall be at the Contractor's expense.

10.11 CLEANING AND FLUSHING: The Contractor shall take every precaution to remove dirt, grease, and all other foreign matter from each length of piping before making connections in the field. After each section of piping is installed, it shall be thoroughly cleaned to remove rocks, dirt, and other foreign matter by washing, sweeping, scraping, or other method that will not harm the lining of the pipe.

The Contractor shall furnish water required for flushing. All temporary connections for flushing and drainage shall be furnished, installed, and subsequently removed by the Contractor.

All open ends of pipes shall be bulkhead or plugged when workmen are not on the job or in the immediate area to prevent rocks or other foreign matter from entering the pipe.

10.12 SERVICE CONNECTIONS: Service Connections to ductile iron pressure pipe shall be as follows:

- A. 3/4" or 1" service connections to ductile iron pressure pipe shall be through either a straight or tapered direct tap (AWWA thread) with Teflon tape to be spirally wrapped completely around the thread area prior to insertion of the corporation stop. The minimum distance between taps is 36 inches with a 5 degree stagger. Service taps that are within 36 inches of the end of the pipe are not permitted.
- B. 1-1/2" or 2" service connections shall be made by a bronze double strap service saddles. Reducing bushings shall be of nylon. The minimum distance between taps is 36 inches with a 5 degree stagger. Service taps that are within 36 inches of the end of the pipe are not permitted.

~ END OF SECTION ~

SECTION 11

DUCTILE IRON PIPE FITTINGS

11.0 GENERAL: This section applies to the furnishing and installing ductile iron pipe fittings.

11.1 DUCTILE IRON FITTINGS: Fittings shall be of the short body design and shall meet ANSI/ AWWA C153/ A21.53 "Ductile Iron Compact Fittings, 3 Inch Through 24 Inch and 54 Inch Through 64 Inch for Water Service" and shall have mechanical or push-on rubber gasket type joints. Fittings inside structures or where otherwise noted on the drawings shall be ASA Class 125 flanged design with full face rubber gaskets.

11.2 FITTINGS:

- A. **MECHANICAL JOINTS:** All mechanical joint glands, bolts, nuts and gaskets shall be in accordance with the requirements of and possess a minimum working pressure 350 psi. All gaskets surfaces shall be smooth and free from imperfections. All mechanical joint gaskets shall conform to tests in accordance with construction specifications and shall be less than one year old.

Bolts shall meet all requirements of the above reference specifications, honoring all characteristics, tolerances, and tests. All bolts shall be of the proper size and length to match the size of pipe fitting as per drawings.

All mechanical joint fittings and valves shall be restrained with mechanical joint retainer glands.

- B. **PUSH-ON JOINTS:** All push-on joints shall meet the requirements of ANSI/ AWWA C111/ A21.11 "Rubber-Gasket Joints for Ductile Iron Pressure Pipe & Fittings." Gaskets shall be free from defects and not over one year old. A method of providing joint restraint within the socket shall be available as specified.

Lubricants shall be non-toxic and have no deteriorating effects on gasket materials. It shall not impart taste, odor or flavor to water in a pipe. It shall conform in every way to ANSI/ AWWA C111/ A21.11.

- C. **FLANGED JOINTS:** Flanged joints shall be bolted firmly with machine, stud or cap bolts of proper size. Flanges may be cast integrally with the pipe or may be screwed or threaded pipe. Flanges shall be faced and drilled and of proper dimensions and class, for size and pressure required. All flanges shall meet requirements of ANSI/ AWWA C110/ A21.10 "Ductile-Iron & Gray-Iron Fittings, 3 Inch Through 48 Inch, for Water and Other Fittings, or ANSI/ AWWA C115/ A 21.15, "Flanged Ductile-

Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges" and ANSI/ AWWA C153/ A21.53.

Bolts and nuts, unless otherwise specified, shall be made of the best quality refined iron or metal steel and have clean, well-fitting threads. Bolts will be provided with standard hexagonal nuts and standard hexagonal heads. Bolts shall be of the diameter required for each flange and, when installed, shall be of length so that no more than 3/8-inch or less than 1/8-inch extends past face of nut. Gaskets shall be 1/16-inch thick, made of best quality sheet gasket material or equal. A gasket for each flange joint of proper size, ring type or full face shall be installed as shown on approved drawings.

All flanges shall be faced and drilled. Where cap screws or stud bolts are needed, flanges shall be tapped to support cap screws or stud bolts as per approved drawings.

11.3 INSTALLATION: All pipe fittings shall be installed as specified in AWWA C600 "Installation of Ductile-Iron Water Mains and Their Appurtenances," except as modified herein and in special conditions approved by the City Engineer.

Tees, elbows, crosses, and reducers shall be used for changes in direction and outlets, unless otherwise specified on the approved drawings.

Joint restraints, and thrust blocks shall be placed at valves, elbows, tees, etc., unless otherwise directed by the City Engineer.

All ductile iron pipe fitting installation shall proceed on a stable foundation, with joints closely and accurately fitted. Joints shall be clean and dry, and a non-toxic joint lubricant, as recommended by the pipe supplier, shall be applied uniformly to the mating joint and gasket surfaces to facilitate easy, positive joint closure. All push-on joints shall have brass wedges as supplied by the pipe manufacture, and installed as per standard push-on joint specifications unless otherwise directed by the City Engineer.

All pipe fittings shall be installed with uniform bearing under the full length. The Contractor shall provide suitable excavations receive each type of fitting as specified to ensure quality installation and service performance. All fittings shall be protected from lateral displacement and possible damage resulting from impact or unbalanced loading during backfilling operations by being adequately bedded.

Select material shall be compacted around the pipe fittings to firmly bed the fittings into position. If adjustment of position of a fitting, for the purposes of length, is required after being installed, the fitting shall be removed and rejoined as for new installation. In addition

to the above requirements, all fitting installation shall comply with the specific requirements of the pipe manufacturer.

As work progresses, the interior of all pipe and fittings shall be cleared of dirt and superfluous materials. Where cleaning after laying is difficult because of small pipe diameter, a suitable swab or drag shall be kept in the pipe and pulled forward past each joint immediately after jointing has occurred. At all times when work is in progress, all open ends of the fittings shall be securely closed to the satisfaction of the City Engineer, so that no water, earth, or other substance will enter fittings.

- 11.4 POLYETHYLENE WRAPPING:** Ductile iron pipe fitting materials may be required to be wrapped, at the direction of City Engineer with a polyethylene plastic wrap the entire length of the fitting, including all fittings and valves, in accordance with ANSI/ AWWA C105/ A21.5 "Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids" and the manufacturer's specifications. This shall be completed in order to provide the necessary cathodic protection required when fittings may be placed in contact with corrosive soils.

Polyethylene encasement wrap shall consist of one (1) or more wraps of sheet polyethylene plastic to produce a minimum thickness of eight (8) mils over all surfaces. The wrap shall be sufficiently loose so that it will contact all surfaces without tension after backfilling. The wrap shall extend one (1) foot, and the laps shall be secured in place. Ends of the wrap shall be secured by circumferential bands on one (1) inch wide polyethylene plastic tape applied under light tension.

Where polyethylene wrap is specified, all compression couplings, mechanical joints, push-on joints, flanged joints, fitting, and valves exposed to soil shall be wrapped with polyethylene wrap and the ends shall be sealed with eight (8) mil thick polyethylene film adhesive tape equal to Polyken No. 900 or Scotchrap No. 50. Enough polyethylene wrap shall be used to overlap the adjoining pipe a minimum of 1-foot and the laps shall be secured in place by circumferential bands of 1-inch wide polyethylene plastic tape. The tape shall be installed to adhere securely to both the pipe and polyethylene.

Valves shall be wrapped by bringing the wrap on the adjacent pipe over the bells or flanges of the valve and sealing with polyethylene plastic tape. The valve bodies are then wrapped with a flat sheet of the film passed under the valve bottom and brought up around the body to the stem and fastened in place with polyethylene tape.

All fittings that require concrete blocking should be completely wrapped prior to pouring the concrete backing block.

Polyethylene wrap shall be protected from the sun and weathering prior to use. Care shall be exercised during backfilling of the protected areas to prevent puncturing the film. The

bottom of the trench shall be shaped to give substantially uniform circumferential support of the lower third of each pipe.

All polyethylene wrapped pipe, fittings and valves shall be inspected for proper wrapping by the City Engineer before backfilling.

~ END OF SECTION ~

SECTION 12

VALVES

- 12.1 GENERAL:** This section covers requirements for gate valves, hydrants and miscellaneous items required in the construction of water lines and services.
- 12.2 GATE VALVES:** Gate valves shall meet or exceed the requirements of AWWA C509. Valves shall be of iron body, resilient seat gate with modified wedge disc, non-rising stem design with O-ring seals. Unless otherwise shown or specified, valves shall be of mechanical joint connection design for buried service and flanged connection design for installation in structures. Gate valves shall be Mueller resilient seat gate valves unless approved otherwise by the City Engineer. Buried valves shall have a 2 inch operating nut; valves in structures shall have handwheels.
- 12.3 BUTTERFLY VALVES:** Valves 12 inch diameter and larger can be butterfly type valves if approved by the City Engineer. Butterfly valves shall meet or exceed the requirements of AWWA C504, Class 150 B. Valve bodies shall be cast in conformance to ASTM A126, Class B. Ends shall be flanged unless otherwise specified. Valve discs shall be streamlined and shall have a continuous 360 sealing surface of stainless steel, ASTM A276, type 304. Shafts shall be stainless steel ASTM A276, type 304, of stub construction with at least 1½ shaft diameter engagement into the disc and shall be fastened to the disc with upset pins. Valve seats shall be of Buna N material bonded to the valve body. Bearings shall be self lubricating and non-corrosive and shall have a significant difference in hardness from the valve shaft. Actuators shall be designed as an integral part of the valve and shall meet all the requirements of AWWA C504. All actuators shall be hermetically sealed and permanently lubricated with no exposed moving parts. All manual actuators will meet the requirements of AWWA C504 for nut input.
- 12.4 VALVE BOXES:** All buried gate valves shall be installed complete with a cast iron, 2 piece, slip type, 5-1/4 inch shaft valve box.

~ END OF SECTION ~

SECTION 13

FIRE HYDRANTS

13.0 GENERAL: Hydrants shall be designed, manufactured, and tested in compliance with the latest edition of AWWA C-502 "Standard For Dry Barrel Fire Hydrants." The hydrant main valve shall be a minimum diameter of 5-1/4 inch with two 2-1/2 inch NST hose nozzles, and one 4-1/2 inch NST pumper nozzle. The hydrant shall be supplied complete with a flanged by mechanical joint end auxiliary gate valve with box.

13.1 FIRE HYDRANTS: All fire hydrants shall be designed to conform to AWWA specification C-502 and shall be "Mueller" Model Centurion, 5 1/4-inch valve opening and will be furnished with a mechanical joint 6-inch inlet.

All hydrants shall be supplied complete with two 2 1/2-inch hose nozzles and one 4 1/2-inch pumper nozzle. All nozzles shall be provided with National Standard Threading, nozzle caps and nozzle cap chain.

Each hydrant shall also be supplied with O-ring seals, a National Standard pentagon operating nut which is designed for clockwise rotation closure.

13.2 AUXILIARY VALVE: All hydrants shall be supplied complete with a flange by mechanical joint end auxiliary gate valve with armor guard gasket, and shall be installed at the water main as designated on the Public Works Standards Drawings unless otherwise approved by the City Engineer. All buried auxiliary valves shall have 2-inch operating nuts unless otherwise specified.

13.3 VALVE BOXES: All buried auxiliary valves shall be installed complete with two-piece, cast iron, slip type, 5 1/4-inch valve box. All valve boxes shall be carefully inspected for proper fit between each section, ring and lid, and shall be set to the grade with a concrete collar as specified.

13.4 HYDRANT INSTALLATION: All fire hydrants shall be installed with a 1 cubic yard gravel sump and concrete thrust block. See Public Works Standards specifications for thrust blocking. Concrete shall not be placed around joints, bolts or drain holes. Cover all metal contact areas with a poly wrap material prior to concrete placement. All hydrants shall be installed with the upper safety flange at least 2 1/2-inches and not more than 6-inches above ground level. All hydrants shall be installed with the steamer nozzle facing the street unless otherwise approved by the City Engineer.

Hydrants shall be located in the park strip on property line extensions, offset from the edge of road, or as designated by the City Engineer. Methods and Materials used to re-connect existing hydrants in service shall be the same as those specified for new hydrants.

13.5 SPACING: The maximum fire hydrant spacing shall be 500-feet. The location of fire hydrants will be determined by the City Engineer. .

~ END OF SECTION ~

SECTION 14

TESTING AND DISINFECTION OF WATERLINES

- 14.1 GENERAL:** All water lines shall be flushed, pressure tested, and disinfected as outlined in this section.
- 14.2 FLUSHING:** All pipelines shall be flushed clean of sediment and debris. Flushing shall be accomplished through hydrants or, if a hydrant does not exist at the end of the line, the Contractor shall install a tap sufficient in size to provide for a 2.5-foot per second flushing velocity in the line. The following is the flow quantity required to provide a 2.5-foot per second flushing velocity:

Pipe Size (in.)	Flow (gpm)
4	100
6	220
8	390
10	610
12	880

- 14.3 TESTING:** Tests shall be made upon completion of system installation or any valved portion thereof. All tests shall be made at the expense of the Contractor and in the presence of the City Public Works Inspector.
- A. **PRESSURE TEST:** After completion of the installation of the system, (including water mains and all service laterals) or any reasonable length thereof, and after thorough flushing of the portion to be tested, pressure tests shall be made as follows:
1. The system to be tested shall be subjected to a hydrostatic pressure of 200 pounds per square inch, following AWWA C600-93 procedures, unless otherwise specified, for a period of not less than 2 hours duration with no drop in pressure.
 2. The portion to be tested shall be filled with water slowly and the specified test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the City Public Works Inspector. The Contractor shall make the temporary connection for pressure testing.
 3. Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants. If permanent air vents are not located at all high points, the contractor shall install corporation stops at such points so

that the air can be expelled as the line is filling with water. After all the air has been expelled, the corporation stop valve shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation stop valve shall be removed and plugged by the Contractor with a brass plug.

4. All exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damage or defective pipe, fittings, valves, or hydrants that are discovered following the pressure test shall be repaired or replaced with sound material and the test shall be repeated until it is satisfactory to the City Public Works Inspector, at no cost to the Owner.

B. LEAKAGE TEST: A leakage test shall be conducted concurrently with the pressure test, following AWWA C600-93 procedures.

1. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 p.s.i. of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water.
2. Maximum leakage during the pressure test shall not exceed one gallon per inch diameter per 1000 feet of pipe. Acceptance of installation shall be determined on the basis of allowable leakage.
3. If any test of pipe laid discloses leakage greater than that specified above, the contractor shall, at his own expense, locate and repair the defective material until the leakage is within the specified allowance.
4. All visible leaks, other than a minor amount of sweating, shall require immediate stoppage of the test and tightening of the joints so that, when pressure is again put on the system, there will be no leakage.

C. DISINFECTION: After pressure and leakage testing, all culinary water lines shall be disinfected by chlorination as per AWWA C651-92 and the State of Utah, Public Drinking Water Regulations.

1. Chlorination shall provide a minimum of 30 ppm residual after 24 hours contact in the pipeline. This may be expected with an application of 50 ppm although some conditions may require more. Chlorine, in the form of a 1% slurry of high test calcium hypochlorite (HTH, Perchloron, Pittchlor, etc., which are 70% available chlorine by weight) shall be fed into the pipeline in such a manner as to mix with the water flowing in the pipeline.
2. The following table provides information as to the required quantity of slurry to be used per 100 feet of pipe to provide a chlorine concentration of 50 ppm.

Pipe Size (in.)	Volume of 100 Ft. Length (gal.)	Required Amount of Slurry (gal.)
4	65	0.47
6	147	1.05
8	261	1.87
10	408	2.92
12	588	4.20

3. During the process of chlorinating the pipeline, all valves and other pipeline appurtenances shall be operated several times to provide sufficient contact with the chlorinating agent. Following chlorination, the water line shall be drained and thoroughly flushed and if necessary, re-chlorinated until a satisfactory bacteriological test is obtained.
 4. The Contractor shall notify the City when disinfection is complete and the City shall obtain samples for laboratory testing of final disinfectant residuals.
 5. The Contractor shall comply with Federal Clean Water Act and all other applicable regulations in disposal of all chlorinated water. If necessary, secure permission from Utah "DEQ" or County Health Department for disposal of heavily chlorinated water.
- D. CLEAR WATER TEST: Following disinfection and flushing of the waterline, a clear water test shall be taken in the presence of the City Inspector. A maximum of 1 ppm of chlorine will be allowed to be present in the pipeline. Should a higher residual of chlorine be present, the Contractor shall be required to re-flush the waterline and re-test.
- E. BACTERIA TEST: Two samples shall be obtained by the City for coliform bacterial testing a minimum of 24 hours after flushing the waterline. If the initial sample passes, a second sample will be obtained after a minimum of 24 additional hours. If the second sample passes, the line may be accepted by the City. If either of the samples do not pass, the Contractor will be required to complete additional testing. The costs for additional testing shall be borne by the Contractor.

~ END OF SECTION ~

SECTION 15

CONSTRUCTION AND PLACEMENT OF THRUST BLOCKS

- 15.1 SCOPE:** This section of the specifications defines the placement and the construction of thrust blocks where required. It also gives the concrete mix design requirements for the concrete required in the construction of the thrust blocks.
- 15.2 INSTALLATION:** Thrust blocks are required at points where the pipe changes direction such as; at tall tees, elbows, wyes, caps, valves, hydrants, reducers, etc. Thrust blocks should be constructed so that the bearing surface is in direct line with the major force created in the pipe or fitting. The earth bearing surface should be undisturbed. See drawings for typical thrust block details. The pipeline shall not be pressurized until the concrete thrust blocks have cured for at least 5 days.
- 15.3 CONCRETE MIX DESIGN:** The Portland Cement Concrete mixture requirements are given in Section 5. The concrete mixture shall have a minimum 28 day compressive strength of 2,500 pounds per square inch.

~ END OF SECTION ~

SECTION 16

RESTORATION OF SURFACE IMPROVEMENTS

- 16.1 GENERAL:** The Contractor shall be responsible for the protection and the restoration or replacement of any improvements existing on public or private property prior to starting the work or placed there during the progress of any work.

Existing improvements shall include, but are not limited to, permanent surfacing, curbs, ditches, driveways, culverts, fences, walls, landscaping, sprinkler systems, utilities, and mail boxes. All improvements shall be reconstructed to equal or better, in all respects, if the existing improvements are damaged or removed.

- 16.2 UNPAVED ROAD SURFACES:** Where trenches are excavated through road base surfaced areas such as roads and driveways, etc., the road base surface shall be restored and maintained as follows:

- A. **MATERIAL:** Untreated Base Course shall consist of select material, either natural or crushed, and shall be installed and graded as per Section 4.
- B. **THICKNESS:** Base course thickness shall match existing or shall be as directed by the City Engineer and shall be placed in the trench at the time it is backfilled.
- C. **SURFACE MAINTENANCE:** The surface shall be maintained by blading, sprinkling, rolling, adding gravel, etc., to maintain a safe, uniform surface satisfactory to the City Engineer. Excess material shall be removed from the premises immediately.

- 16.3 PAVED ROAD SURFACES:** Where trenches are excavated through roads, parking areas, driveways, etc., the surface shall be restored and maintained as follows:

- A. **MATERIAL:** Hot mix asphalt shall conform to the requirements listed in Section 4.
- B. **THICKNESS:**
 - 1. Hot mix asphalt Bituminous paving surface shall be placed as soon as is practical, weather permitting. Minimum thickness in City Streets shall be 3 inches. In all other areas it shall be as directed by the City Engineer.
 - 2. Untreated base course shall be placed to such depth as to provide directed by the City Engineer and shall be brought flush with the bottom of the existing paved surface. Minimum thickness in City Streets shall be 10 inches. In all other areas it shall be as directed by the City Engineer.

C. PREPARATION:

1. The installation of bituminous paving surface shall include applying tack coat to the pavement edges and placing a hot plant mix bituminous material to the level of the adjacent pavement surfaces.
2. The area over trenches to be resurfaced shall be graded and compacted. Mud or other soft or unstable material shall be removed and the space filled with approved granular material and rolled and compacted thoroughly in layers not exceeding 8 inches in thickness. The edges of trenches which are broken down during the making or subgrade shall be removed and trimmed straight before resurfacing.

D. SAW-CUTTING: Before any permanent resurfacing is placed, the Contractor shall saw-cut the existing paving to clean, straight lines as nearly parallel to the centerline of the trench as practical. Said straight lines shall be 30 feet minimum length and no deviations from such lines shall be made except as specifically permitted by the Engineer. The existing bituminous paving shall be cut back beyond the limits of any excavation or cave-in along the trench so that the edges of the new paving will rest on at least 12 inches of undisturbed soil.

16.4 CONCRETE SURFACES: All concrete curbs, gutter, sidewalks and driveways shall be removed and replaced to the next joint or scoring line beyond the actually damaged or broken sections; or in the event that joints or scoring lines do not exist or are 3 or more feet from the removed or damaged section, the damaged portions shall be removed and reconstructed to neat, plane faces. All new concrete shall match, as nearly as possible, the appearance of adjacent concrete improvements.

All concrete work shall conform to the requirements of Section 5 of these Specifications.

~ END OF SECTION ~

SECTION 17

SUBSURFACE DRAIN PIPE MATERIALS

17.1 GENERAL: Buried drain pipe with closed or open joints or perforated pipe shall be provided for the drains in the locations shown on the drawings. The Contractor shall furnish and lay the drain pipe.

17.2 MATERIALS: Drainpipe material shall be selected based upon the type of drainage system.

- A. **CLOSED JOINT DRAIN PIPE:** All closed joint subsurface drainage piping shall be PVC plastic drain pipe and shall be made of compound conforming to ASTM D-1784 with a cell classification of 13364-B. PVC drain pipe must meet all the dimensional, chemical, and physical requirements outlined in ASTM D-3034, shall have a SDR of 35.0 and shall be supplied in 13 foot laying lengths. Standard Dimension Ratio (SDR) and laying length may be modified as conditions dictate when approved by the City Engineer.
 - 1. **Installation:** PVC drain pipe shall be installed according to ASTM D-2321 and the manufacturer's requirements.
 - 2. **Joints:** Joints for PVC plastic drain pipe shall be of the rubber gasket bell and spigot type, and the rubber gaskets shall conform to ASTM D-D1869.
 - 3. **Fittings:** All fittings shall be made of PVC plastic conforming to ASTM D-1784, have a cell classification as outlined in ASTM D-3034, and carry the IAPMO UPC Seal of Approval.
- B. **OPEN JOINT DRAIN PIPE:** Non-perforated pipe shall be extra-strength verified clay or extra strength non-reinforced concrete. The pipe may be furnished with either bell-and-spigot or tongue-and-groove joints. Laying lengths of the non-perforated pipe shall not exceed 4 feet. To insure open joints between lengths of pipe, spacer lugs approximately 1/8 inch thick located on the 1/3 or 1/4 points around the perimeter shall be provided at each joint between lengths of drain pipe. The lugs may be case on one end of the pipe during manufacturing or may be gasket-type lugs of plastic, metal, or other suitable material cemented to the pipe by the Contractor and approved by the City Engineer.
- C. **PERFORATED PIPE:** Perforated pipe may be extra-strength vitrified clay pipe with 1/4 inch diameter perforations, extra-strength non-reinforced concrete pipe, or reinforced concrete pipe, and may be furnished with bell-and-spigot or tongue-and-groove joints. Corrugated polyethylene pipe as per ASTM F-405 may also be used if installed with direct burial laser grade control equipment.

- 17.3 LAYING PIPE:** For open joint or perforated pipe, gravel backfill shall be placed under and over the pipe to the minimum depth as shown on the drawings. The pipe shall be laid carefully on the gravel in a workmanlike manner and to the lines and grades shown on the drawings or established by the City Engineer. The open joints for un-perforated pipe shall be covered with an approved drainage fabric placed to extend over the upper half of the circumference of the pipe and to not less than 4-1/2 inches in each direction from the joint.

The maximum allowable departure from grade shall not exceed 10 percent of the inside diameter of the drain pipe, and in no case shall the departure exceed 1 foot. Where departures occur, the rate of return to established grade shall not exceed 2 percent of the pipe diameter per joint of pipe. The maximum allowable departure from alignment shall not exceed 20 percent of the inside diameter of the drain pipe, with a rate of return to the established line not to exceed 5 percent per joint of pipe.

The finished bed for all pipe shall be made smooth, including removal of material under the bell, so that the full length of pipe will be evenly and uniformly supported. The pipe shall be laid and completed with adjacent ends closely abutted and with the bell ends upgrade. Where necessary, as determined by the City Engineer, mechanical means shall be used to hold the pipe in place. Any pipe that is broken, cracked, or otherwise unsuitable, as determined by the City Engineer, shall be removed and replaced. The bottom of the trench area shall be maintained free of standing water while the pipe is being installed. The pipe shall not be covered with backfill until it has been inspected and approved by the City Engineer. After approval, the trench shall be backfilled as prescribed in Section 22 – 16.

The Contractor shall keep the pipe drain and manholes free from deposits of mud, sand, gravel, or other foreign matter and in good working condition until the construction is complete and accepted. Upon completion of the drain, if a clear and unobstructed view of the whole bore of the pipe cannot be obtained between manholes by use of a light or sun reflector, a device approved by the City Engineer, having a diameter 1 inch less than the drain tile to be tested, shall be pulled through the drain between manholes. Any obstructions found in the drain shall be removed by the Contractor without cost to the City. Any methods used by the Contractor to remove deposits of mud, sand, gravel, or other foreign matter from the drains, such as use of water pressure, shall be subject to the approval of the City Engineer.

- 17.4 CONCRETE CULVERT PIPE:** Concrete culverts shall be installed as per Section 7.

~ END OF SECTION ~

SECTION 18

GRATES AND FRAMES

- 18.1 GENERAL:** Grates and grate frames shall be the size and type shown on the standard drawings. Cast iron grates and frames shall be supplied with an approved paint or coating to retard rusting. All fabricated grates and frames shall be constructed of ASTM A-36 structural steel or an approved equal and the finished fabricated product shall be hot dip galvanized in accordance with ASTM A-123. Frames shall be securely embedded in concrete by use of approved anchors.

Any miscellaneous metal components required on Public Works projects and not shown on the Standard Drawings shall be reviewed and approved by the City Engineer prior to construction.

~ END OF SECTION ~

SECTION 19

FENCING SPECIFICATIONS

19.1 GENERAL: Temporary construction fencing and permanent fencing shall be provided along boundaries, property lines or open ditches as required by the City.

19.2 CHAIN LINK FENCE SPECIFICATIONS:

A. MATERIALS:

1. Fabric to be chain link which has been galvanized after weaving with a minimum of 1.2 oz. per square foot of wire surface. 6 foot high of 2 inch mesh, 9 gauge.
2. Tension wire for bottom only, No. 7 gauge spring coil.
3. Top Rail: 1-3/8 inch tubular rail
4. Corner, Gate, or End Posts: Minimum diameter 2-7/8 inch O.D. galvanized pipe at 2.65 lbs. per foot.
5. Line Posts: Minimum diameter of 1-7/8 inches O.D. galvanized pipe at 2.72 lbs. per foot.
6. Braces: For all corner and gate posts - 1-5/8 inch O.D. galvanized pipe and adjustable 3/8 inch truss rods.
7. Concrete: Shall conform to the provisions of Section 5, Class C.

B. INSTALLATION:

1. The steel posts shall be set true to line and grade in concrete bases.
2. The distance between posts in any section shall be uniform, but shall not exceed the following spacing:
3. Tangent sections and curves down to 500 foot radius; not more than 10 feet.
4. Curves 500 foot radius to 200 foot radius; not more than 8 feet. Curves 200 foot radius to 100 foot radius; not more than 6 feet. Curves 100 foot radius; not more than 5 feet.
5. A minimum of 6 inches of concrete shall be provided below the bottom of each post. End posts, pull post, corner post, and gate posts shall have a

concrete base at least 10 inches in diameter. Concrete bases for line posts shall be at least 8 inches in diameter.

6. Pull posts shall be provided at 500 foot maximum intervals. Changes in line of 30 degrees or more shall be considered as corners.
7. Fence fabric shall be placed on the roadway side of posts unless otherwise specified. The fabric shall be placed approximately 1 inch above the ground, and on a straight grade between posts by excavating high points of the ground. Filling depressions will be permitted only upon approval of the City Engineer.
8. The fabric shall be stretched taut and securely fastened to the posts. Fastening to end, gate, corner and pull posts shall be with stretcher bars and metal bands spaced at one foot intervals. The fabric shall be cut and each span fastened independently at all pull and corner posts. Fastening to line posts shall be with tie wire, metal bonds, or other approved methods at 14 inch intervals. The top edge of fabric shall be attached to the top rail at approximately 24 inch intervals and shall be secured to the end or pull posts with brace bands.

19.3 WOOD FENCE SPECIFICATIONS:

A. MATERIALS:

1. Slats: Redwood, cedar, combed spruce, or other wood covering acceptable to the City Engineer or his representative.
2. Bottom and Top Rail: Minimum 2 inch x 4 inch x 8 foot cedar stud.
3. Corner, Gate, End, or Line Posts: Minimum size 4 inch x 4 inch cedar wood post.
4. Concrete: All corner, gate, end, or line wood posts shall be set in concrete. All concrete used for post bases shall conform to the provisions of Section 22 - 15, Class C.

B. INSTALLATION:

1. The cedar posts shall be set true to line and grade in concrete bases at least 2 feet in depth. All posts shall be sound and free from all decay, splits, multiple cracks, or any other defect which would weaken the posts or otherwise cause them to be structurally unsuitable for the purpose intended.
2. The maximum distance between posts in any section shall not exceed 8 feet.

3. The top and bottom railings shall be securely fastened to the posts with galvanized nails or other acceptable means.
4. Changes in line of 30 degrees or more shall be considered as corners.
5. A minimum of 6 inches of concrete shall be provided below the bottom of each post. End posts, corner posts, and gate posts shall have a concrete base at least 12 inches in diameter. Bases for line posts shall also be 12 inches in diameter.
6. Fence slats shall be placed on the roadway side of the posts unless otherwise specified. The slats shall be placed approximately 1 inch above the ground, and on a straight grade between posts by excavating high points of the ground. Filling depressions will be permitted only upon approval of the City Engineer.
7. The slats shall be sound and free from all major decay or defects which would weaken or otherwise cause them to be unsuitable for fence slats. Fastening to top and bottom railings shall be done with 2 galvanized nails at both the top and bottom rail.

19.4 WIRE FENCE SPECIFICATIONS:

A. MATERIALS:

1. Fabric to be wire mesh which shall conform to ASTM Designation A-116, nominal 0.9999 inch Farm Grade with standard 6 inch graduated spacing. The wire mesh shall have a Class 1, zinc coating.
2. Corner, gate, end or line posts shall be painted metal tee, U or Y channel, angular or other approved shapes 6' 6" in length.

B. INSTALLATION:

1. Metal fence posts shall be spaced a maximum interval of 16 feet. Post spacing measurements shall be made parallel to the ground slope. All posts shall be placed in a vertical position. As approved by the City Engineer or Public Works Director, metal posts may be installed by driving, if this can be done without damage to the post. Otherwise, they shall be installed to the specified depth (2' 6") in larger holes and placed in concrete.
2. Corner posts shall be braced in two directions. End and gate posts shall be braced in one direction.

3. Wire mesh fabric shall be drawn tight enough to eliminate all sag without causing the “tension crimps” to fail.
4. Any high points along the ground surface which interfere with the placing of wire mesh shall be excavated to provide at least 2 inches of ground clearance. Every alternate lateral wire in the mesh fabric shall be fastened to each post by means of a clamp.

~ END OF SECTION ~

SECTION 20

STREET LIGHTING

20.1 GENERAL: This Section shall cover the requirements for street lighting.

20.2 POLICY: Streets and highways are intended to facilitate the safe movement of vehicle and pedestrian traffic both day and night. Night-time brings increased hazards to both pedestrian and vehicle traffic due to limited visibility.

Street lighting should be provided at locations where proper illumination is a recognized necessity for greater vehicle and pedestrian visibility. Therefore, the following conditions must be met for the consideration of installation of street lights:

A. **LOCATIONS:** Street lights will be considered for installation at all intersections with the following exceptions:

1. Intersections where street lights are located within 250 feet.
2. Minor intersections; which are defined as intersections with terminal streets less than 650 feet. Cul-de-sacs and dead-ends are considered terminal.
3. At mid-block where existing lighting is more than 1,300 feet.
2. At established pedestrian walk throughs and crosswalks.

C. **NEW DEVELOPMENTS:** All new developments will be responsible to install street lighting in accordance with this policy or as specified by the City Engineer, Public Works Director or his designated representative.

All new developments shall have street lighting plans as approved by the City Engineer, Public Works Director or his designated representative. Street lights shall be provided at all street intersections and along new proposed streets at a maximum street light spacing of 600 feet, or as approved.

20.3 LIGHT POLES: Street light poles shall be constructed within the Residential and Commercial Districts within South Ogden City at locations approved by the City Engineer, Public Works Director or his designated representative, as follows:

A. **STANDARD:** Street light poles shall be 35 foot, Class 4 Wooden poles or as approved by the City Engineer or Public Works Director.

- B. DECORATIVE: Street light poles shall be “Wadsworth”, black, aluminum pole. Other poles must be approved by the City Engineer or Public Works Director.
 - C. LOCATIONS: Poles shall be located within the right-of-way in the parking strip, except where approved by South Ogden City Public Works.
- 20.4 LUMINAIRE:** Luminaires shall be constructed within the Residential and Commercial Districts within South Ogden as approved by the City Engineer or Public Works Director, as follows:
- A. STANDARD: Standard Cobra Head style fixtures shall be light emitting diode (LED), 64 watt for secondary lights and 140 watts for main lights. Lights shall be photo-electric controlled.
 - C. DECORATIVE: Decorative luminaries shall American Revolution fixture as approved by Rocky Mountain Power. Fixture shall be light emitting diode (LED), 64 watt and shall be photo-electric controlled.
- 20.5 PHOTO-ELECTRIC CONTROLS:** Each light fixture shall be equipped with a photo-electric control which will automatically turn the light fixture off during daylight hours and on at dusk. The photo-electric control shall operate on 120 VAC. Photo-electric controls shall be of an electronic control design.
- 20.6 MAST ARMS:** Mast arms for the 64 Watt LED lights shall be 2" x 6'. Mast arms for the 140 watt LEDs shall be a minimum size of 2" x 10'. Mast arms shall always extend to at least 10% of the back of curb roadway width, past the top back of curb nearest the pole. Mast arms shall extend on right angles from the intersection.
- 20.7 WIRING:** All fixtures shall use #10 THHN from the light to the weather head or drip loop. Overhead wiring to the pole from the Rocky Mountain Power Service shall be #4 A.A.C. AL duplex underground conductor. Underground wiring shall be placed in 2" diameter schedule 40 gray conduit with #8 3 wire R.H.W. coating.
- 21.8 SERVICE BOX:** Each light pole shall have a 13" X 24" service box located within 10' of transformer for disconnection and servicing.

~ END OF SECTION ~

SECTION 21

STREET SIGNS

21.1 GENERAL: This Section provides guidelines for the design of street signs in South Ogden City. These guidelines provide a basic and uniform standard for use within the City. The basis for the guidelines in this section is the Manual on Uniform Traffic Control Devices (MUTCD), while others are derived from accepted and standard practice in the design, placement and layout, of municipal street signs.

21.2 SIGN DIMENSIONS:

A. Regulatory Signs

Sign	Size	Color
Stop	30" x 30"	Red on White
Yield	30" x 30"	Red on White
Speed Limit	24" x 30"	Black on White
Parking	12" x 18"	Red on White
Arrows	24" x 30"	Black on White
Cross Walk	30" x 30"	Black on Yellow

B. School Signs

Sign	Size	Color
Crosswalk Warning / Crosswalk Sign	36" x 36"	Black on Fluorescent Green/Yellow
Speed Limit	24" x 48"	Black on White
End of School Zone	24" x 30"	Black on White
School, 20 mph	36" x 12"	Black on White, Diamond Grade
School	24" x 48"	Black on White

C. Miscellaneous Signs

Sign	Size	Color
Warning	30" x 30"	Black on Yellow
Information Sign	30" x 30"	Red on White
Street Sign - City Owned	38" x 8"	White on EC Green
Street Sign - Private	38" x 8"	White on Blue

21.3 SHEETING:

- A. All regulatory and warning signs shall be equivalent to or exceed the manufactured 3M, high intensity prismatic 3930 series ASTM type 3, 4 or 10, or equal.
- B. School crossing and school signs that are black on florescent green/yellow in color shall be a 3M diamond grade DG3 series number 4000, or equal. The sheeting for speed limit, end of school zone signs and the school crossing signs shall be a 3M high intensity prismatic 3930 series ASTM type 3, 4 or 10, or equal.
- C. The sheeting for signs that are not regulatory, warning or school crossing signs shall be ASTM type 1 engineered grade prismatic.

21.4 SIZE OF LETTERING: On streets that are named, the first letter of the name must be capitalized and shall be 6-inches in height. All other letters in the name must be lower case and be 4 1/2-inches high.

21.5 MOUNTING HEIGHT: The clearance between the ground and the bottom of the main sign shall be a minimum of 7-feet. Supplemental plaques or signs mounted below the main sign shall be 1-foot less than the height specified for the main sign. If the supplemental plaque or sign is greater than 1-foot in height, the height of the main sign should be increased in order to meet the requirements for the supplemental sign.

21.6 POLES AND ANCHORS:

All poles shall be a 2" x 2" Telspar pole. Holes shall be spaced at 1" intervals and shall be 1/2" in diameter.

Stop signs or Yield signs shall be 12-feet in length. All other poles shall be 10-feet in length. Signs shall be anchored with a 30" (2-1/4" x 2-1/4") anchor and shall be attached with a 5/16" x 2-1/2" long corner bolt and nut. Signs shall be attached to poles with aluminum, vandal resistant rivets.

Any sign not listed in this Section must receive special case approval from South Ogden City Public Works.

~ END OF SECTION ~

SOUTH OGDEN CITY CORPORATION

PUBLIC WORKS STANDARD

DRAWINGS & DETAILS

MARCH 2015

MAYOR

JAMES F. MINSTER

CITY COUNCIL

WAYNE SMITH

SALLEE ORR

RUSSELL PORTER

BRYAN BENARD

BRENT STRATE

PUBLIC WORKS DIRECTOR

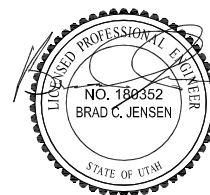
JON ANDERSEN

CITY MANAGER

MATTHEW DIXON

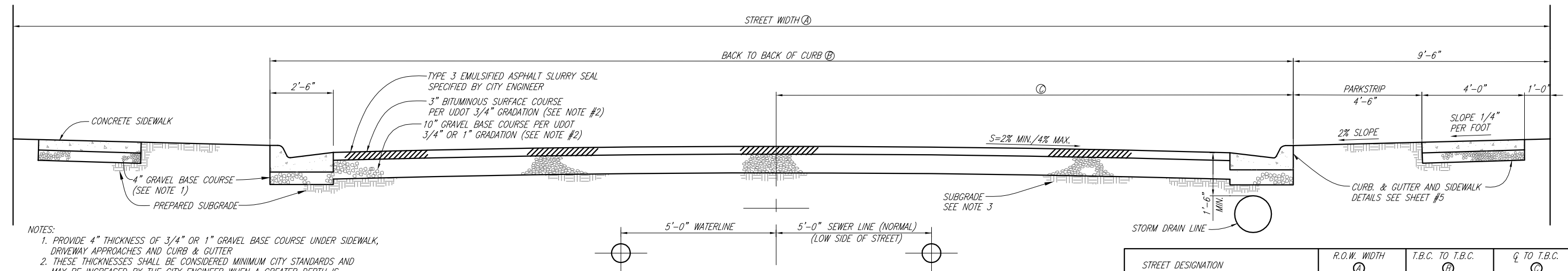
CITY ENGINEER

BRAD C. JENSEN

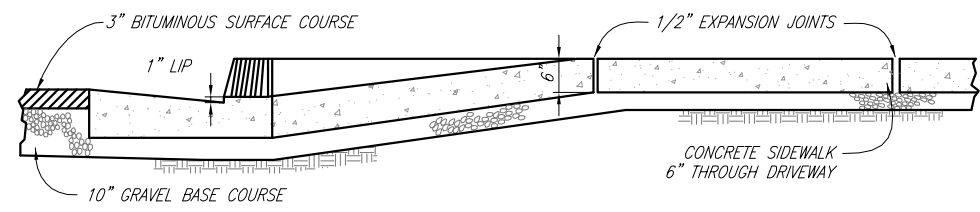


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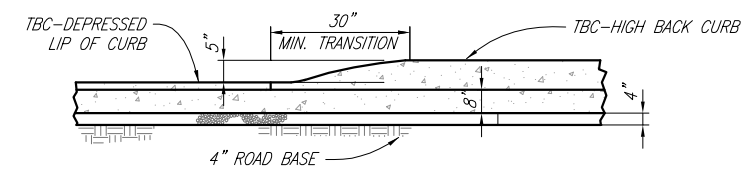
1. COVER SHEET
2. ROADWAY SURFACE IMPROVEMENTS
3. STREET INTERSECTION & MONUMENT DETAILS
4. TYPICAL PEDESTRIAN ACCESS RAMP & CURB DETAILS
5. CUL-DE-SAC DETAILS
6. FIRE HYDRANT & WATER SERVICE CONNECTIONS
7. THRUST BLOCKING & WATER SERVICE CONNECTIONS
8. PRESSURE REDUCTION & AIR/VACUUM RELIEF STATIONS
9. SANITARY SEWER CONNECTION DETAILS & TRENCH SECTION
10. SANITARY SEWER LATERAL DETAILS & CLEANOUT
11. SANITARY SEWER MANHOLE DETAILS
12. DOUBLE & SINGLE CATCH BASIN DETAILS
13. CURBLESS INLET, FRAME & GRATE DETAILS
14. STORM DRAIN MANHOLE & SUBSURFACE DRAINAGE DETAILS
15. FENCING DETAILS
16. STREET LIGHT DETAILS
17. DECORATIVE STREET LIGHT DETAILS



- NOTES:
1. PROVIDE 4" THICKNESS OF 3/4" OR 1" GRAVEL BASE COURSE UNDER SIDEWALK, DRIVEWAY APPROACHES AND CURB & GUTTER
 2. THESE THICKNESSES SHALL BE CONSIDERED MINIMUM CITY STANDARDS AND MAY BE INCREASED BY THE CITY ENGINEER WHEN A GREATER DEPTH IS NECESSARY TO PROVIDE SUFFICIENT STABILITY. DESIGNER AND/OR DEVELOPER MAY SUBMIT AN ALTERNATIVE PAVEMENT DESIGN BASED ON A DETAILED SOILS ANALYSIS FOR APPROVAL BY THE CITY ENGINEER WHICH MAY MODIFY PAVEMENT THICKNESSES, BUT IN NO CASE SHALL THE BITUMINOUS SURFACE COURSE BE LESS THAN 3" AND GRAVEL BASE COURSE LESS THAN 10" THICK.
 3. IF SUBGRADE MATERIAL IS DETERMINED TO BE STABLE IT SHALL BE EITHER UNDISTURBED OR SHALL BE SCARIFIED AND COMPACTED TO 95% MIN. AS DETERMINED BY THE CITY ENGINEER (PER ASTM D-1557)



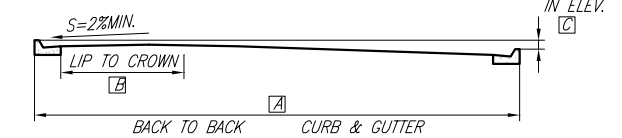
SECTION A-A



SECTION B-B

STREET DESIGNATION	R.O.W. WIDTH A	T.B.C. TO T.B.C. B	Q TO T.B.C. C
PRIVATE (SEE NOTE #3)	50'	31'	15'-6"
STANDARD RESIDENTIAL	60'	41'	20'-6"
COLLECTOR	66'	47'	23'-6"
MINOR ARTERIAL	80'	61'	30'-6"
MAJOR ARTERIAL	100'	81'	40'-6"

- NOTES:
1. MAXIMUM DIFFERENCE IN ELEVATION BETWEEN CURBS ON OPPOSITE SIDES OF THE STREET SHALL NOT EXCEED THOSE SHOWN IN DETAIL & TABLE BELOW
 2. ON ARTERIAL STREETS AND CERTAIN STREETS APPROVED BY THE CITY COUNCIL THE CITY ENGINEER WILL PROVIDE A PAVEMENT DESIGN LOCATION OF SIDEWALK AND CURB + GUTTER MAY VARY ON INDIVIDUAL ARTERIAL STREETS PER DIRECTION OF THE CITY ENGINEER.
 3. PRIVATE STREETS ARE ONLY ALLOWED FOR UNUSUAL CIRCUMSTANCES AND REQUIRE SPECIAL CASE APPROVAL.

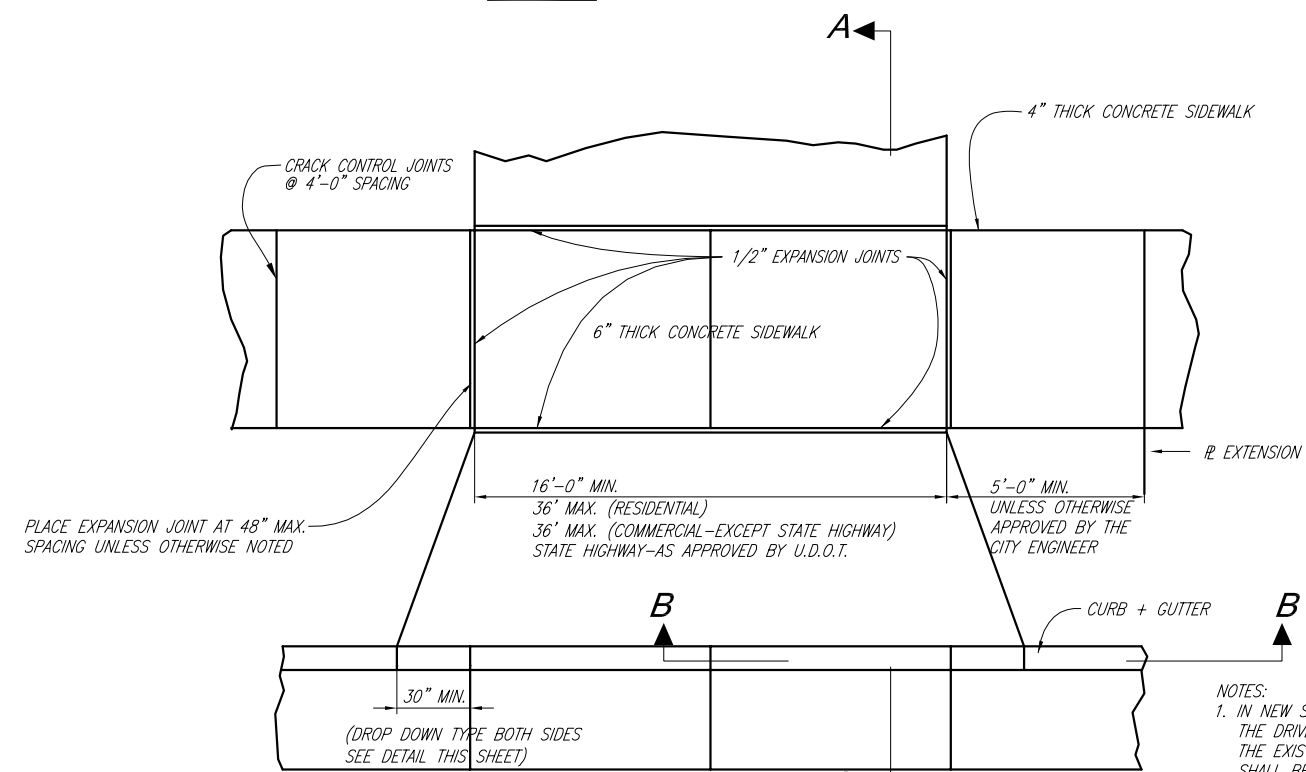


CROWN LOCATION TABLE

A	B	C
40'	20'	0.00
40'	12'	0.50
40'	12'	1.00
46'	23'	0.00
46'	12'	0.50
46'	12'	1.00

CROWN LOCATION FOR VARIOUS CROSS SLOPES

NOTE:
ALL OTHER PROPOSED STREET X-SECTIONS SHALL BE AS APPROVED BY THE SOUTH OGDEN CITY ENGINEER.

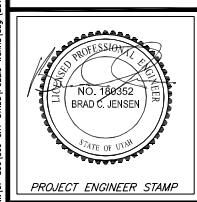


DRIVEWAY APPROACH

DROP DOWN STYLE
N.T.S.

- NOTES:
1. IN NEW SUBDIVISIONS WHERE FUTURE DRIVEWAY LOCATIONS ARE UNKNOWN, THE DRIVEWAY APPROACH SHALL BE MADE BY SAW CUTTING THE BACK OF THE EXISTING CURB TO THE REQUIRED DRIVEWAY WIDTH. ALL SAW CUTTING SHALL BE ACCOMPLISHED BY A CITY APPROVED LICENSED CONTRACTOR.
 2. IF THE SIDEWALK HAS BEEN PREVIOUSLY INSTALLED WHEN THE NEW DRIVEWAY IS CONSTRUCTED, THE 4" THICK SIDEWALK SHALL BE REMOVED AND REPLACED WITH 6" THICK SIDEWALK THROUGH THE NEW APPROACH, AT THE OWNERS OR DEVELOPERS EXPENSE.

10:10:50Z:BRW-CITY-SW0517ABCS-MWPC51.mxd (2015) 15:46:42.mxd 3/11/2015 10:16:33 AM MDT



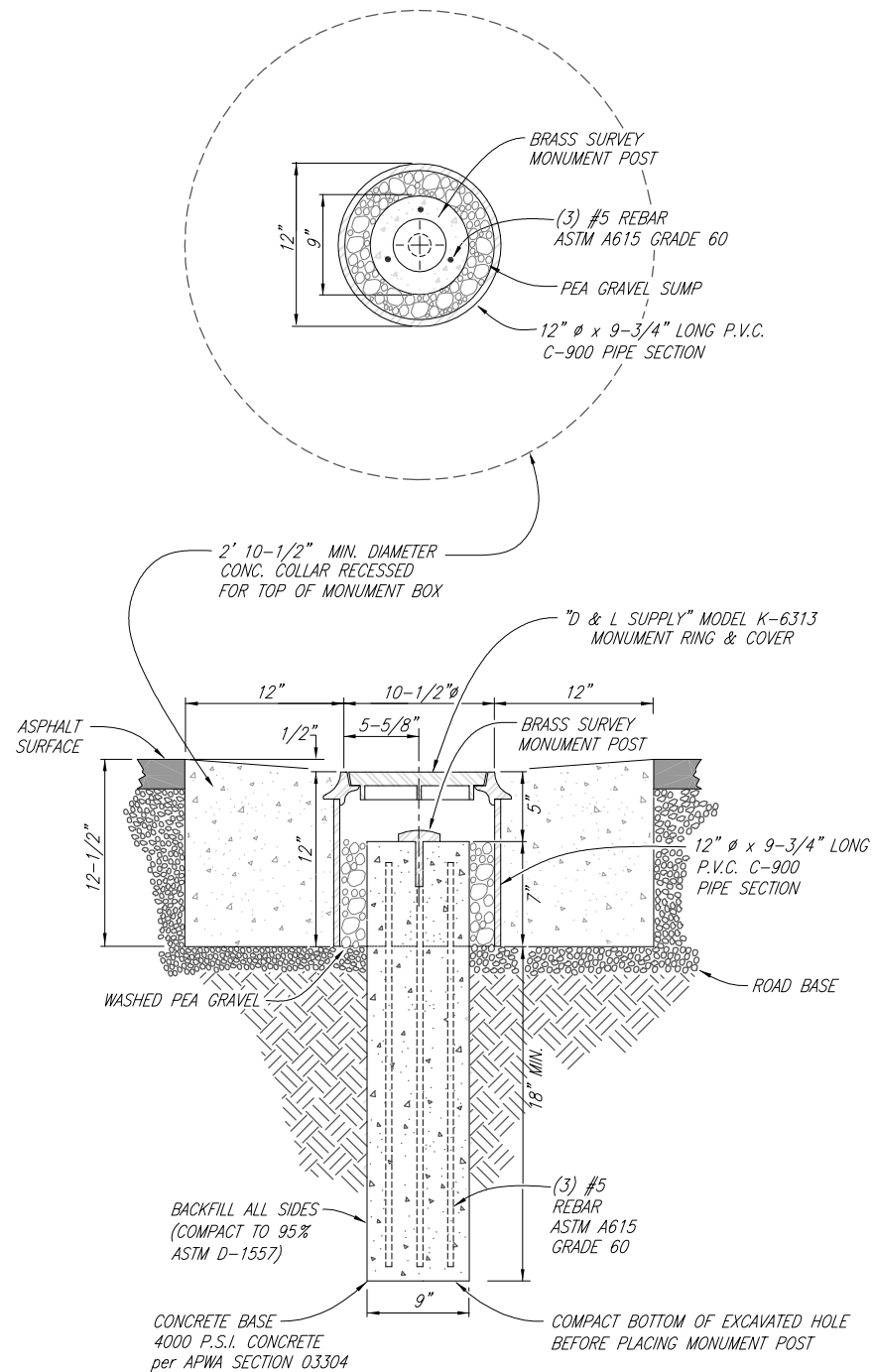
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Consulting Engineering
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REV	DATE	APPR.

DESIGNED	M.T.M.	DATE	MAR. 10, 2015
DRAWN	C.C.S.	SCALE	NOT TO SCALE
CHECKED	M.T.M.		

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CITY CORPORATION

PUBLIC WORKS STANDARD DRAWINGS & DETAILS
ROADWAY SURFACE IMPROVEMENTS



SURVEY MONUMENT DETAIL
N.T.S.



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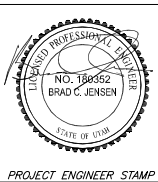
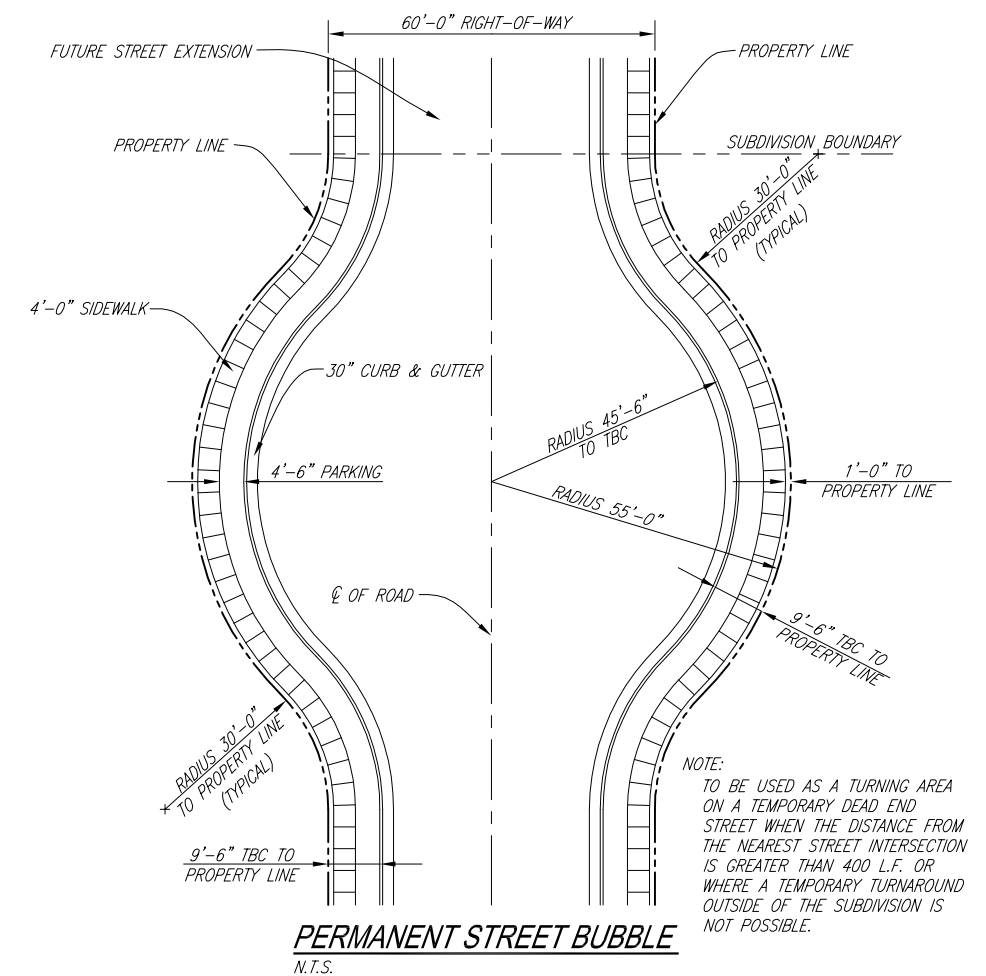
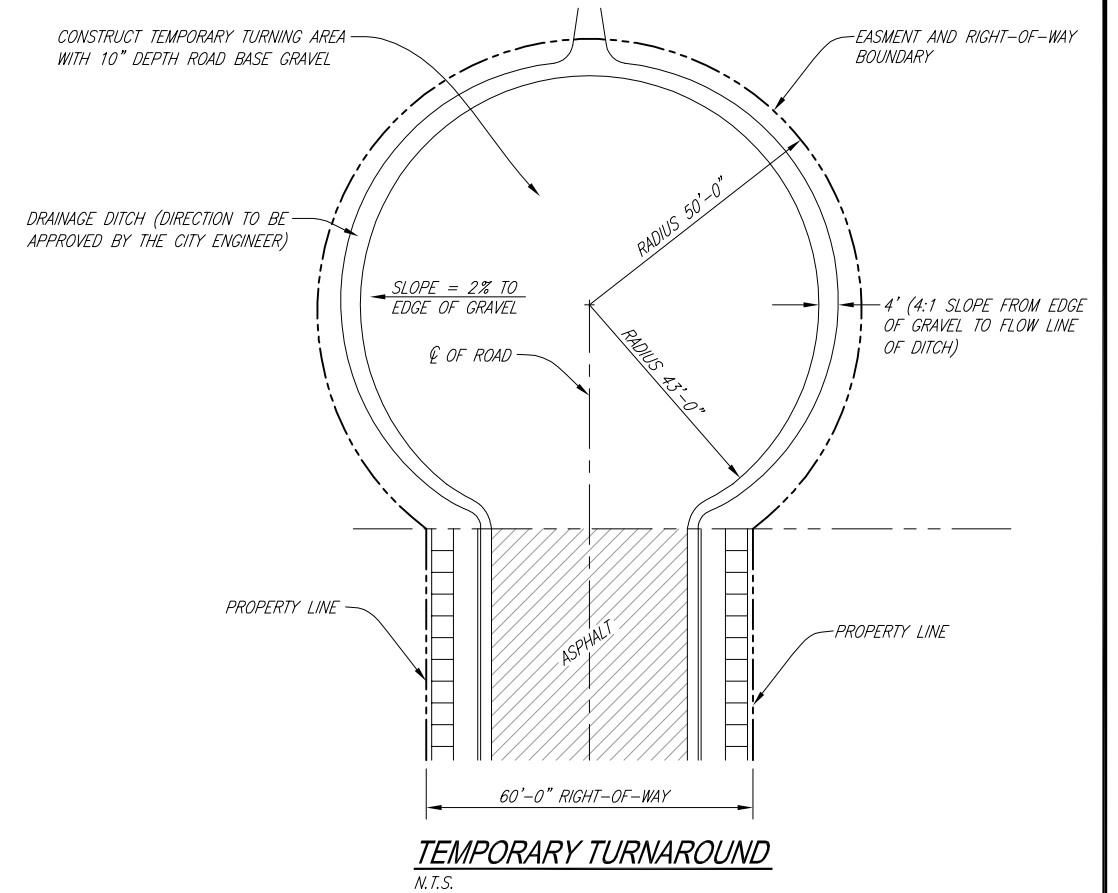
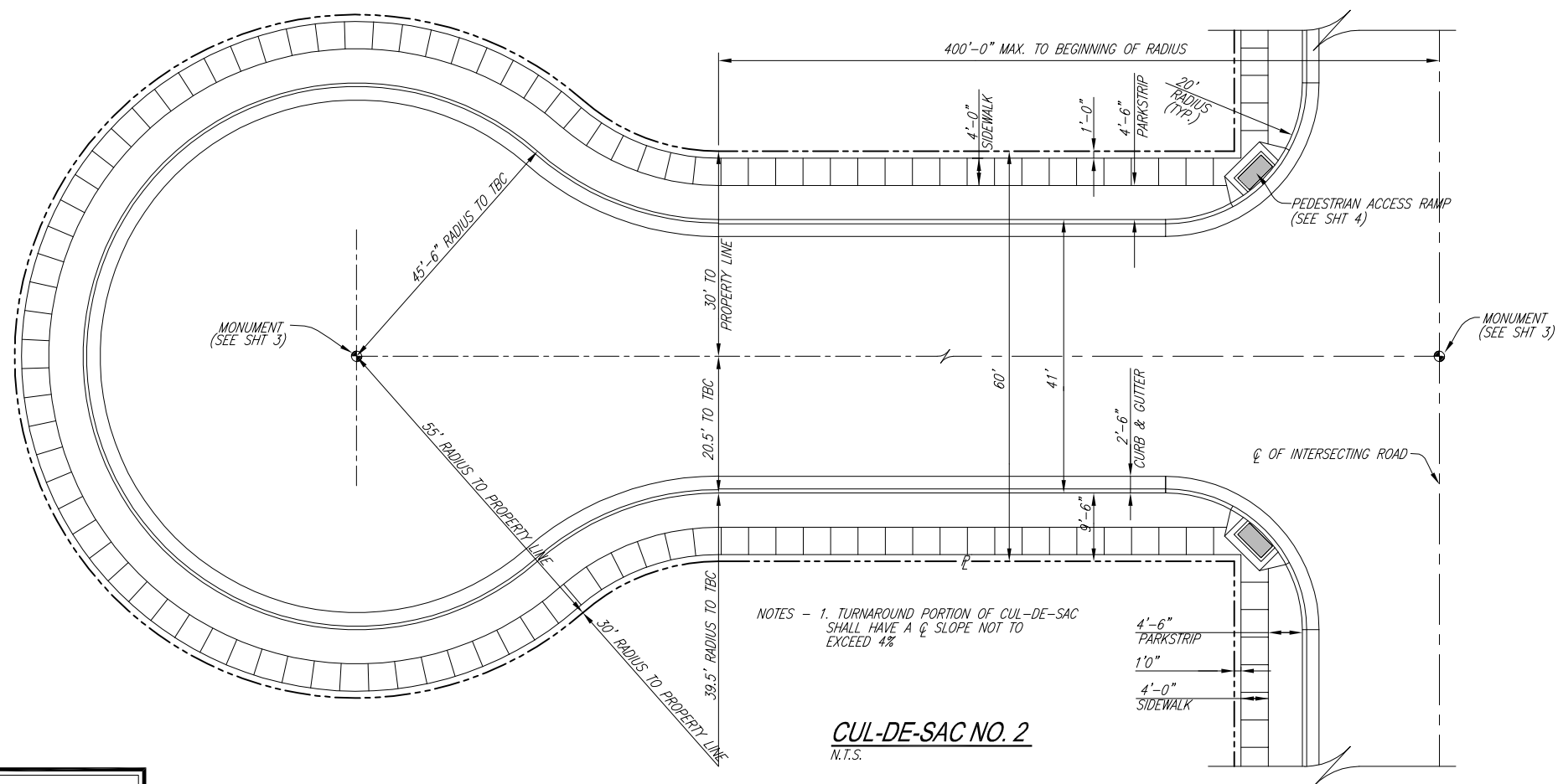
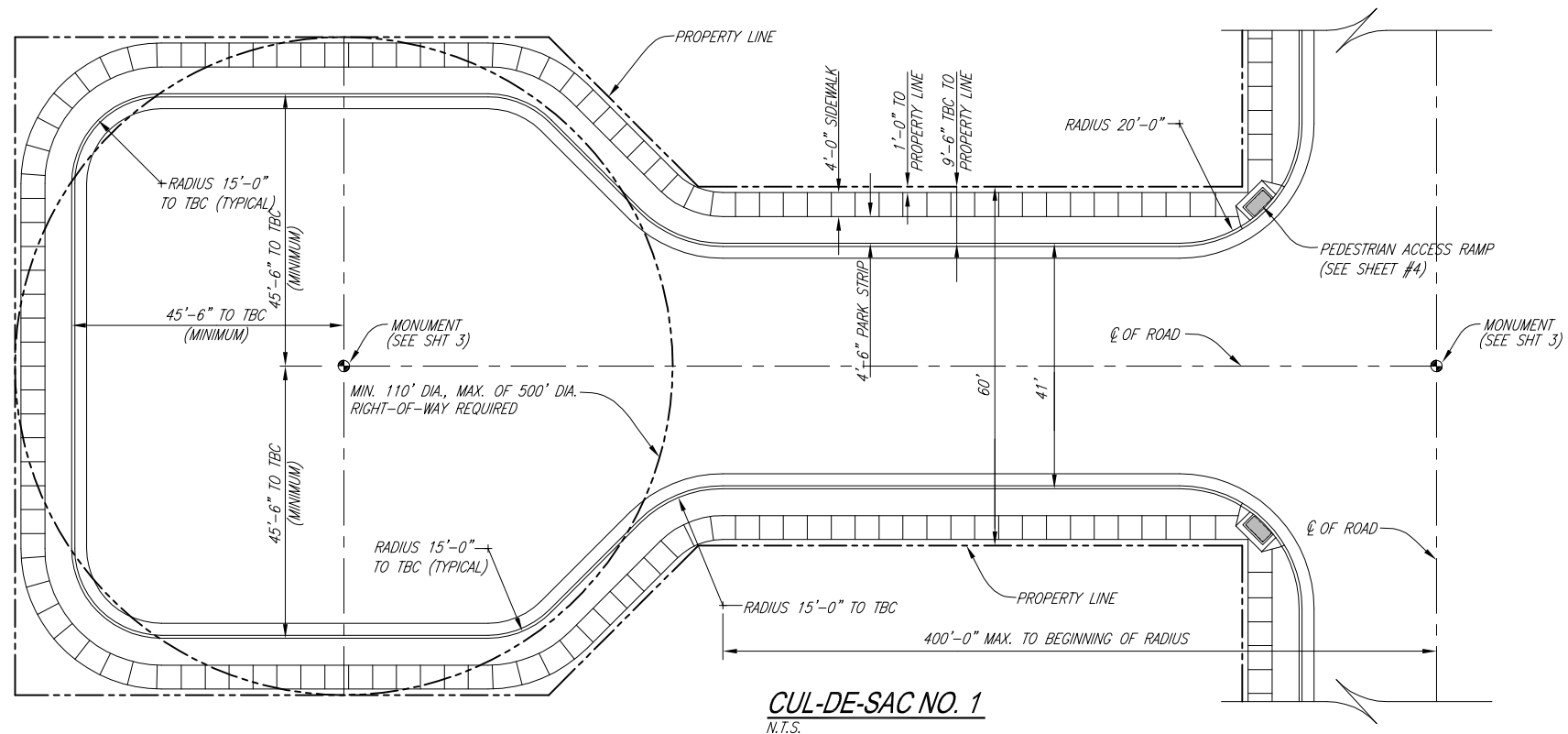
REV.	DATE	APPR.	

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PUBLIC WORKS STANDARD DRAWINGS & DETAILS
STREET INTERSECTION & MONUMENT
DETAILS

SHEET:
3
OF 17 SHEETS



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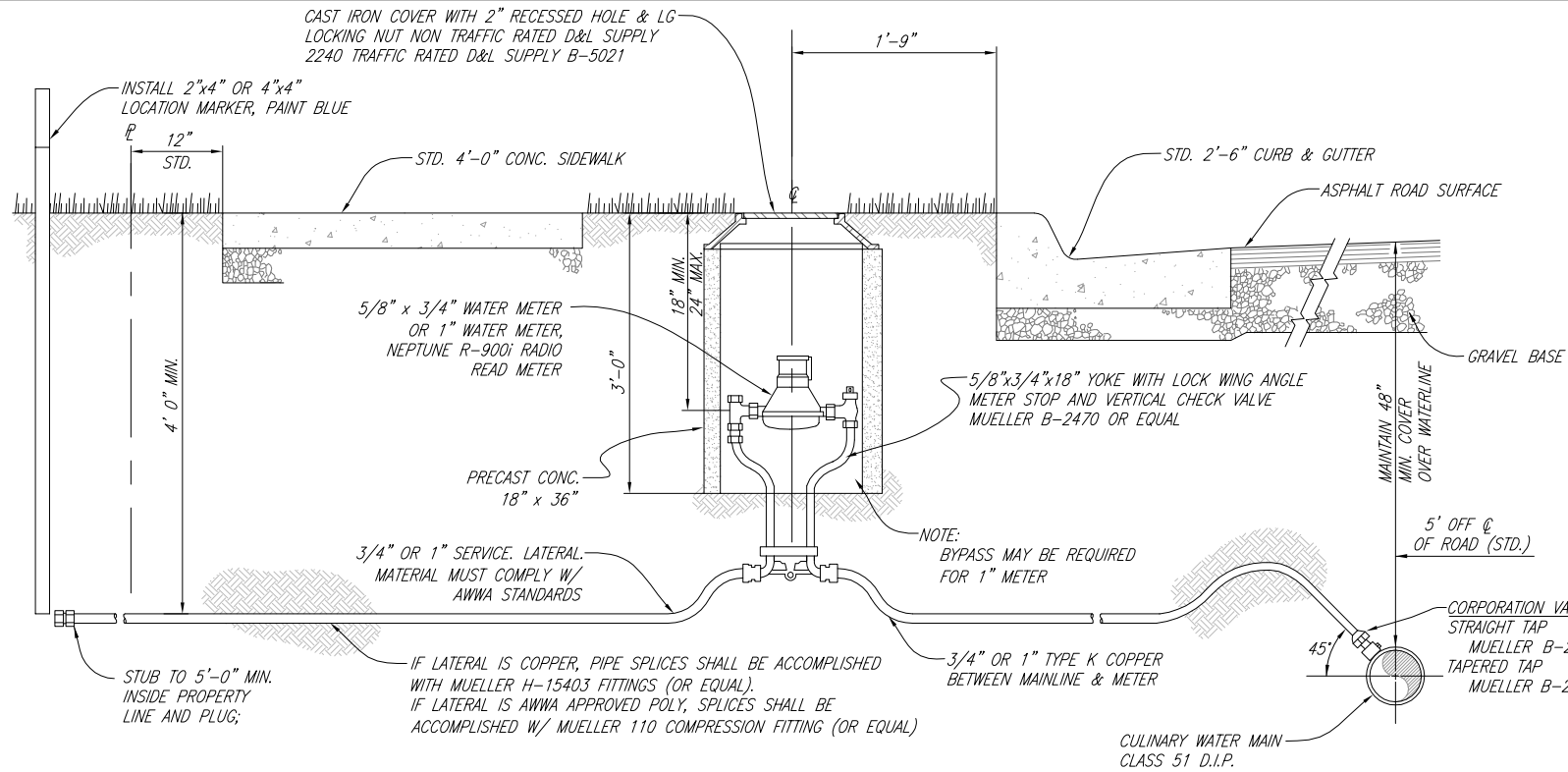
PUBLIC WORKS STANDARD DRAWINGS & DETAILS

CUL-DE-SAC DETAILS

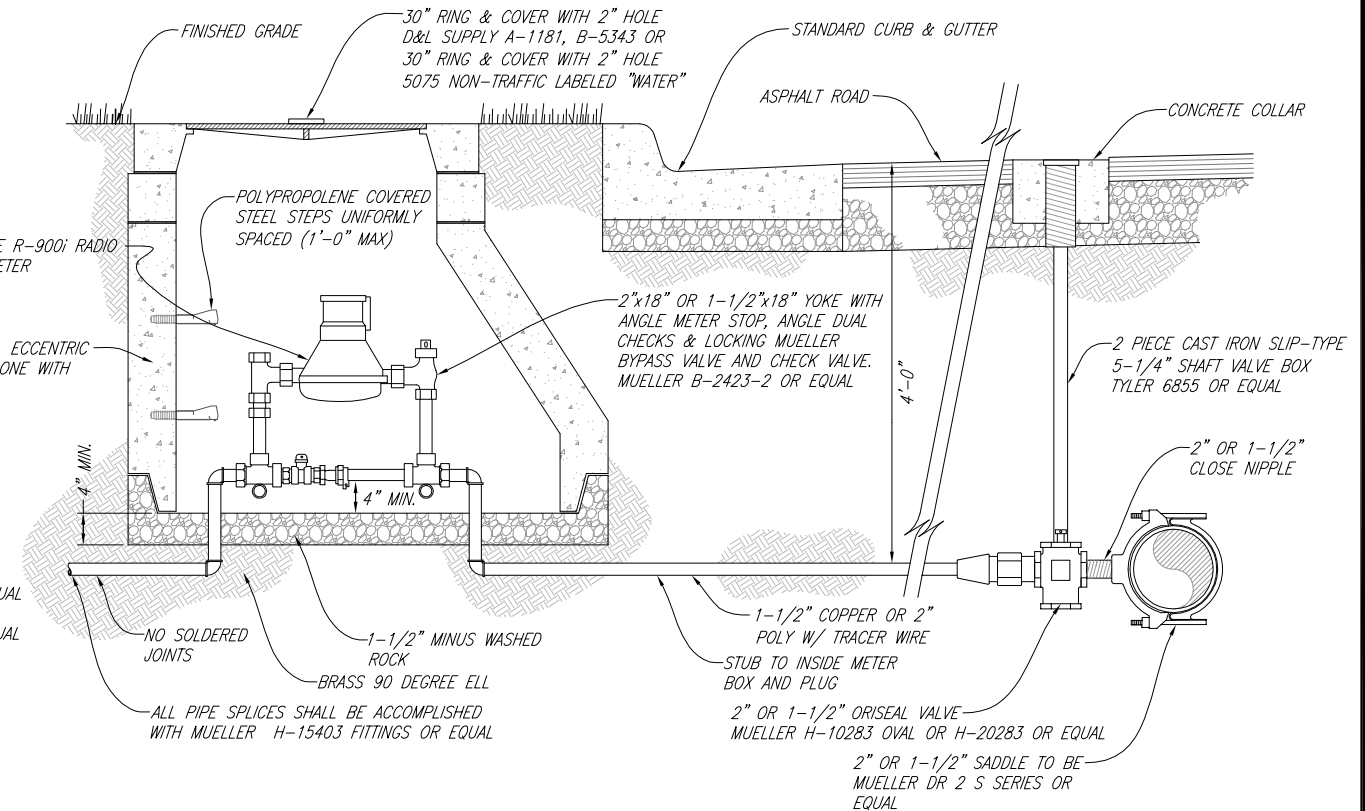
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5

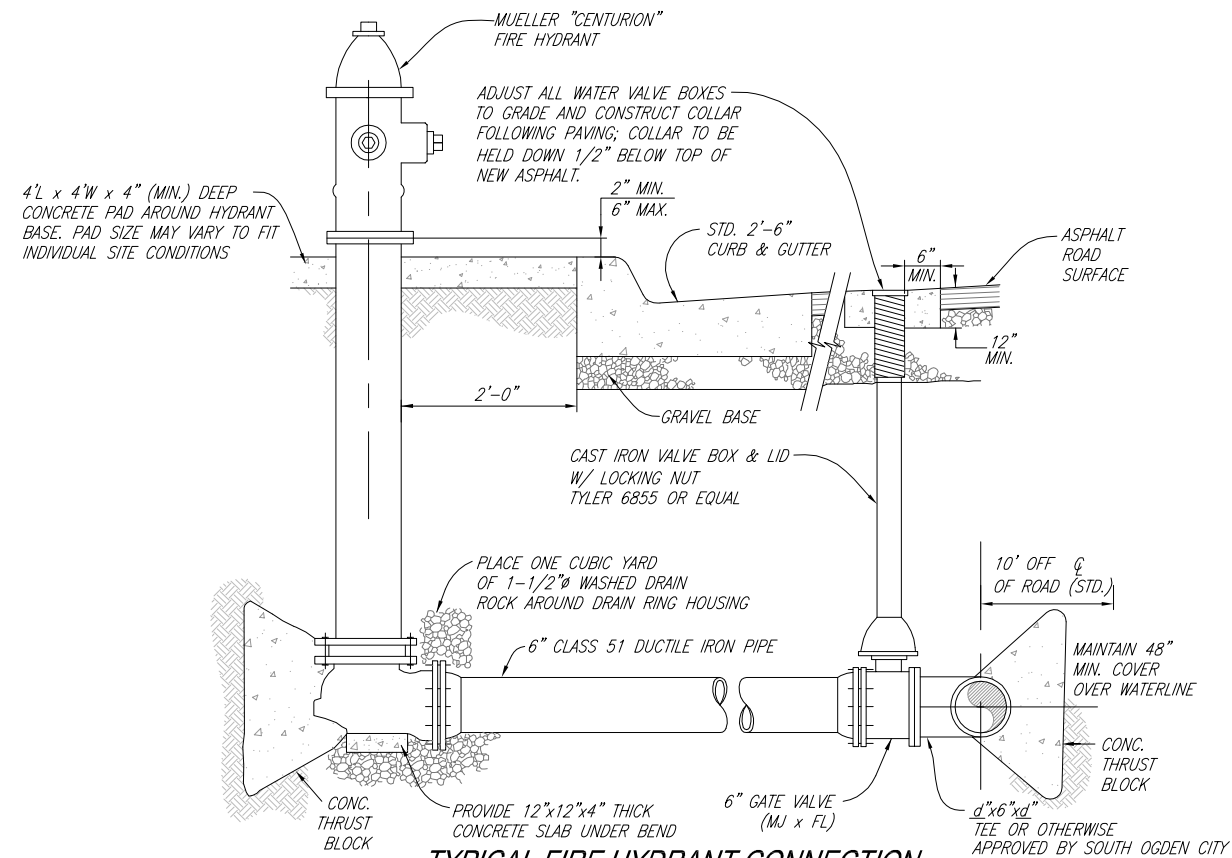
17 SHEETS



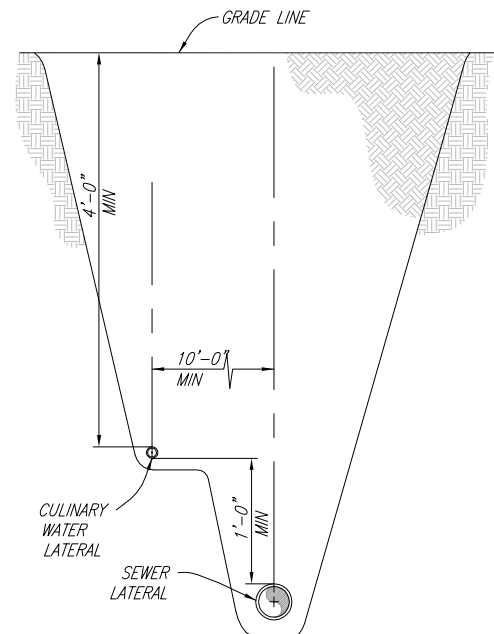
3/4" OR 1" CULINARY WATER SERVICE CONNECTION
N.T.S.



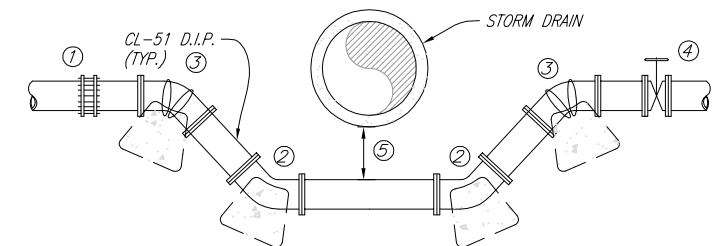
1-1/2" OR 2" WATER CONNECTION
N.T.S.



TYPICAL FIRE HYDRANT CONNECTION
N.T.S.



WATER & SEWER LATERAL SECTION
N.T.S.



- ① TRANSITION COUPLING; ROCKWELL MODEL 441, ROMAC MODEL 501 OR EQUAL.
- ② MJ 45° BEND W/JOINT RESTRAINTS, (MEGALUG OR EQUAL).
- ③ CONSTRUCT THRUST BLOCKS AT EACH 45° BEND W/(3) #6 REBARS SECURING BLOCK TO FITTING, (EPOXY COATED).
- ④ FURNISH & INSTALL MJ GATE VALVE & BOX, (IF REQUIRED).
- ⑤ MINIMUM OF 12" COVER BETWEEN THE WATERLINE AND STORM DRAIN.

TYPICAL WATERLINE LOOP
N.T.S.



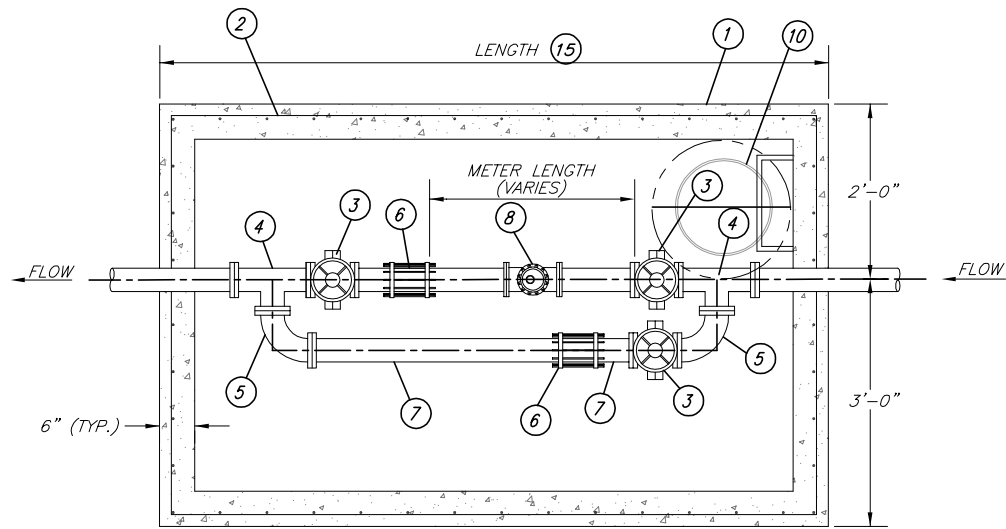
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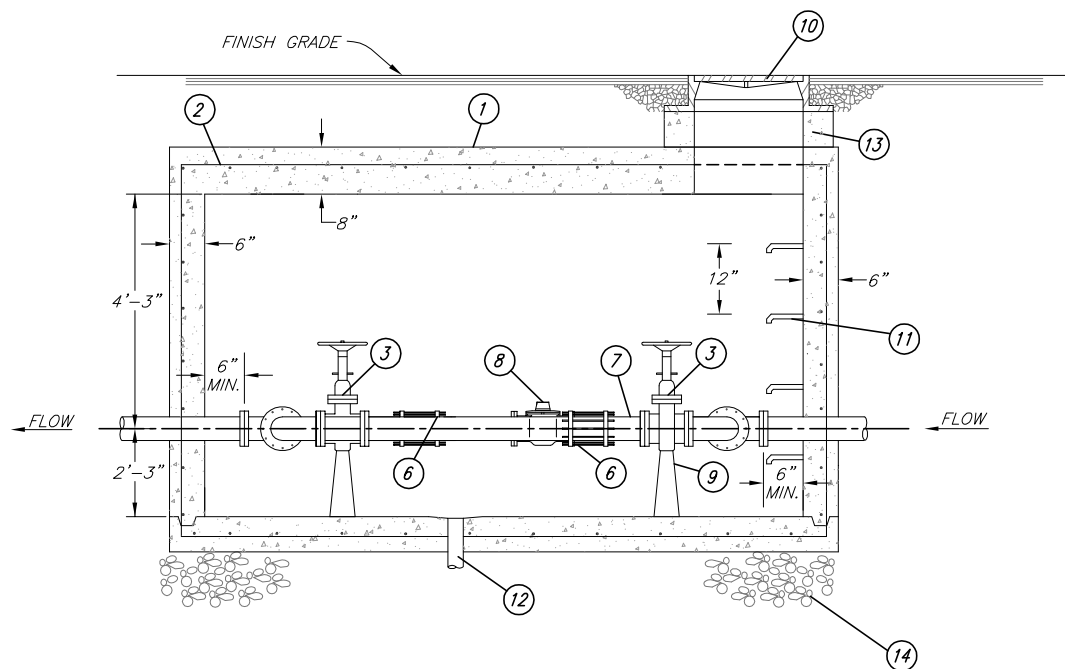
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**SOUTH OGDEN
CITY CORPORATION**

**PUBLIC WORKS STANDARD DRAWINGS & DETAILS
FIRE HYDRANT & WATER SERVICE
CONNECTIONS**



PLAN VIEW



CROSS SECTION

3" & 4" WATER SERVICE CONNECTION DETAIL

N.T.S.

PIPE & FITTING SCHEDULE

3" METER		4" METER	
NO.	DESCRIPTION	DESCRIPTION	
1	REINFORCED CONCRETE VAULT	REINFORCED CONCRETE VAULT	
2	#4 BARS 8" O.C. BOTH WAYS, TOP & SIDES	#4 BARS 8" O.C. BOTH WAYS, TOP & SIDES	
3	3" RESILIENT WEDGE GATE VALVE (FLANGED)	4" RESILIENT WEDGE GATE VALVE (FLANGED)	
4	3"x3"x3" TEE (FLANGED)	4"x4"x4" TEE (FLANGED)	
5	3" 90° BEND (FLANGED)	4" 90° BEND (FLANGED)	
6	3" FLEXIBLE COUPLING	4" FLEXIBLE COUPLING	
7	3" FL. x P.E. BYPASS PIPE (LENGTH VARIES)	4" FL. x P.E. BYPASS PIPE (LENGTH VARIES)	
8	3" WATER METER, NEPTUNE H-P TURBINE WITH RADIO READ (SEE NOTE)	4" WATER METER, NEPTUNE H-P TURBINE WITH RADIO READ (SEE NOTE)	
9	ADJUSTABLE PIPE SUPPORTS	ADJUSTABLE PIPE SUPPORTS	
10	36"Ø "D&L SUPPLY" A-1460 MANHOLE RING & COVER MARKED "WATER"	36"Ø "D&L SUPPLY" A-1460 MANHOLE RING & COVER MARKED "WATER"	
11	MANHOLE STEPS	MANHOLE STEPS	
12	DRAIN TO STORM DRAIN OR TO DAYLIGHT, NO GRAVEL SUMP PERMITTED. IF NO GRAVITY DRAIN IS AVAILABLE, OMIT DRAIN.	DRAIN TO STORM DRAIN OR TO DAYLIGHT, NO GRAVEL SUMP PERMITTED. IF NO GRAVITY DRAIN IS AVAILABLE, OMIT DRAIN.	
13	MIN. 1 EA. 6" GRADE RING	MIN. 1 EA. 6" GRADE RING	
14	8" THICK COMPACTED BASE COURSE	8" THICK COMPACTED BASE COURSE	
15	VAULT LENGTH (O.D.) = 9 FEET	VAULT LENGTH (O.D.) = 11 FEET	

NOTE: A COMPOUND METER MAY BE REQUIRED FOR SOME SERVICES.

THRUST PER P.S.I. OF WATER PRESSURE AT VARIOUS FITTINGS				
PIPE SIZE	DEAD END OR TEE	90° ELBOW	45° ELBOW	22 1/2° ELBOW
4	19	27	15	7
6	39	55	30	15
8	67	94	51	26
10	109	154	84	43
12	155	218	119	61
14	210	296	161	82
16	272	383	209	106
18	351	494	269	137
20	434	611	333	169
24	623	878	478	244

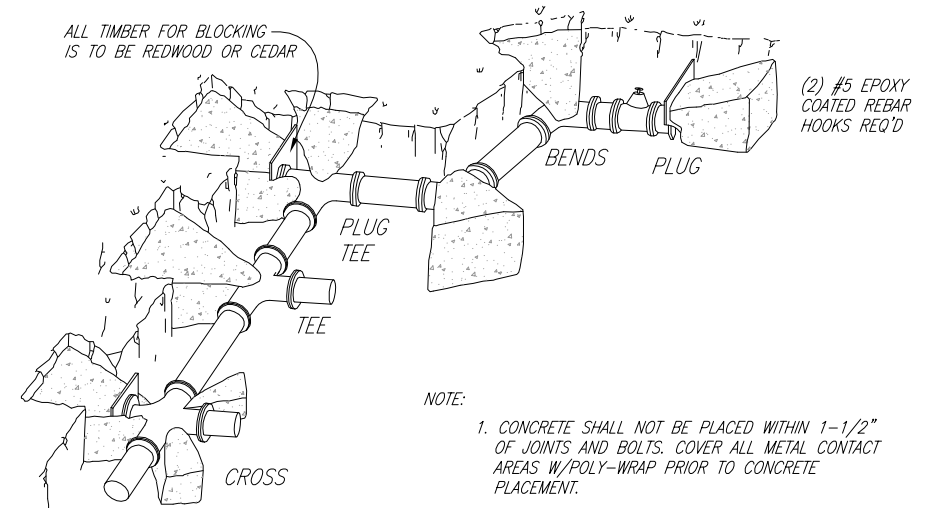
EXAMPLE:

8-INCH 90° ELBOW, PRESSURE 200 LB./SQ. IN.
FROM TABLE : THRUST = 94 x 200 = 18,800 LB.
ASSUME BEARING STRENGTH OF SOIL = 2000 LB./SQ. FT.
AREA OF BEARING REQUIRED FOR THRUST BLOCK

$$\frac{18,800}{2,000} = 9.4 \text{ SQ. FT.}$$

NOTES:

- IN USING THE ABOVE TABLES, USE THE MAXIMUM INTERNAL PRESSURE ANTICIPATED (I.E. HYDROSTATIC TEST PRESSURE, POSSIBLE SURGE PRESSURE DUE TO PUMP SHUT OFF, ETC.).
- SEE SOILS REPORT FOR BEARING STRENGTH OF SOIL.



THRUST BLOCKING

N.T.S.

NOTE:

- CONCRETE SHALL NOT BE PLACED WITHIN 1-1/2" OF JOINTS AND BOLTS. COVER ALL METAL CONTACT AREAS W/POLY-WRAP PRIOR TO CONCRETE PLACEMENT.
- IN THE ABSENCE OF A SOILS REPORT, ALL THRUST BLOCKS SHALL BE SIZED ON THE BASIS OF A MAX. LATERAL BEARING VALUE OF 800 P.S.F. AND A THRUST RESULTING FROM 150% OF THE WATERLINE STATIC TEST PRESSURE.
- THRUST BLOCKS ARE REQ'D. AT ALL BENDS OF 22-1/2" OR MORE.
- ALL THRUST BLOCKED FITTINGS ARE TO BE RESTRAINED.



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CITY CORPORATION

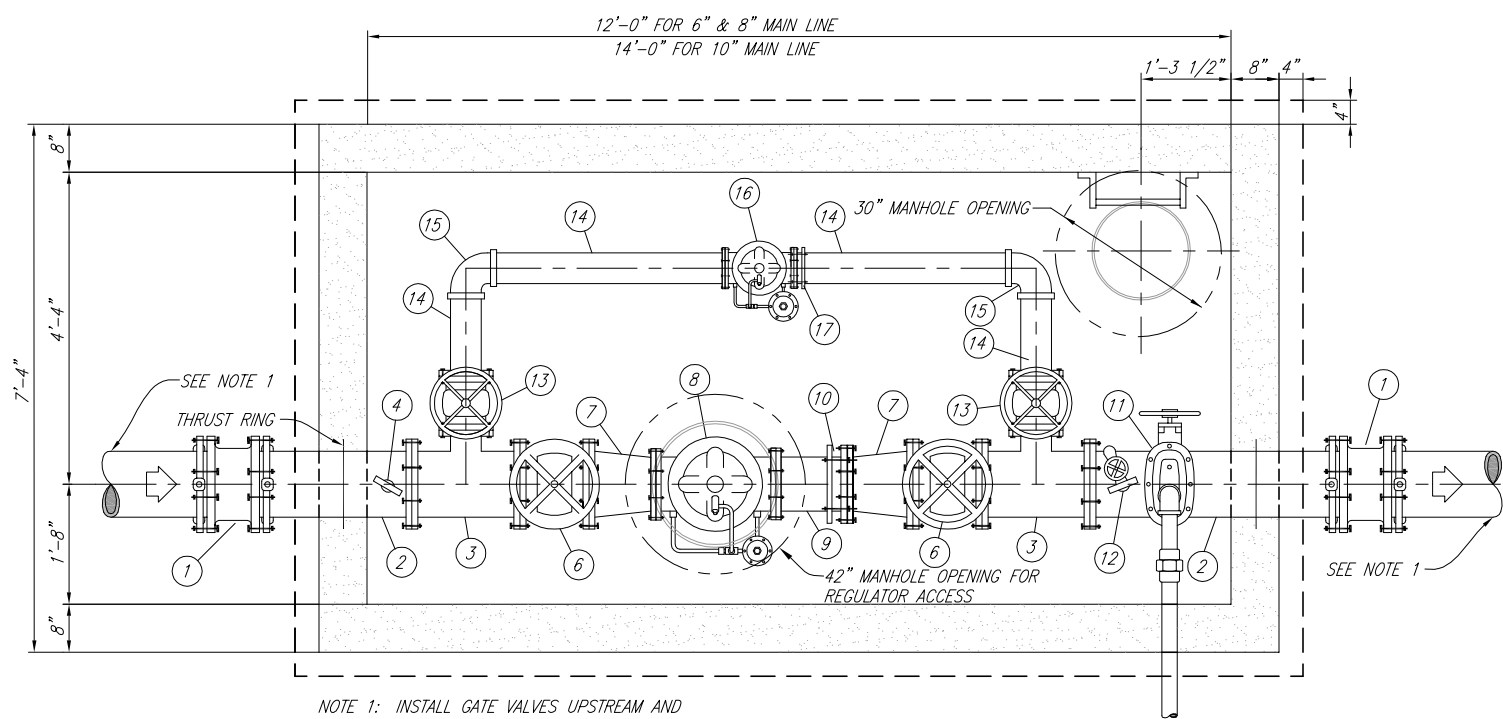
PUBLIC WORKS STANDARD DRAWINGS & DETAILS
THRUST BLOCKING & WATER SERVICE
CONNECTIONS

SHEET:
7
OF 17 SHEETS

PIPE & FITTING SCHEDULE

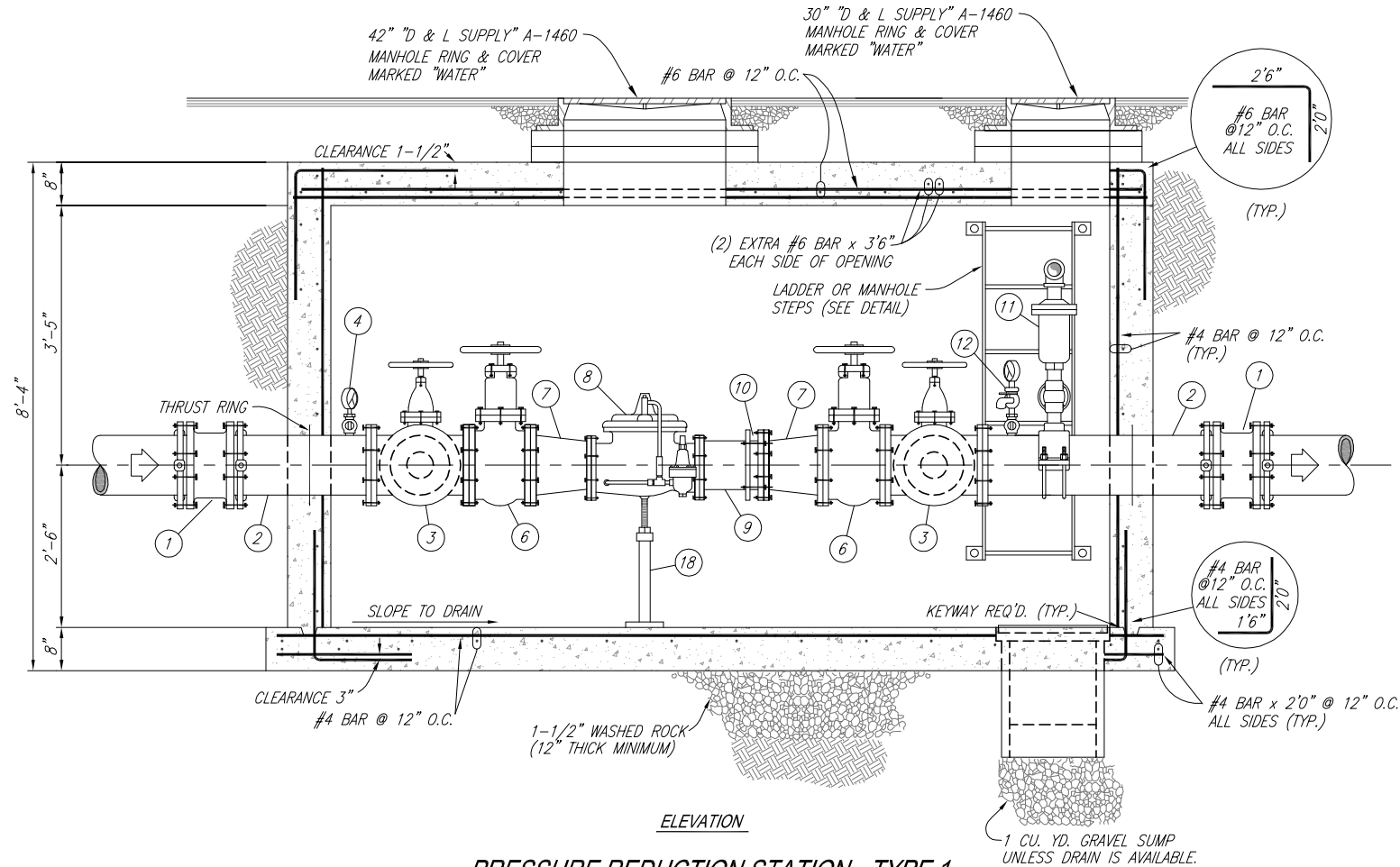
NO.	DESCRIPTION	JOINT TYPE	6"	8"	10"
			LINE	LINE	LINE
1	D.I. FLEXIBLE COUPLING (2)	PExPE	6"	8"	10"
2	D.I. SPOOL PIECE W/ THRUST RING (2)	FLxPE	6"	8"	10"
3	D.I. TEE (2)	FL	6"x6"x4"	8"x8"x4"	10"x10"x4"
4	LIQUID FILLED PRESSURE GAUGE (0-300 P.S.I.) W/ 3/4" CORPORATION VALVE & REDUCER	THR.	-	-	-
6	GATE VALVE (2)	FL	6"	8"	10"
7	D.I. REDUCER (2)	FL	6"x4"	8"x6"	10"x8"
8	CLA-VALVE 90-01 PRESSURE REDUCTION VALVE	FL	4"	6"	8"
9	D.I. SPOOL PIECE	FLxPE	4"	6"	8"
10	D.I. FLANGED COUPLING ADAPTER	-	4"	6"	8"
11	AIR/VACCUUM ASSEMBLY (SEE DETAIL)	-	-	-	-
12	PRESSURE GAUGE W/ SAMPLING FAUCET (SEE DETAIL)	-	-	-	-
13	GATE VALVE (2)	FL	4"	4"	4"
14	D.I. SPOOL PIECE	FL	4"	4"	4"
15	D.I. 90° BEND (2)	FL	4"	4"	4"
16	CLA-VALVE 90-01 PRESSURE REDUCTION VALVE	FL	4"	4"	4"
17	D.I. FLANGED COUPLING ADAPTER	FL	4"	4"	4"
18	ADJUSTABLE PIPE SUPPORT (CLOW F-1608 OR EQUIVALENT)	-	-	-	-

NOTE - STRUCTURE, PIPING & VALVE SIZES FOR P.R.V. STATIONS ON LINE SIZES GREATER THAN 10" SHALL BE SPECIFIED BY THE ENGINEER.



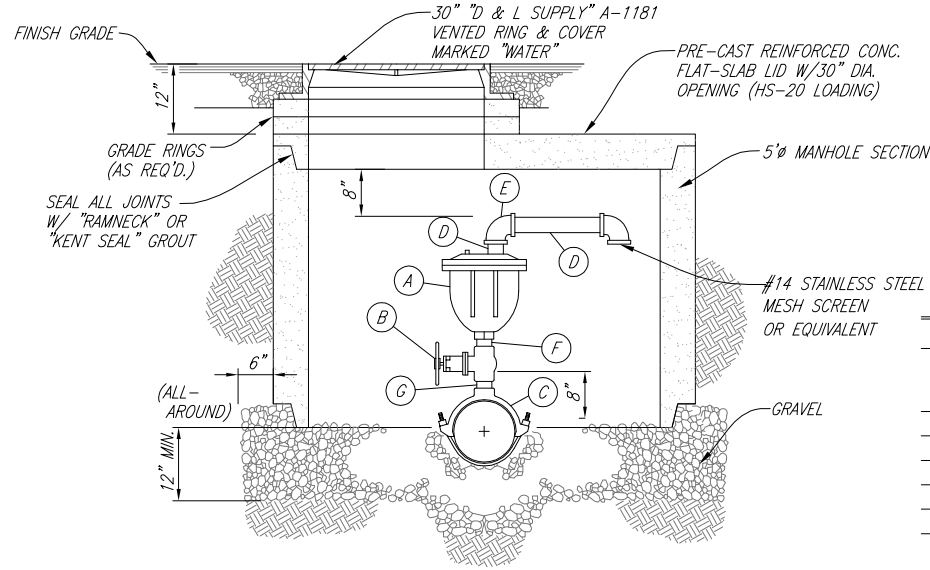
NOTE 1: INSTALL GATE VALVES UPSTREAM AND DOWNSTREAM FROM REDUCTION STATION AT LOCATIONS SPECIFIED BY ENGINEER

PLAN
N.T.S.

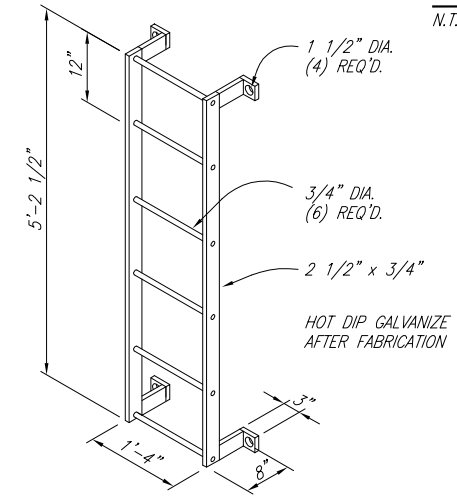


ELEVATION

PRESSURE REDUCTION STATION - TYPE 1
N.T.S.



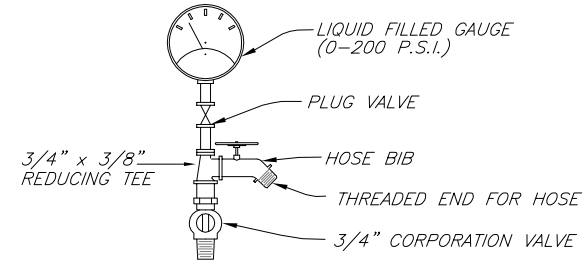
AIR/VACUUM RELIEF STATION
N.T.S.



LADDER DETAIL
N.T.S.

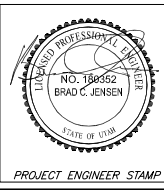
PIPE & FITTING SCHEDULE

NO.	DESCRIPTION	FITTING
A	2" HEAVY-DUTY COMBINATION AIR/VACUUM RELIEF VALVE "APCO" MODEL 144 OR EQUIVALENT	THR.
B	2" GATE VALVE OR BALL VALVE	THR.
C	2" BRASS DOUBLE STRAP SERVICE SADDLE	-
D	2" GALV. STEEL PIPE	THR.
E	2" GALV. STEEL 90° ELBOW	THR.
F	2" BRASS PIPE	THR.



PRESSURE GAUGE W/ SAMPLING FAUCET DETAIL
N.T.S.

107-500-BRD-CITY-SWST-FABRIC-MANHOLE (2015) 10-16-18.dwg 3/17/2015 10:20:07 AM MDT



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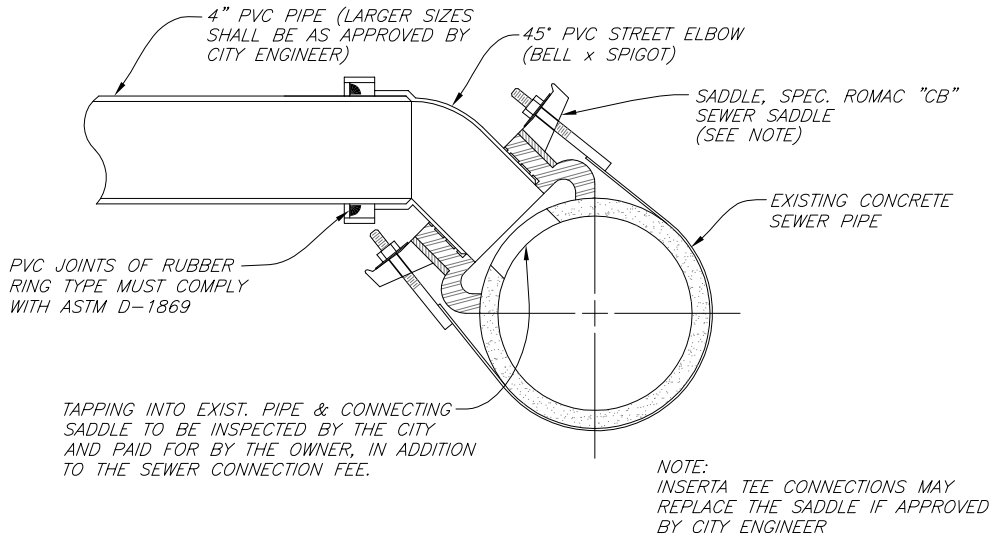
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PUBLIC WORKS STANDARD DRAWINGS & DETAILS
PRESSURE REDUCTION & AIR/VACCUUM
RELIEF STATIONS

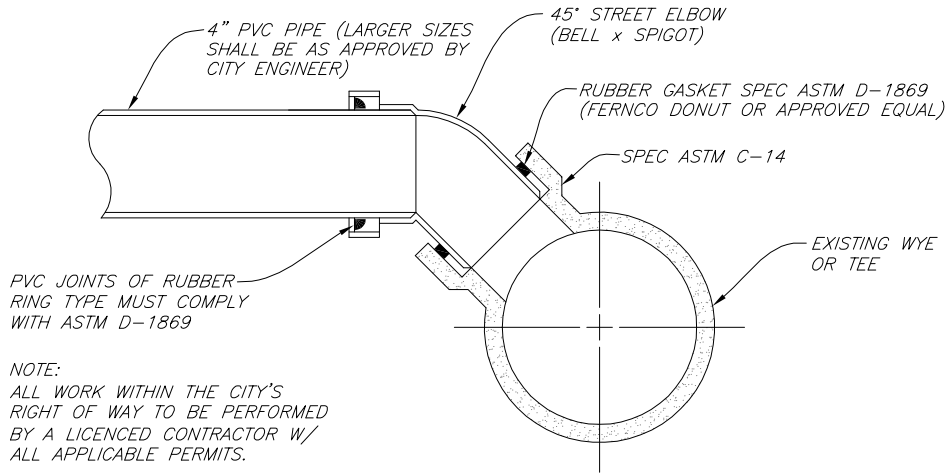
NOTE:
PVC PIPE FITTINGS ASTM D-3034
WITH A S.D.R. 35



TAPPING INTO EXISTING CONCRETE PIPE

N.T.S.

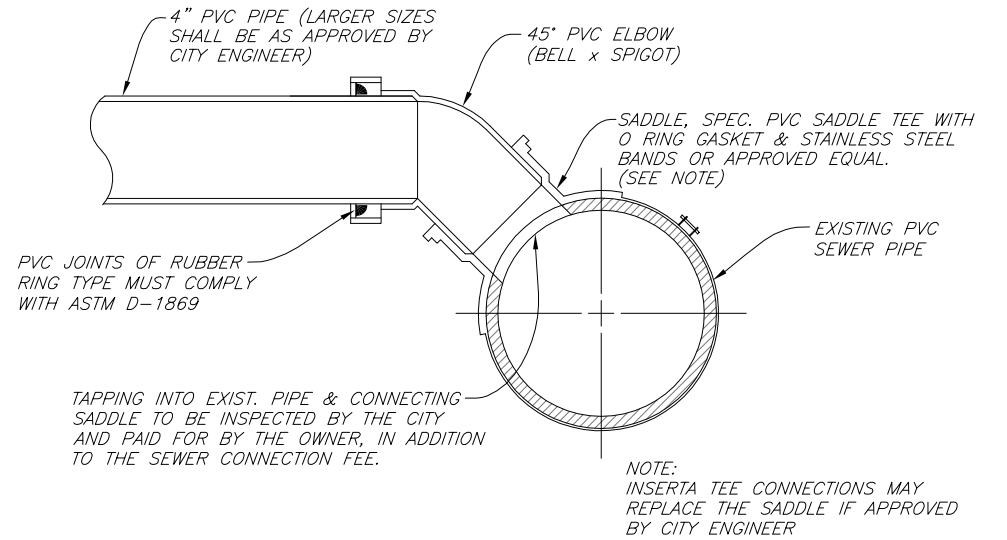
NOTE:
PVC PIPE FITTINGS ASTM D-3034
WITH A S.D.R. 35



CONNECTING INTO EXISTING WYE OR TEE

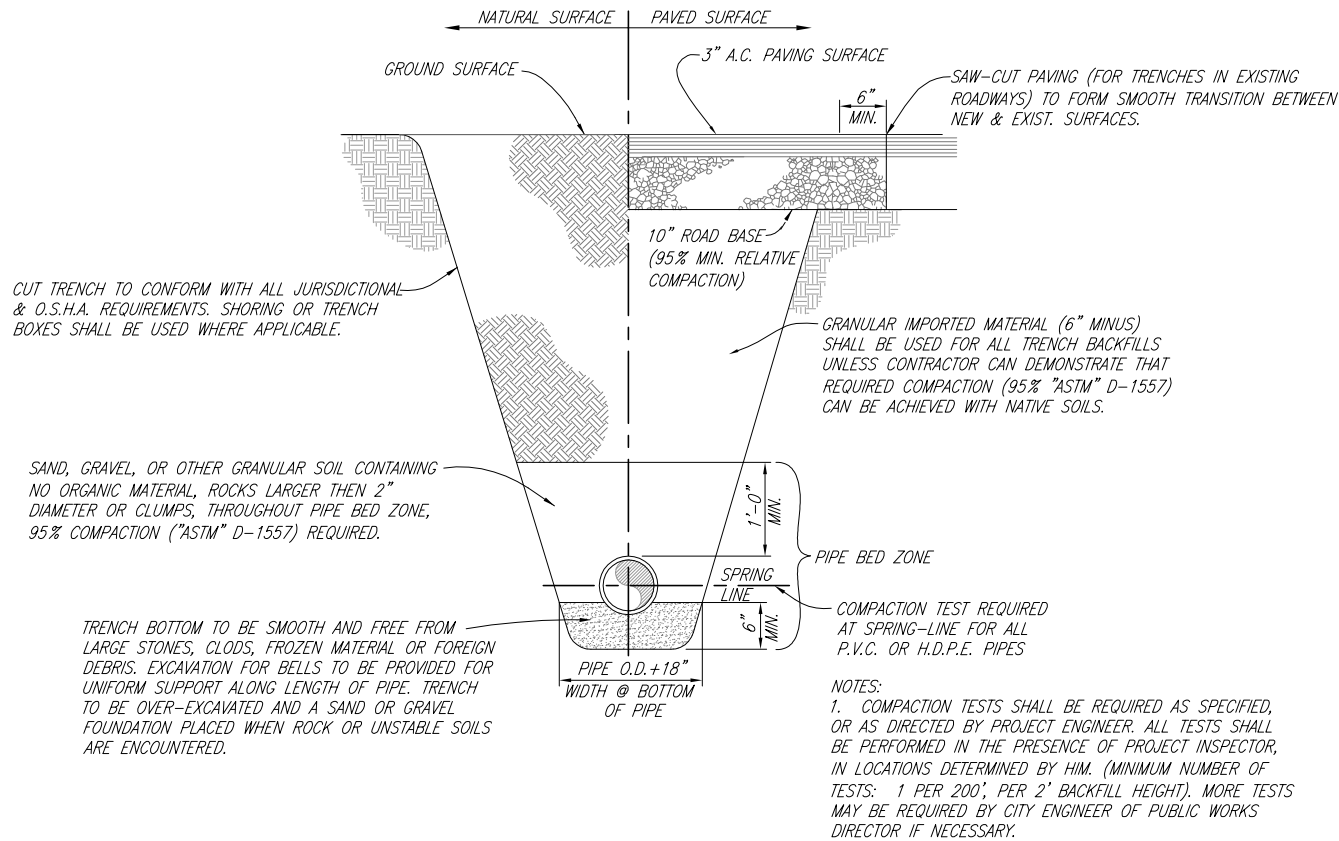
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NOTE:
PVC PIPE FITTINGS ASTM D-3034
WITH A S.D.R. 35



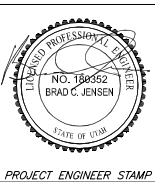
TAPPING INTO EXISTING PVC PIPE

N.T.S.



TYPICAL TRENCH SECTION

N.T.S.



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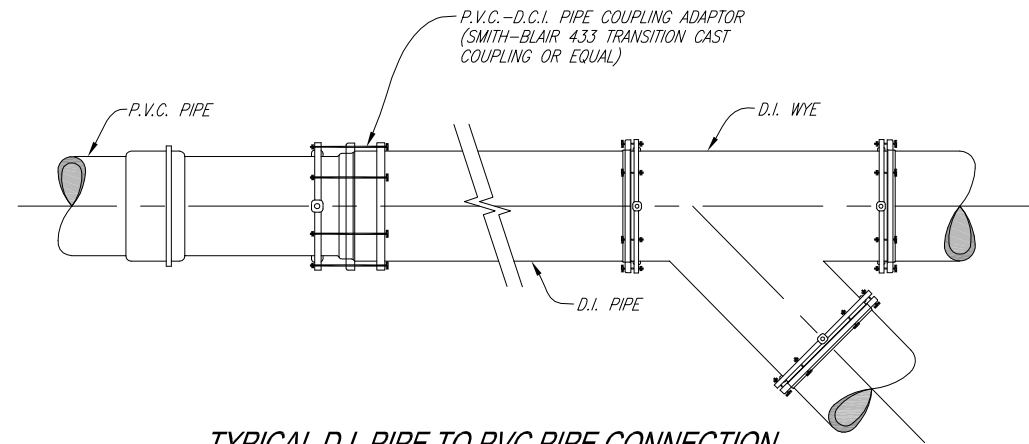
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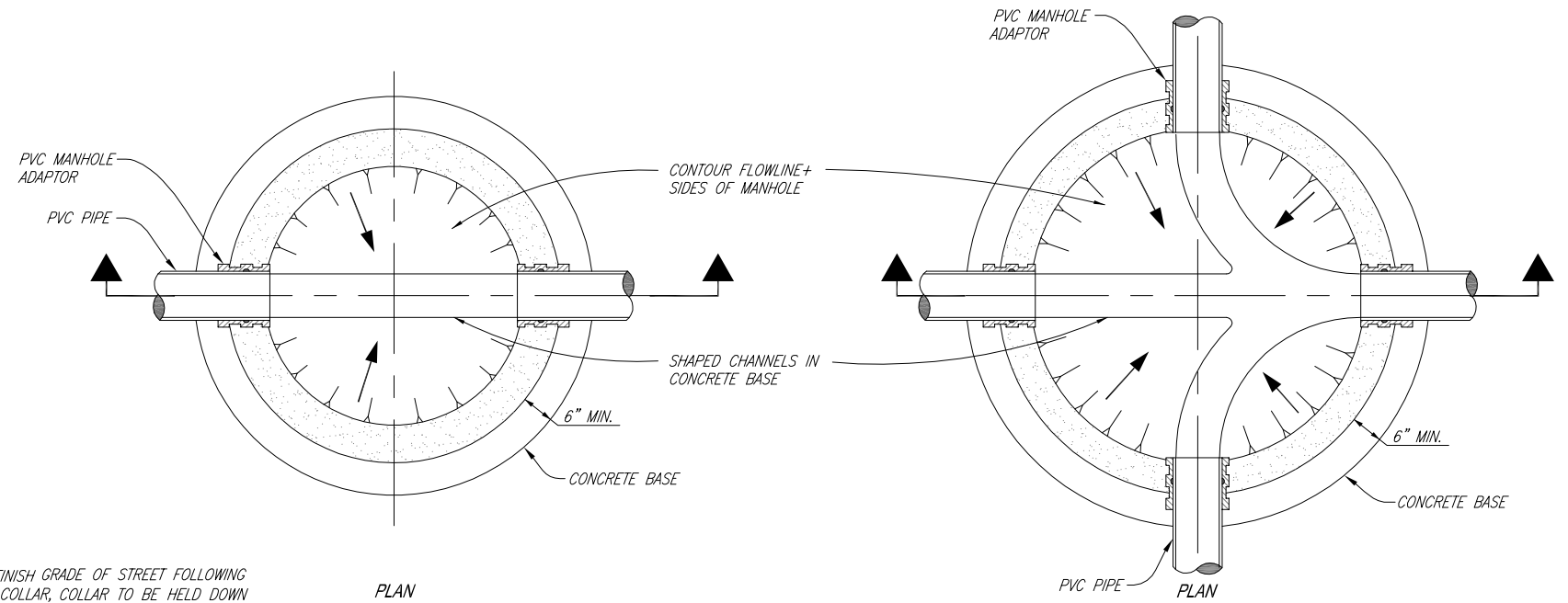
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**PUBLIC WORKS STANDARD DRAWINGS & DETAILS
SANITARY SEWER CONNECTION DETAILS
& TRENCH SECTION**

SHEET:
9
OF 17 SHEETS

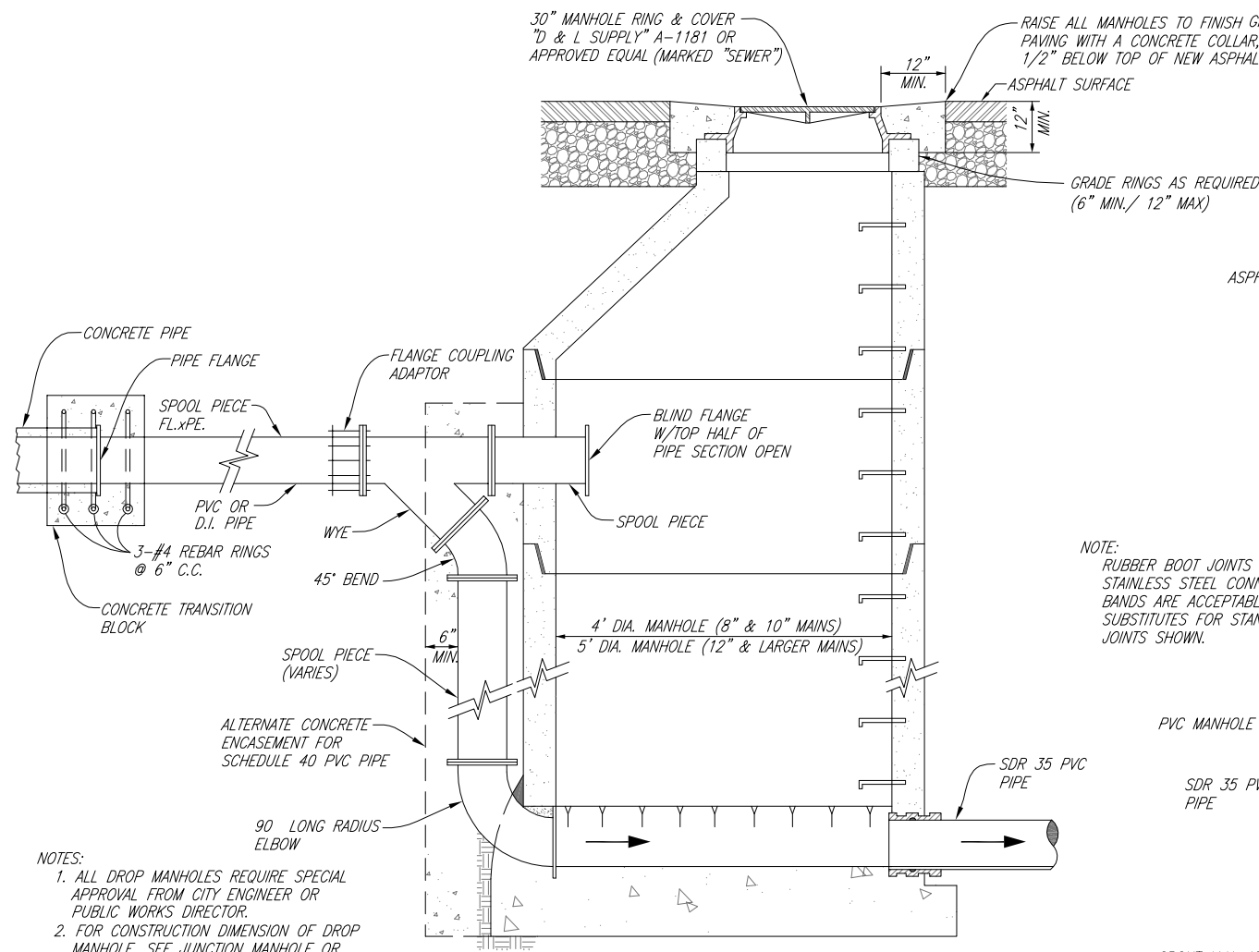


TYPICAL D.I. PIPE TO PVC PIPE CONNECTION
N.T.S.

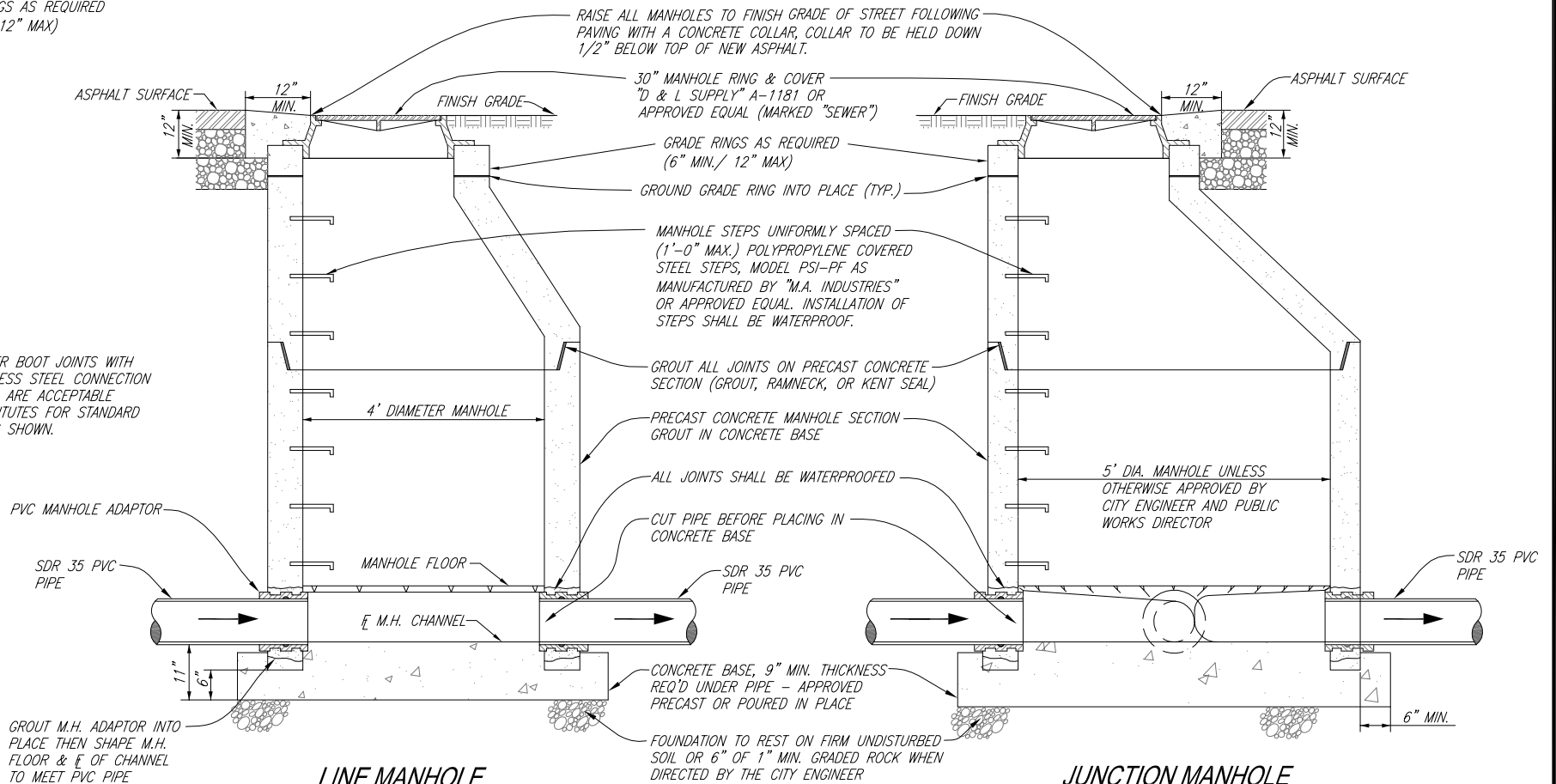


PLAN

PLAN



OUTSIDE DROP MANHOLE
TYPICAL D.I. PIPE TO CONCRETE PIPE CONNECTION
N.T.S.

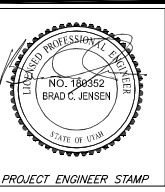


LINE MANHOLE
N.T.S.

JUNCTION MANHOLE
N.T.S.

- NOTES:
1. ALL DROP MANHOLES REQUIRE SPECIAL APPROVAL FROM CITY ENGINEER OR PUBLIC WORKS DIRECTOR.
 2. FOR CONSTRUCTION DIMENSION OF DROP MANHOLE, SEE JUNCTION MANHOLE OR LINE MANHOLE DETAIL THIS SHEET.
 3. ALL PIPE FOR DROP MANHOLE TO BE FLANGED DUCTILE IRON PIPE, OR ALTERNATE SCH. 40 PVC ENCASED IN CONCRETE.

NOTE: RUBBER BOOT JOINTS WITH STAINLESS STEEL CONNECTION BANDS ARE ACCEPTABLE SUBSTITUTES FOR STANDARD JOINTS SHOWN.



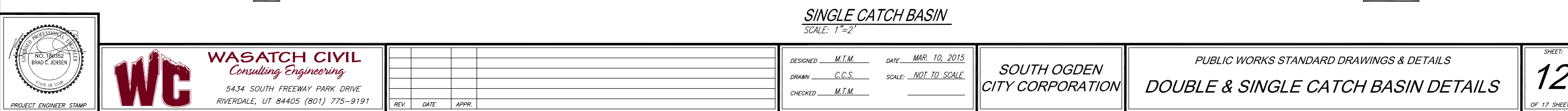
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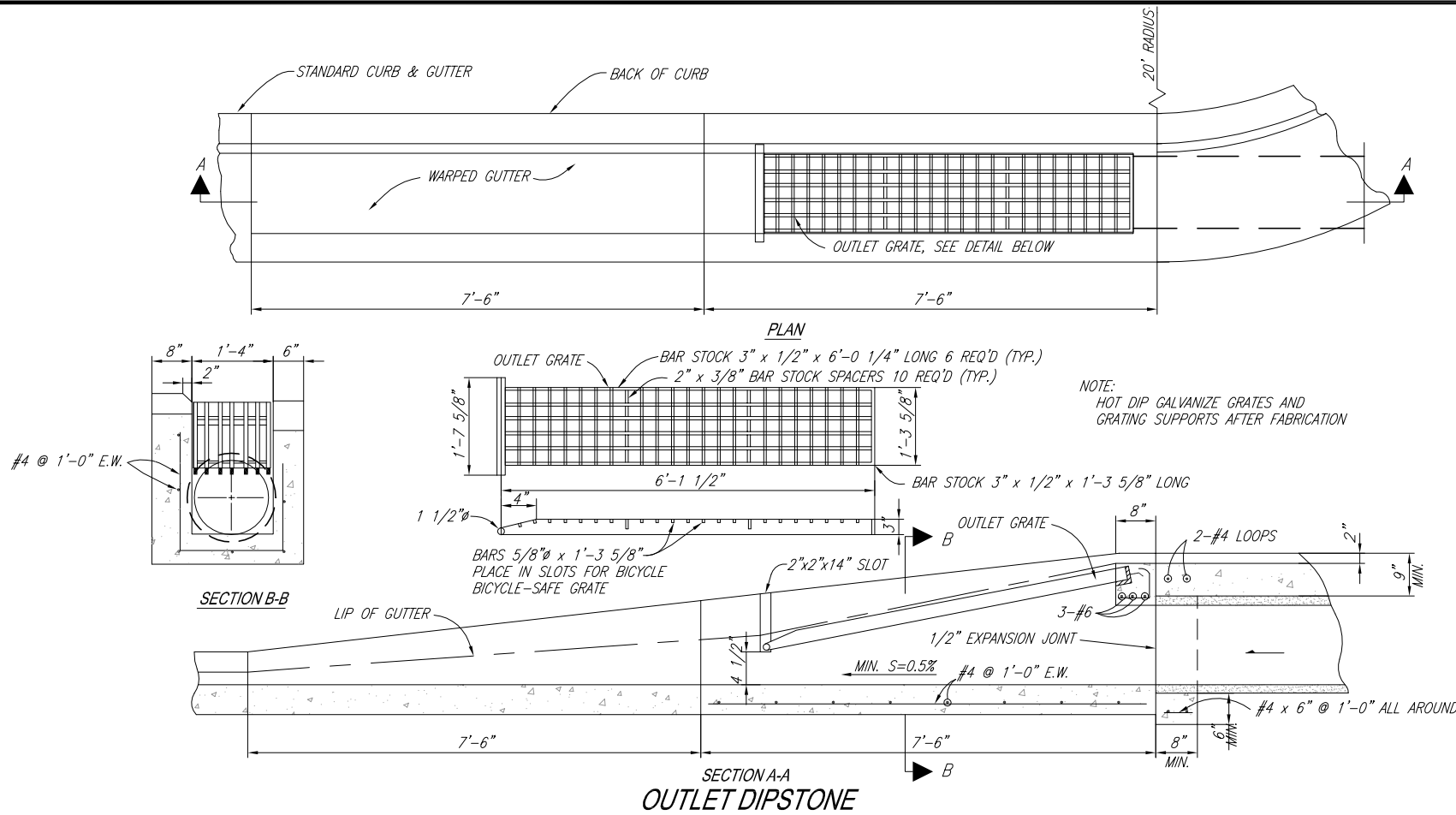
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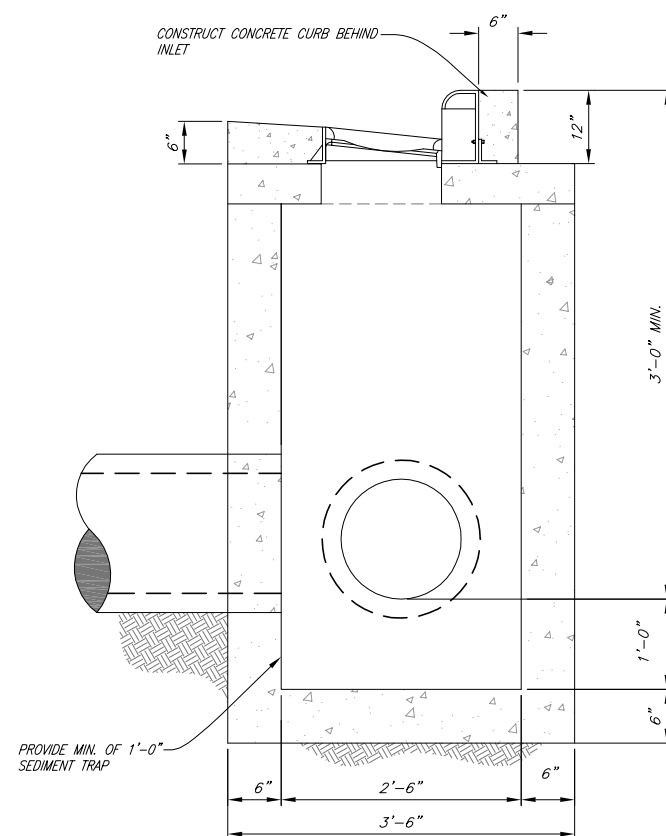
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PUBLIC WORKS STANDARD DRAWINGS & DETAILS
SANITARY SEWER MANHOLE DETAILS





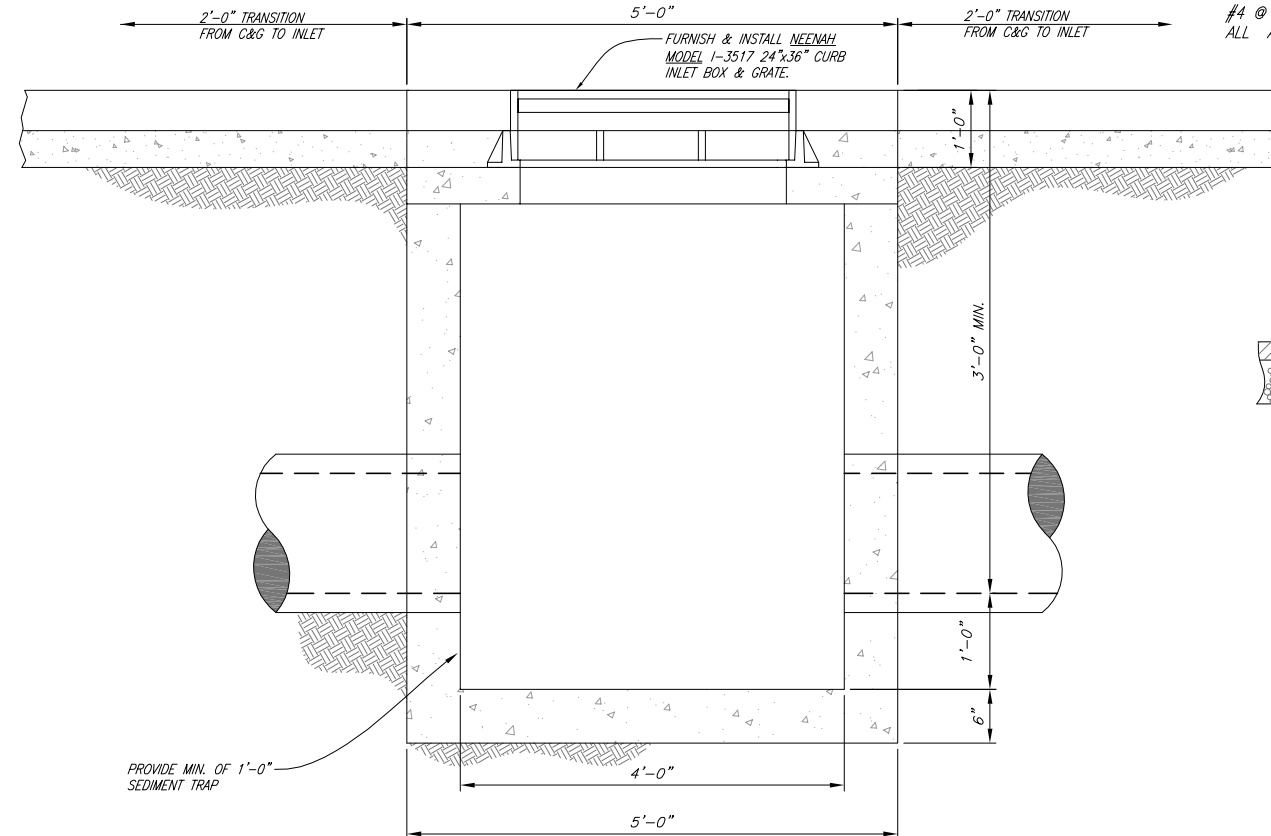
OUTLET DIPSTONE



SIDE ELEVATION

HOODED CURB INLET BOX, FRAME AND GRATE

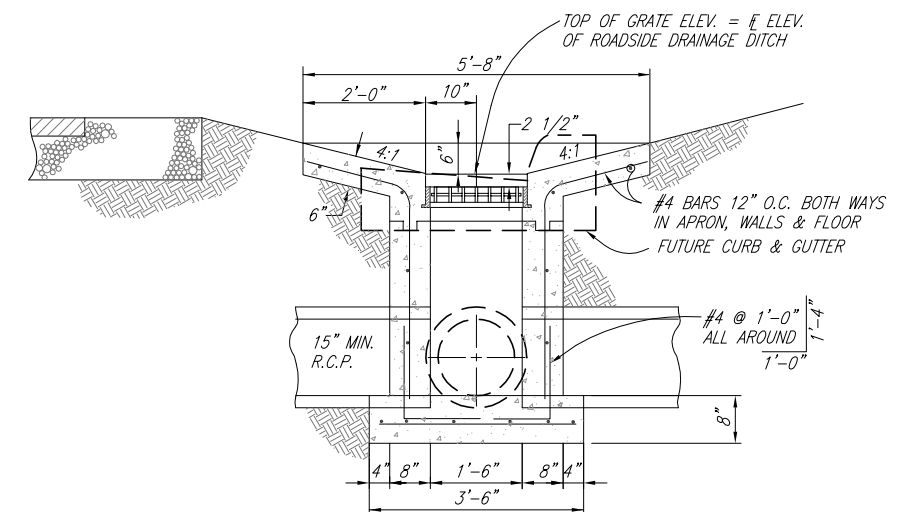
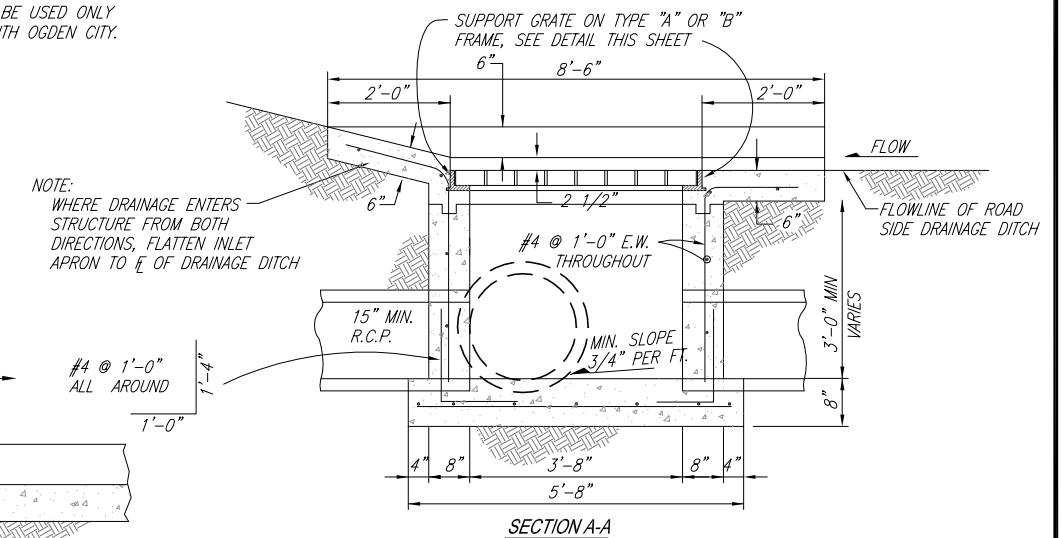
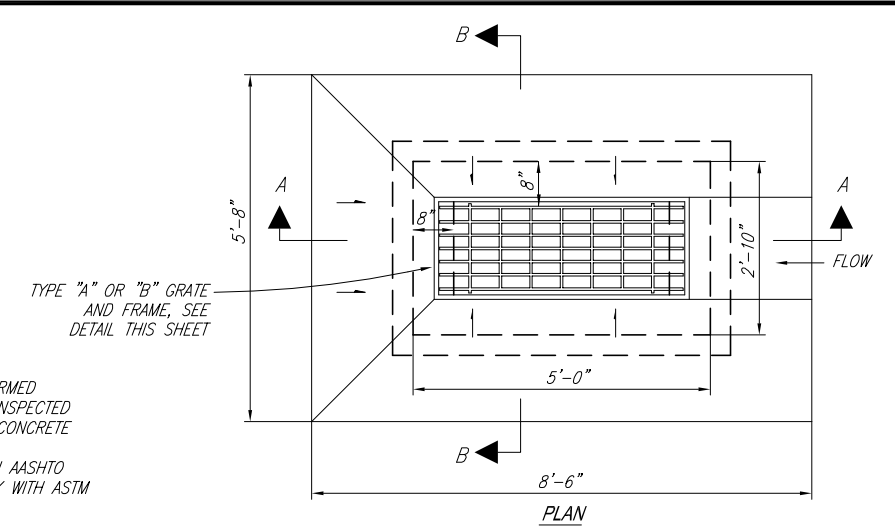
N.T.S.



FRONT ELEVATION

NOTES:

1. CAST IN PLACE BOXES TO BE FORMED INSIDE AND OUT, AND MUST BE INSPECTED BY THE CITY PRIOR TO PLACING CONCRETE
2. PRE CAST BOXES SHALL HAVE AN AASHTO H-20 RATING AND SHALL COMPLY WITH ASTM C-857 AND C-858
3. FRAME & GRATE SHALL BE PRE-FABRICATED AND GALVANIZED IN ACCORDANCE WITH A.S.T.M. A-123 SPECIFICATIONS.
4. HOODED INLET BOXES ARE TO BE USED ONLY WITH APPROVAL FROM THE SOUTH OGDEN CITY.



CURBLESS INLET



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RIVERDALE, UT 84405 (801) 775-9191

REV.	DATE	APPR.

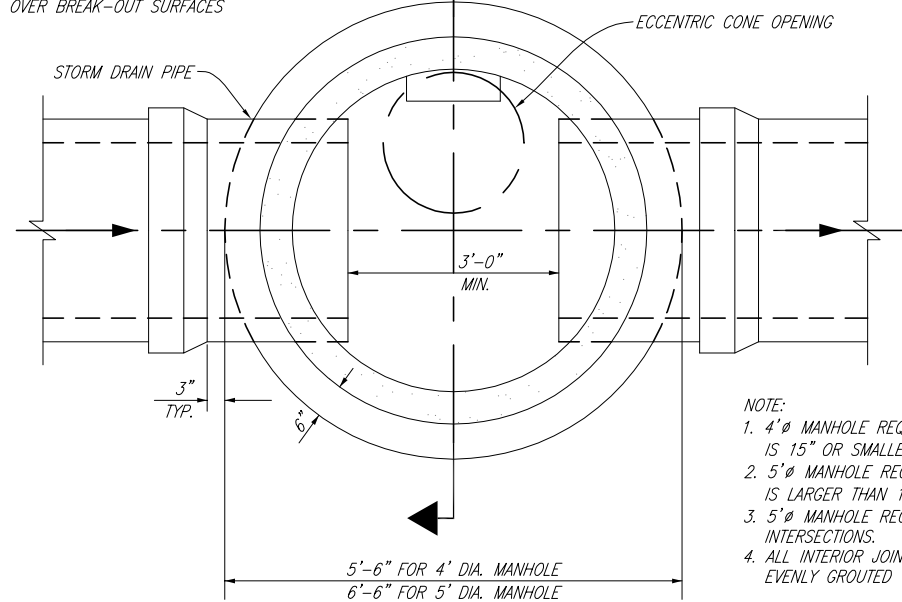
DESIGNED M.T.M. DATE MAR. 10, 2015
DRAWN C.C.S. SCALE: NOT TO SCALE
CHECKED M.T.M.

SOUTH OGDEN CITY CORPORATION

PUBLIC WORKS STANDARD DRAWINGS & DETAILS
CURBLESS INLET, FRAME & GRATE
DETAILS

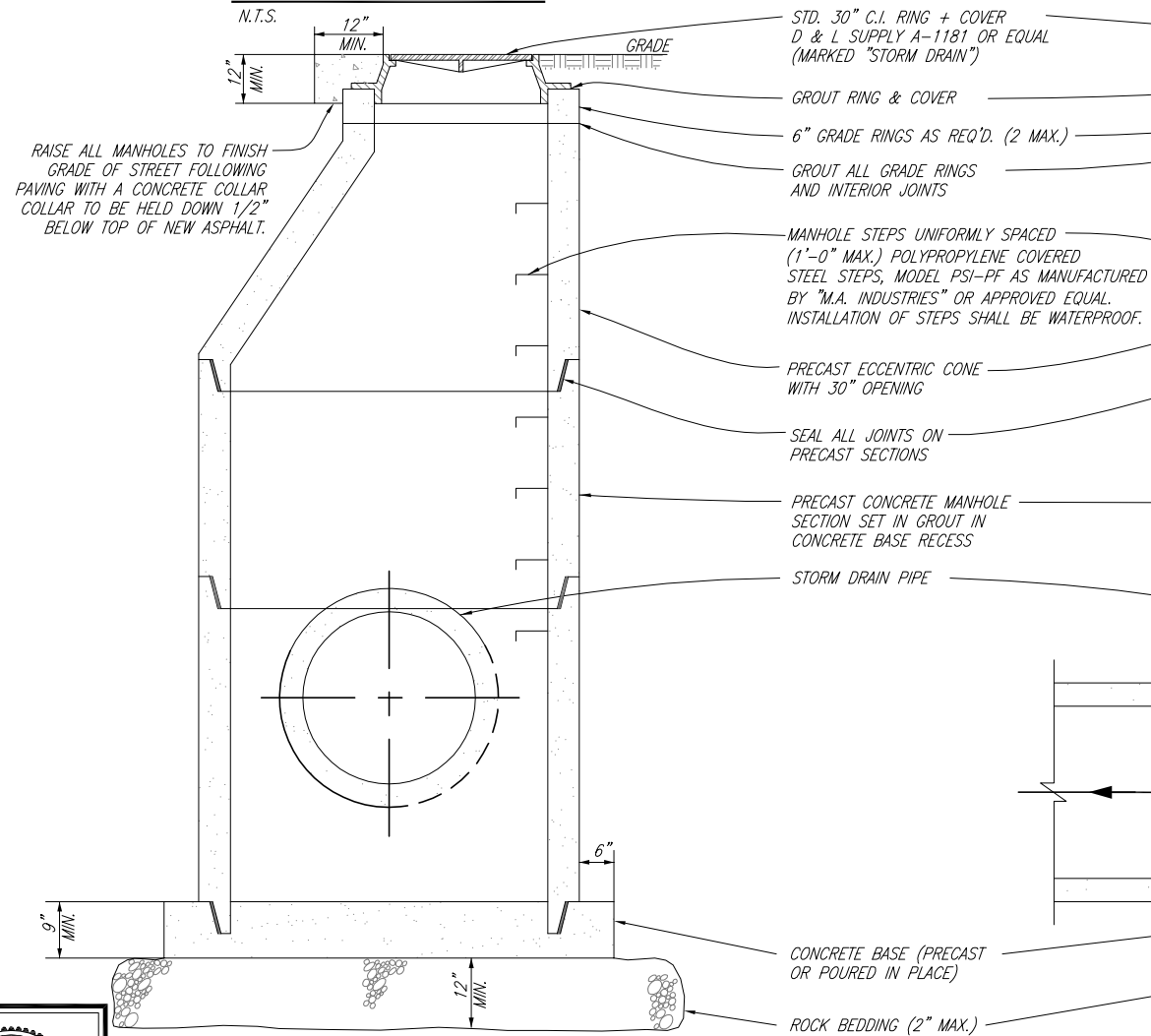
SHEET:
13
OF 17 SHEETS

OPENING IN PIPE SCORED BY MFR. BREAKOUT OR SAW CUT IN FIELD AT LOCATIONS. CUT BACK REINFORCING MESH AND GROUT (NON-SHRINK) OVER BREAK-OUT SURFACES

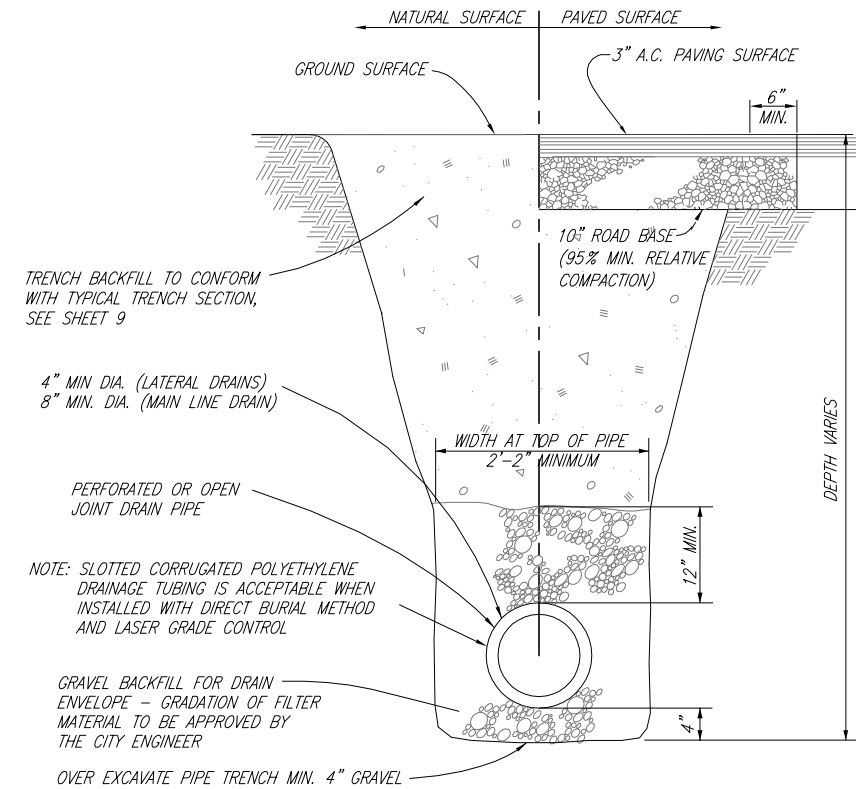
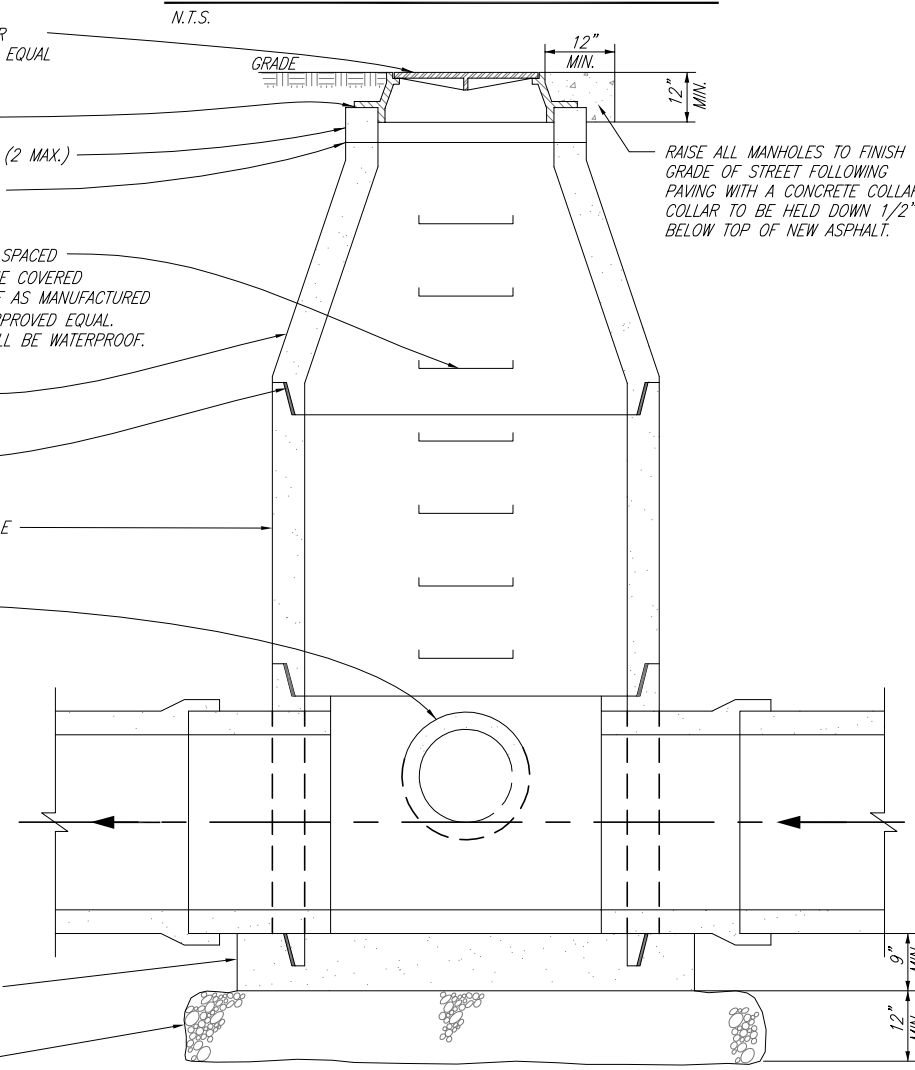


- NOTE:
1. 4'Ø MANHOLE REQUIRED WHERE LINE SIZE IS 15" OR SMALLER.
 2. 5'Ø MANHOLE REQUIRED WHERE LINE SIZE IS LARGER THAN 15".
 3. 5'Ø MANHOLE REQUIRED AT ALL PIPE INTERSECTIONS.
 4. ALL INTERIOR JOINTS SHALL BE SMOOTH AND EVENLY GROUTED WITH NON-SHRINK GROUT MIX.

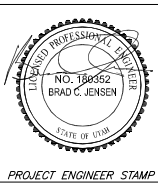
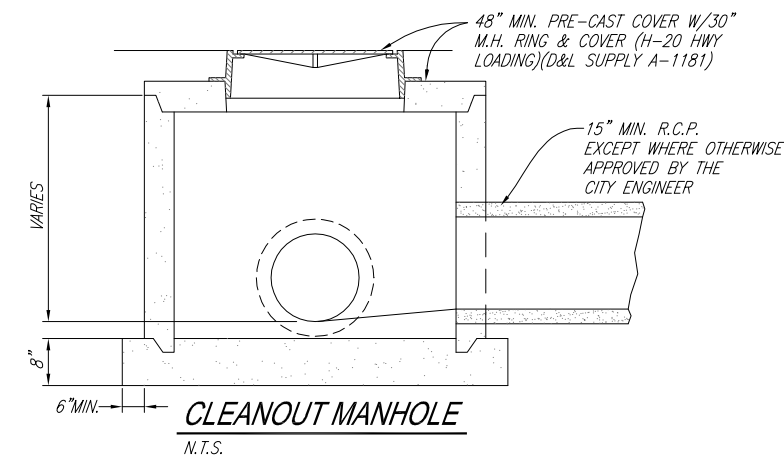
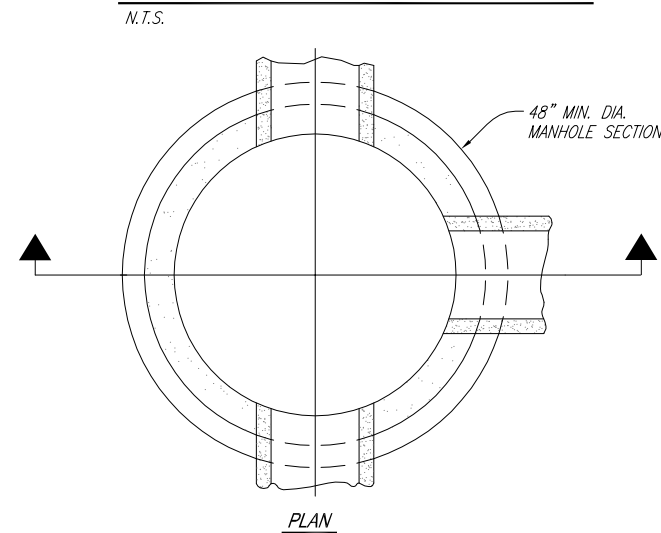
TYPICAL LINE MANHOLE



TYPICAL 5' DIAMETER JUNCTION MANHOLE



TYPICAL LAND DRAIN PIPE SECTION



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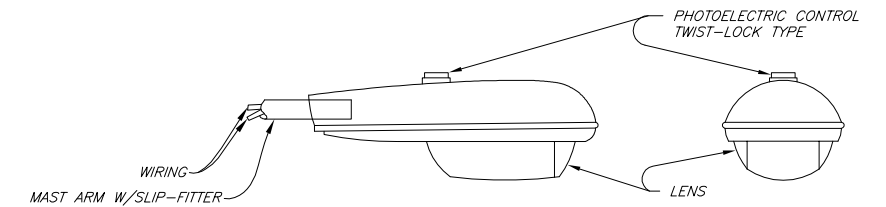
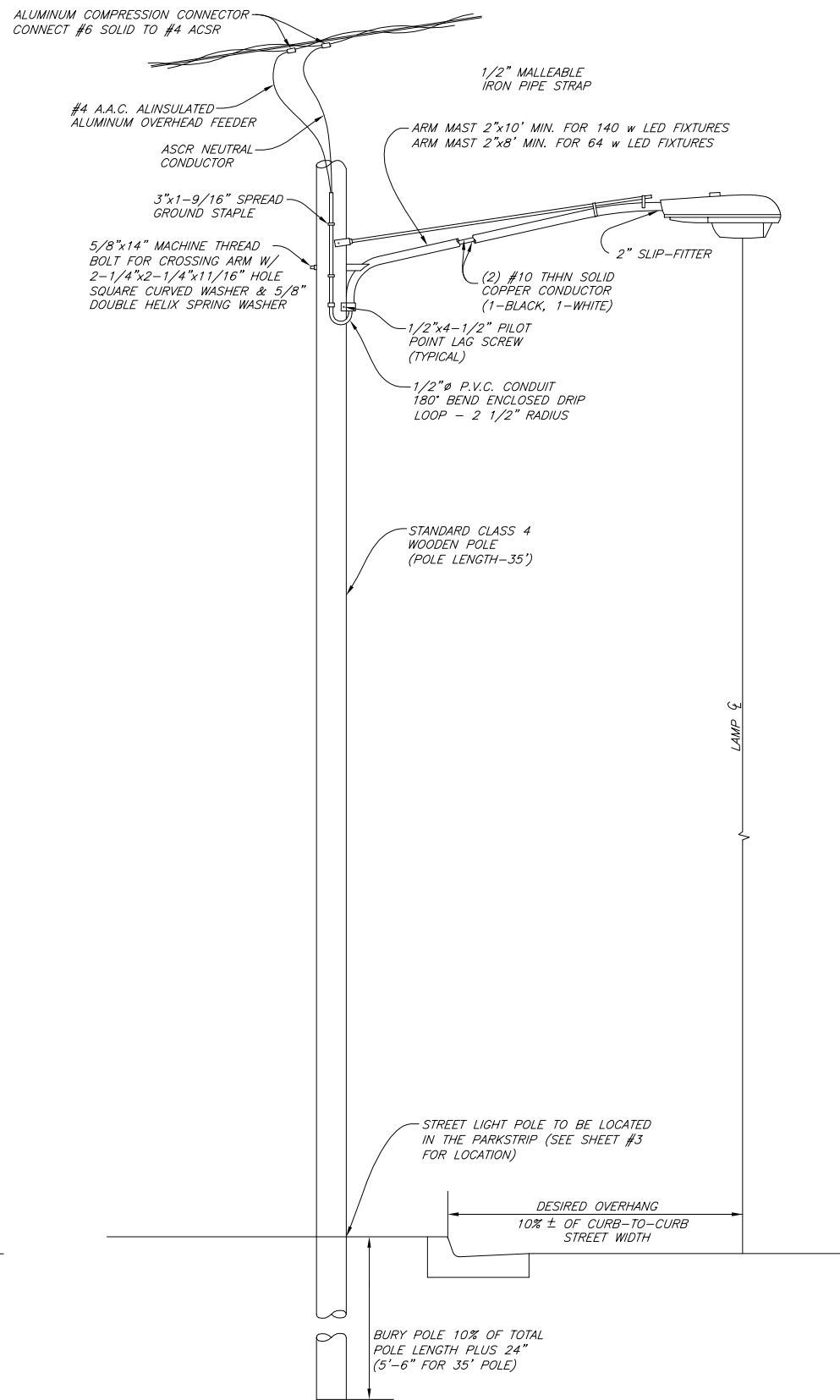
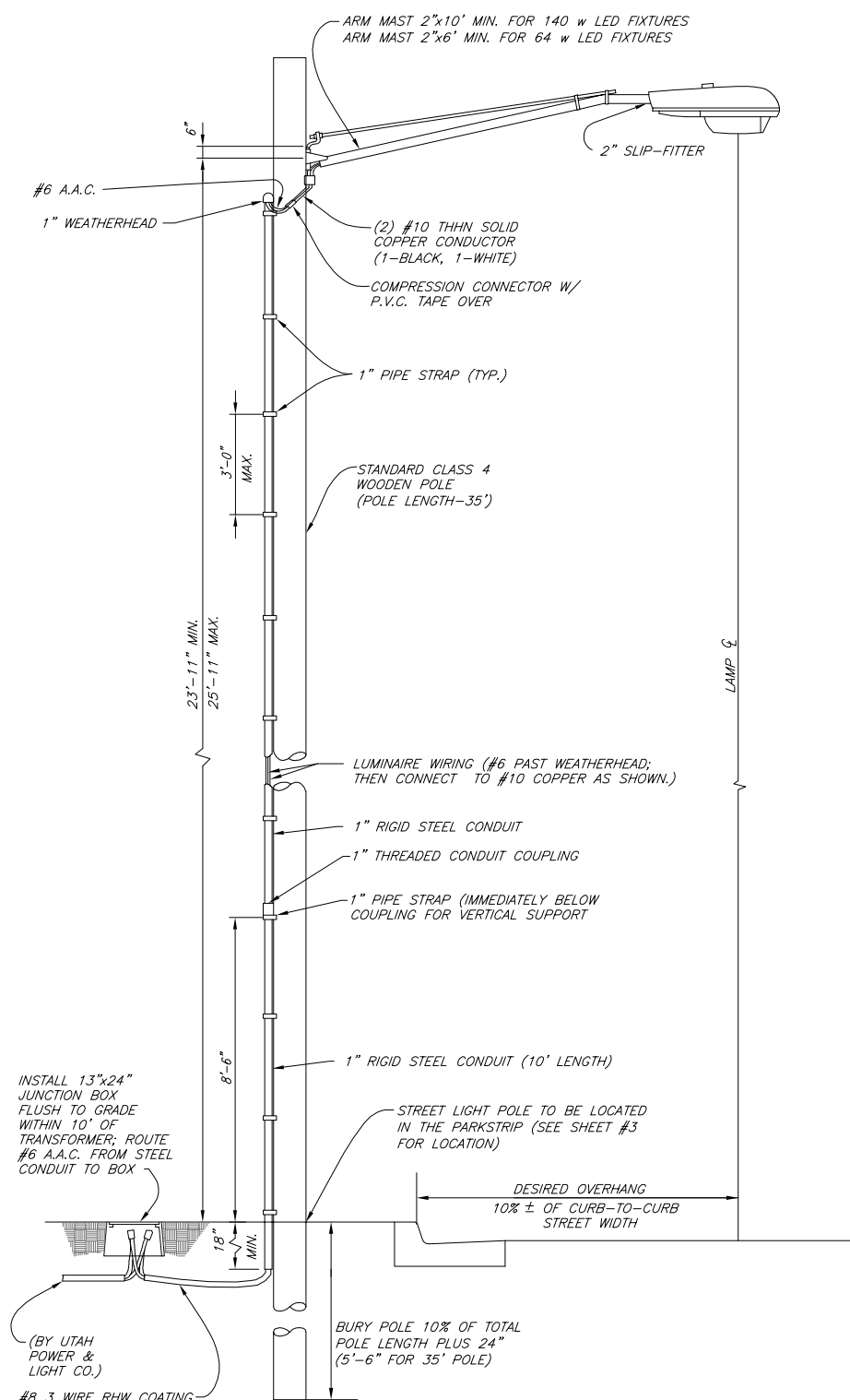
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CITY CORPORATION

PUBLIC WORKS STANDARD DRAWINGS & DETAILS
STORM DRAIN MANHOLE & SUBSURFACE
DRAINAGE DETAILS

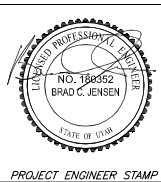
SHEET:
14
OF 17 SHEETS

7 SHEETS



- ATTENTION

1. DEVELOPER/CONTRACTOR SHALL NOTIFY THE POWER COMPANY DESIGN OFFICE PRIOR TO LIGHTING INSTALLATION TO ARRANGE FOR POWER TO BE PROVIDED ON-SITE, AS WELL AS APPROVAL OF LIGHTING UNIT LOCATIONS AND APPROVAL OF ACTUAL COMPONENT SELECTION.
2. ALL CONSTRUCTION SHALL CONFORM TO THE POWER COMPANY CONSTRUCTION STANDARDS.
3. ALL MATERIALS AND FINISHED WORK TO BE APPROVED BY SOUTH OGDEN CITY AND THE CITY ENGINEER.
4. LIGHTS MUST BE INSTALLED IN SUCH A WAY SO THE POWER COMPANY WILL MAINTAIN THE LIGHT & POLE FOLLOWING INSTALLATION.



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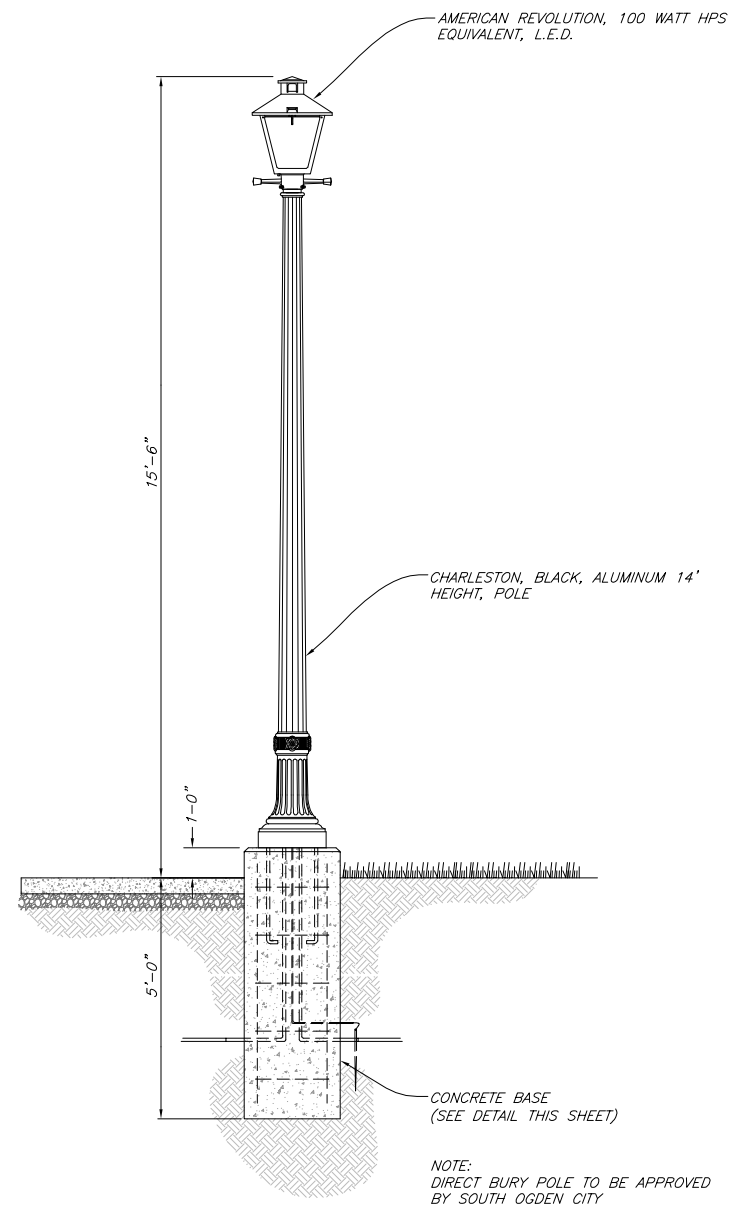
PUBLIC WORKS STANDARD DRAWINGS & DETAILS

STREET LIGHT DETAILS

SHEET:

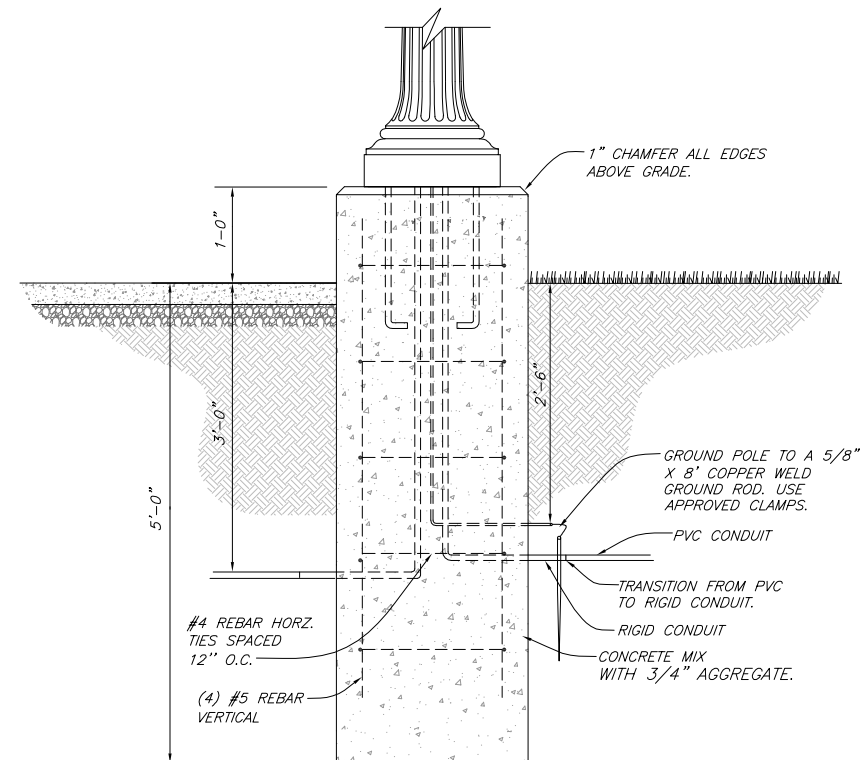
16

F 17 SHEETS



POLE DETAIL

SCALE: 1" = 4'

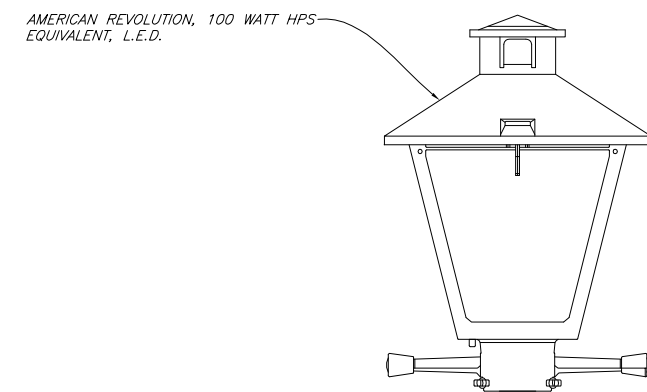


BASE DETAIL

SCALE: 1" = 2'

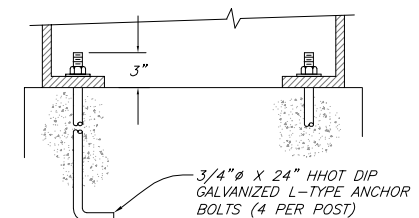
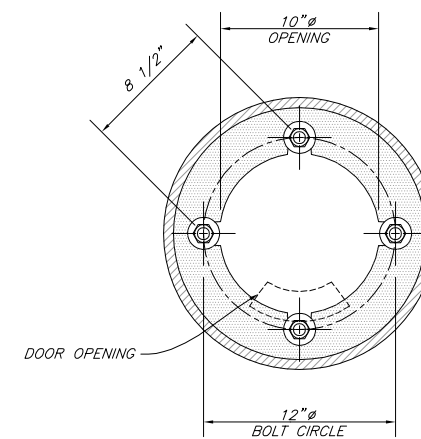
ATTENTION

1. DEVELOPER/CONTRACTOR SHALL NOTIFY THE POWER COMPANY DESIGN OFFICE PRIOR TO LIGHTING INSTALLATION TO ARRANGE FOR POWER TO BE PROVIDED ON-SITE, AS WELL AS APPROVAL OF LIGHTING UNIT LOCATIONS AND APPROVAL OF ACTUAL COMPONENT SELECTION.
2. ALL CONSTRUCTION SHALL CONFORM TO ROCKY MOUNTAIN POWER COMPANY CONSTRUCTION STANDARDS.
3. ALL MATERIALS AND FINISHED WORK TO BE APPROVED BY SOUTH OGDEN CITY AND THE CITY ENGINEER.
4. LIGHTS MUST BE INSTALLED IN SUCH A WAY SO THE POWER COMPANY WILL MAINTAIN THE LIGHT & POLE FOLLOWING INSTALLATION.



LUMINAIRE DETAIL

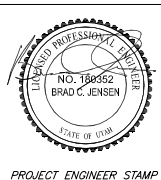
SCALE: $1/2" = 1'$



— 3/4" Ø X 24" HHOT DIP
GALVANIZED L-TYPE ANCHOR
BOLTS (4 PER POST)

CONNECTION DETAIL

SCALE: 1/2" = 1'



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CITY CORPORATION***

PUBLIC WORKS STANDARD DRAWINGS & DETAILS

DECORATIVE STREET LIGHT DETAILS

SHEET:

17

17 SHEETS