CITY OF HUBBARD

DEPARTMENT OF PUBLIC WORKS

DESIGN AND CONSTRUCTION STANDARDS

Adopted

May 12, 2009

The preparation of this document was funded in part with a grant from the Oregon State Lottery through the Mid-Willamette Valley Community Development Partnership for the purpose of promoting economic and community development

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CITY OF HUBBARD

DESIGN AND CONSTRUCTION STANDARDS

Non-Sequential page numbering allows the addition, deletion, or revision of the specifications and details without revising this page. Follow the table of contents found at the beginning of each chapter.

ORDINANCE NO. 306-2009

AN ORDINANCE REPEALING ORDINANCE NOS. 239-2000, 256-2002 and 270-2003 AND ADOPTING THE CITY OF HUBBARD PUBLIC WORKS DEPARTMENT DESIGN AND CONSTRUCTION STANDARDS.

WHEREAS the City Council of the City of Hubbard finds it necessary to clarify the Design and Construction Standards for the City of Hubbard:

THE CITY OF HUBBARD ORDAINS AS FOLLOWS:

Section 1: The City of Hubbard Public Works Department Design and Construction Standards are hereby adopted as set forth in the attached Exhibit A which is by this reference incorporated herein.

Section 2: Ordinance Nos. 239-2000, 256-2002, and 270-2003 shall be repealed May 12, 2009.

The foregoing ordinance was passed by City Council of the City of Hubbard this 12th day of May, 2009, by the following vote:

AYES: 4
NAYS: 0
ABSENT: 0

WHEREUPON the Mayor declared the motion to be carried and the ordinance adopted.

PASSED AND APPROVED by the City Council of the City of Hubbard this 12th day of May, 2009.

MAYOR

Vickie L Nogle
CITY RECORDER

APPROVED AS TO FORM:

CITY ATTORNEY

CHAPTER 1

DESIGN STANDARDS

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CHAPTER 1

DESIGN STANDARDS

CITY OF HUBBARD
DESIGN STANDARDS

GENERAL REQUIREMENTS

DEVIATIONS AND EXCEPTIONS:

The Public Works Superintendent will consider deviations and exceptions to the design standards, standard specifications, and standard details on a case-by-case basis.

OBSOLESCENCE:

Design standards, standard specifications, and standard details made obsolete by the revision of referenced standards (ASTM, AWWA, DEQ, ODOT, etc.), product discontinuance, renumbering, or reclassification, may be updated from time to time by the Public Works Superintendent without council approval.

FEES:

All new construction will require plan review prior to construction and inspection during and 1-year after construction is completed prior to final acceptance. To cover the costs incurred by the City that are directly related to a specific development, the City will from time to time establish fees by resolution. Contact the City Recorder for a current fee schedule.

TIME LIMITS:

Construction shall commence within 6-months of the date of plan approval. If construction is not commenced in 6-months, plan approval shall expire and plans shall be resubmitted for approval.

MAINTENANCE BOND:

Refer to the City of Hubbard Development Code for Maintenance Bond requirements for all public improvements. The value of the improvements covered under the maintenance bond shall be determined by:

- The Engineer's Estimate, as submitted by the Developer's Engineer, or;
- The cost of construction as shown on a copy of the construction contract between the Developer and his Contractor.

SCHEDULING AND TRAFFIC CONTROL:

All construction shall be scheduled with the City and/or County, in writing, at least 48 hours prior to construction. All public right of ways subject to pedestrian and vehicular traffic where construction is to occur shall be provided with signing, barricades and flagmen as required during the life of construction that could impact pubic use. All traffic control shall conform to the most current edition of the "Manual on Uniform Traffic Control Devices". Construction shall be managed to keep a single lane of traffic open at all times and both lanes open to traffic at the end

of each work day. The closure of any street or road (with detouring of traffic around the closure) will only be considered on a case-by-case basis where maintenance of a single lane of traffic is not a viable option. Closure will only be granted by the City in writing after formal request with written detailed schedule of construction to inform the police, sheriff, fire department and school district, etc.

UTILITY LOCATIONS:

Sanitary Sewer:	Center of street, or 5-feet either side of center
Storm Sewer:	4-feet inside of curb, on northerly or easterly side
Water:	In planter strip, if property line sidewalk is required
	Behind sidewalk, if curb line sidewalk is required
Dry Utilities (electric, etc.)	In PUE* outside of right-of-way (both sides of street)
Gas	In PUE*outside of right-of-way (both sides of street)

- The franchised utility companies shall determine the exact locations within the PUE.

FUTURE DEVELOPMENT:

Streets and utilities shall be located with special consideration for extension to serve future development. Public works or the City Engineer may require special studies, extensions of plans and profiles, or master plans in order to assure orderly future development.

PRECONSTRUCTION CONFERENCE:

At the discretion of the Public Works Superintendent, a preconstruction conference may be required. If a preconstruction conference is required, Public Works Superintendent will issue an agenda, outlining items for discussion and/or items requiring submittal review.

- Submittals may include, construction schedules, traffic control plans, special drawings, franchised utility plans, material catalogue cuts, and other items showing compliance with Hubbard's Design and Construction Standards. Three copies of all submittals will be required.

INSPECTIONS:

All work, public and private, is subject to inspection and approval by the Public Works Department.

AS BUILT DRAWINGS:

As built drawings shall be submitted within 30-days of project completion. Building or Occupancy Permits may be withheld if as built drawings are not submitted.

END OF GENERAL REQUIREMENTS

PLAN PREPARATION STANDARDS

REQUIREMENTS:

Plan Preparation:

Construction Plans on 24" x 36" sheets.

Horizontal Scale: 1"=50' maximum.

Vertical Scale: 1"=5' maximum.

Cover sheet shall have title, vicinity map, benchmark, general and construction notes, and Engineers seal.

Plans and Profiles Shall Show:

Proposed streets and right-of-ways, utility easements, and property lines.

Existing ground contours at 2'-0" intervals.

Catch basins, manholes, cleanouts, valves, and other similar appurtenances shall be stationed.

Offsets from curb or street centerlines shall be shown.

Location of all water courses, railroad crossings, culverts, storm drains, sewers, ditches, 100 year flood plains, wells, valves, pump stations, blowoffs within 200'-0" of the proposed improvements.

Agency Approvals:

The developer shall be responsible for obtaining all approvals from Oregon Department of Environmental Quality, Oregon Health Division, Marion County Building Department, Marion County Public Works Department and other agencies as applicable prior to final approval.

END OF PLAN PREPARATION STANDARDS

STREET DESIGN STANDARDS

REQUIREMENTS:

The cost of all streets shall be wholly borne by the Developer, including any off site street improvement required.

RELATED DOCUMENT:

In addition to the requirements found herein, conform to the latest edition of the City of Hubbard Transportation System Plan.

DESIGN:

Design calculations: Shall be performed and stamped by a Civil Engineer registered in the State of Oregon shall be included with all plan submittals.

Geometric Design: Conform to the latest edition of AASHTO Policy on Geometric Design of Highways and Streets. All streets shall have curbs or curb and gutters. Curb height shall be a full 6" in height per standard details.

- Turn-arounds (both public and private) for emergency vehicles shall conform to the latest edition of the International Fire Code.

- Bikeways shall conform to the latest edition of the Oregon Bicycle and Pedestrian Plan, Published by ODOT. When sharing the street, the structural section shall be the same as the shared street. Bikeways outside the street, i.e., stand-alone bikeways, shall be constructed of 2", Level 1, ½" Dense, HMAC Pavement over 6" Aggregate Base (1" or ¾" minus).

Street and Right-of-Way Widths: Conform to *Table 21. Street Design Standards* of the City of Hubbard Transportation System Plan.

Design Speeds:

Local Streets	30 mph
Collector Streets	35 mph
Arterial Streets	40 mph

Vertical Curves Required for Change in Vertical Alignment > 1.5%:

	Local	Collector	Arterial
Minimum $K_{STATION}$	30	40	50
Minimum K_{CREST}	20	30	40
Maximum Grade	12%*	8%	6%

- 15% if approved by City Engineer

Minimum Street Grade: 0.25% curb & gutter 0.50% curb only

Street Cross Slope: 2% minimum 6% maximum

PARKING:
Shall be in accordance with the latest amendments to the City of Hubbard Development Code. All parking lots shall have an approved aisle located outside of the street right-of-way. The right-of-way may not be used for direct access to parking stalls.

- Minimum parking stall size shall be 8-1/2 feet x 20 feet for 90 degree parking, otherwise, stall, aisle, and radii dimensions shall be as recommended by the most recent edition of the following publications:

  AIA, Architectural Graphic Standards
  AASHTO, Geometric Design of Highways and Streets

  ADA requirements for parking stalls shall be as set forth in the latest edition of the Oregon Structural Specialty Code (Building Code).

- Structural Sections for parking, including driveways, shall be:

  Residential: 2 1/2 inches of HMAC over 6 inches of aggregate base, or 4 inches of Portland Cement Concrete (PCC).

  Commercial, Industrial, and Institutional: 3 inches of HMAC over 6 inches of aggregate base, or 5 inches of Portland Cement Concrete (PCC).

COMMERCIAL, INDUSTRIAL, AND INSTITUTIONAL TRASH/RECYCLING ENCLOSURES:
Shall conform to the requirements of the franchised waste collection company standards.

- Trash/recycling enclosures shall be located so that minimum interference with daily vehicular movement is achieved.

DRIVEWAYS: (Private)
All driveways shall conform to the standard details. Only one (1) driveway drop shall be allowed for each single dwelling unit, except two (2) driveway drops may be approved provided the total drop width does not exceed 36'-0". All driveway drop wings shall be located within the property frontage. Driveway drops, excluding wings, shall conform to the following widths:

Single Dwelling Unit:	36'-0" Maximum Width*	12'-0" Minimum Width
Commercial and Industrial:	36'-0" Maximum Width*	12'-0" Minimum Width (single)
		20'-0" Minimum Width (double)

*The maximum width shall note exceed 50% of the lot frontage.

Driveways shall meet the minimum separation of 5-feet between residential driveways, 22-feet between commercial, industrial and institutional driveways, and 20-feet between an intersection and local street as measured from the property line. Separation from collector and arterial streets shall be determined on a case-by-case basis with stacking lane length the prime consideration. A traffic study may be required as determined by the City Engineer. Non-residential properties are

encouraged to combine driveway drops. Spacing standards for driveways onto major and minor arterial, and collector streets shall conform to the standards established in the street design section of the Transportation System Plan.

CLEAR VISION AREAS:
Conform to the requirements of the City of Hubbard Development Code and Standard Details.

- Utility poles and traffic control signs may be located in clear vision areas, when unavoidable.

STRUCTURAL SECTIONS: (Public and Private)

Local Streets:	3", Level 2, ½" Dense, HMAC Pavement
(serving less than 80 dwelling units)	10" Aggregate Base (1" or ¾" minus)
	Subgrade Geotextile Fabric
	Assumed Resilient Modulus (M_R) 5,000 – 10,000 psi
Collector Street:	4", Level 2, ½" Dense, HMAC Pavement
(serving more than 80 dwelling units)	11.5" Aggregate Base (1" or ¾" minus)
	Subgrade Geotextile Fabric
	Assumed Resilient Modulus (M_R) 5,000 – 10,000 psi
Arterial Street	4", Level 3, ¾" Dense, HMAC Pavement
(serving more than 150 dwelling units)	13.5" Aggregate Base (1" or ¾" minus)
Subgrade Geotextile Fabric	Assumed Resilient Modulus (M_R) 5,000 – 10,000 psi

Aggregate Base Compaction: 95% of ASTM D 698.

HMAC Compaction: Per City of Hubbard Standard Specifications

STREET LIGHTING:
Streetlights shall be mounted on 25' poles, as standard with the local electric utility, and served from an underground source of supply. The cost of the luminaries, poles, and installation shall be borne by the developer. The poles and luminaries shall be installed by or their installation approved and inspected by the local electric utility and will conform to the latest guidelines from the Illumination Engineering Society and City of Hubbard Standard Details.

END OF STREET DESIGN STANDARDS

WATER SYSTEM DESIGN STANDARDS

REQUIREMENTS:

Conform to all Oregon Heath Division Requirements. Minimum water pressure at the highest fixture in the development shall be 20 psi. Provide one water service per tax lot. Provide 30" minimum cover over all water mains. Water mains shall be located 1'-0" away from existing or proposed sidewalks, on the property side. All irrigation meters shall have approved backflow prevention devices, inspected annually by a State Certified Backflow Technician with a report sent to the City of Hubbard Public Works Department. Private water systems shall be equipped with approved double detector check valve assemblies, or other backflow prevention device, as directed by the City.

Horizontal Separation:

The horizontal separation of a sewer line paralleling a water line shall be 10 feet and the water main shall be installed above the crown elevation of the sewer. When water and sewer lines cross, the water line shall be higher than the sewer line and the vertical separation shall not be less than 18 inches. In addition, the water line shall be installed with no joints within 7 feet of the sewer. Where there is less than 18 inches of clearance, the sewer line shall be replaced with ductile iron pipe for 9 feet on each side of the crossing. Horizontal separation of 3 feet with all other utilities is required. Refer to OAR 333-061-0050 (10) *Crossings- Sanitary Sewer and Water Lines* for more information.

DESIGN:

Calculations:

Design calculations performed and stamped by a Civil Engineer registered in the State of Oregon shall be included with all plan submittals.

Fire Flows:

Fire flows shall meet or exceed the International Fire Code requirements.

Peak Hourly Demand:

Development Type	Design Peak Hourly Demand
Single Family Residential	0.75 gpm per person
Multi Family Residential	0.25 gpm per person
Commercial Development	5,000 gal/acre/day
Industrial Development	10,000 gal/acre/day

Valves:

Direct Buried Valves: Follow the Standard Specifications

Exposed Valves (in vaults): Follow the Standard Specifications

END OF WATER SYSTEM DESIGN STANDARDS

STORM DRAINAGE DESIGN STANDARDS

DRAINAGE REQUIREMENTS:

All stormwater runoff shall be conveyed to a public storm sewer or natural drainage channel. Receiving waters, including underground storm drainage systems, shall have adequate capacity to carry necessary flow without overflowing or causing damage to public property or welfare. The cost of the approved system shall be wholly borne by the developer, including any off site improvements required.

DESIGN:

Calculations:

Design calculations performed and stamped by a Civil Engineer registered in the State of Oregon shall be included with all plan submittals. Peak design flows may be calculated using the Rational Formula, Q = CiA for basins under 10 acres. The King County Method, TR-20, or other approved methods may be used for basins larger than 10 acres.

Design Rainfall Event:

The following guidelines shall apply for selecting a design rainfall event. Design rainfall events shall be the 5, 10, 25, 50, and 100-year events. Analyses shall be provided showing no increase in runoff for all storm events up to, and including, the design frequency event.

Development Type	Frequency
Residential and commercial development	10 Year
Critical facilities, sag inlets, and minor drainage ways	25 Year
Critical drainage basins (As determined by the City Engineer)	100 Year
Major drainage ways or waterways having a delineated floodplain boundary as shown on the FIRM	100 Year
Drainage ways or waterways not having a delineated floodplain boundary on the FIRM. (These shall be delineated by the Developer's Engineer and included on the final PLAT)	100 Year

Rainfall Intensity Duration Frequency Curve:

For developments less than 20 acres using the Rational Method, rainfall intensities shall be taken from the ODOT Zone 7 Intensity-Duration-Frequency (IDF) Curves. For smaller areas having a time of concentration of 10 minutes or less, the following rainfall intensities shall apply.

5-Year	1.0 inches/hr.
10-Year	1.2 inches/hr.
25-Year	1.5 inches/hr.
50-Year	1.9 inches/hr.
100 Year	2.3 inches/hr.

Runoff Coefficients:

LAND USE	SLOPE		
	2% or Less	2% to 7%	7% or More
Unimproved Areas	.10	.20	.30
Meadows & Pasture Land	.25	.30	.35
Woodland & Forests	.10	.15	.20
Impervious Surfaces (Pavement, Roofs, Driveways, Gravel, etc)	.92	.92	.92
Agricultural	.15	.20	.25
Parks & Cemeteries	.15	.20	.25
Lawns	.17	.22	.35
Playgrounds	.20	.25	.30
Low Density Residential (1 to 3 units per acre)	.45	.50	.55
Medium Density Residential (3 to 6 units per acre)	.55	.60	.65
High Density Residential (6 to 15 units per acre)	.75	.80	.85
Commercial & City Business Areas	.85	.85	.85
Light Industrial	.65	.70	.80
Heavy Industrial	.75	.80	.90
Parks and Open Spaces	.10	.15	.20
Mobile Home Parks	.60	.65	.70

Time of Concentration:

Time of Concentration shall be calculated using the Soil Conservation Service Method or other approved method.

After a maximum of 300-feet, sheet flow typically becomes shallow concentrated flow. Open channel flow is assumed to begin where surveyed cross-section information has been obtained, where channels are visible on aerial photographs, or where blue lines (indicating streams) appear on Unites States Geological Survey *(USGS)* quadrangle sheets.

Runoff Control:

Development of areas within the City of Hubbard must provide runoff controls to limit the developed condition's peak rates of runoff to the pre-development runoff rate. Detention is the collection and temporary storage of surface water with the outflow rate restricted usually to the pre-developed flow rate. Required detention storage is equal to the difference in volume of excess runoff from the design storm event with post-development conditions and the 5-year storm with pre-development conditions.

Detention is required for all developments, except where determined unnecessary by the City Engineer.

Control orifices and structures shall be sized using approved engineering methods. To prevent plugging, the minimum diameter of the orifice shall be 2-inches. The detention facility shall have an overflow system with the capacity to past the 50-year storm event to an accessible drainage feature.

Detention shall be supplied either by subsurface storage in conduits and structures, or by a pond. Temporary parking lot ponding may be utilized as storage volume with approval of the City Engineer.

Hydraulic Considerations:

The minimum design velocity for storm drainage conduits shall be 3.0 fps. Pipe slopes of 15% or greater will require anchor walls at approved intervals. Manning's "n" value of 0.013 shall be used for flow and velocity calculations. Manning's equation shall be used for design of piped systems where practicable.

When pipe depths exceed 10-feet, calculations for pipe loading and strength shall be submitted.

Subsurface utilities crossing private property shall have a minimum easement width of 10 feet.

Storm Water Quality:

Point source water quality facilities shall be provided where required by the City Engineer. Catch basins shall be outfitted with approved "turndowns" and sumps for oil/water separation and sedimentation control. Storm water quality manholes shall be installed in all proposed storm drains outletting into existing drainage facilities.

Manholes:

Manholes are required at:

(1.) All changes in horizontal or vertical alignment greater than 15 degrees.

(2.) All connections and changes in pipe size.

(3) At a maximum spacing of 500-feet.

Inlets and Catch Basins:

Inlets must be placed at all low points in streets, at intersections, at points where changes in the street configuration will direct flow across the street and at intervals on continuous grades that will limit the width of flow in the gutter to 5-feet.

Minimum lateral diameter for connection to an inlet or catch basin shall be 10-inches. Minimum inlet lead slopes shall be 2%.

Water from all low areas must be collected and conveyed to the storm drainage system. Quantity of gutter flow is determined using the Rational Method. Inlet design flows shall exceed gutter design flows.

Water quality provisions shall be installed in all catch basins or manholes as directed by the Department of Public Works.

Culverts:

Culvert design shall be performed using the Federal Highway Administration (FHWA) publication *Hydraulic Design of Highway Culverts (Reference No. 10).* Other methods may be used with approval of the City Engineer.

Perimeter Drainage

Construction drawings shall include an approved "Grading and Drainage Plan" showing the location of perimeter drainage facilities and private drainage easements that will control runoff to and from project sites.

Grading and Drainage Plans shall identify control for Finished Floor Elevations, and shall be enforced in conjunction with Building Permits issued by the City of Hubbard.

Erosion and Pollution Control:

Adequate erosion and pollution control facilities shall be installed in conjunction with construction projects. Developments greater than 1-acre in size shall be required to obtain an NPDES 1200-C erosion control permit from the Department of Environmental Quality.

END OF STORM DRAINAGE DESIGN STANDARDS

SANITARY SEWER DESIGN STANDARDS

REQUIREMENTS:

All sanitary sewage shall be conveyed to a public sanitary sewer. Receiving sewer systems shall have adequate capacity to carry necessary flow without overflowing or causing damage to public property or welfare. The cost of the approved system shall be wholly borne by the developer, including any off site improvements required.

DESIGN:

Calculations:

Minimum Sanitary Sewer Velocity = 2 feet per second.

Manning Roughness "n" coefficient = 0.013

Pipe slopes greater than 20% shall be restrained. Restraining devices shall be approved by the City Engineer.

Pipe materials:

Ductile Iron (DI) pipe shall be used for sanitary sewer force mains.

Polyvinyl Chloride (PVC) Pipe shall be used for gravity flow sanitary sewer mains.

Air Relief Valves:

Air Relief Valves shall be installed at high points along force mains.

Minimum Cover:

Minimum cover over PVC sanitary and storm sewer pipe shall be 3'-0"

Minimum cover over ductile iron sanitary and storm sewer pipe shall be 1'-0".

Horizontal Separation:

The horizontal separation of a sewer line paralleling a water line shall be 10 feet and the water main shall be installed above the crown elevation of the sewer. When water and sewer lines cross, the water line shall be higher than the sewer line and the vertical separation shall not be less than 18 inches. In addition, the water line shall be installed with no joints within 7 feet of the sewer. Where there is less than 18 inches of clearance, the sewer line shall be replaced with ductile iron pipe for 9 feet on each side of the crossing. Horizontal separation of 3 feet with all other utilities is required. Refer to OAR 333-061-0050 (10) *Crossings-Sanitary Sewer and Water Lines* for more information.

Location:

Sanitary sewer lines shall be located 5'-0" off the centerline of roadways.

When public sanitary or storm sewer lines are not located in public right-of-ways 15'-0" minimum easements shall be provided.

Monitoring Manhole:

Monitoring Manholes shall be required on all sanitary sewers serving Industrial Property. Conform to City of Hubbard Standard Details.

END OF SANITARY SEWER DESIGN STANDARDS

CHAPTER 2

DOCUMENT AND FORM EXAMPLES

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CHAPTER 2

DOCUMENT AND FORM EXAMPLES
(To Be Modified at Time of Execution)

AFTER RECORDING RETURN TO:

City Recorder
City of Hubbard
P.O. Box 380
Hubbard, OR 97032

UNTIL A CHANGE IS MADE SEND ALL TAX STATEMENTS TO:

NO CHANGE

Original Deed **REEL** ____, **PAGE** ____

IMPROVEMENT AGREEMENT

This Agreement, made and entered into this ____ day of _____ by and between the City of Hubbard, an Oregon municipal corporation, hereinafter called the City, and _____, hereinafter called the Developer.

WHEREAS, on _____, 20___, the Planning Commission granted conditional approval to the Developer, for the development of _____, (Planning File No. _____); and

WHEREAS, certain conditions were imposed on the Developer as part of the approval as shown on the Notice of Planning Commission Action; and

WHEREAS, the Developer is constructing Public Improvements for a _____ lot Subdivision along the _____; and

WHEREAS, on _____, the City Engineer approved construction plans under Public Works Project Number _____ for _____, consistent with the conditions contained within the approval; and

WHEREAS, the Developer wishes to plat and develop the _____ Subdivision, the boundary of which is described as follows:

SEE ATTACHMENT "A"

NOW, THEREFORE, the Developer and the City agree to the following conditions for the development of this Subdivision to-wit:

1. The Developer shall complete or cause to be completed the improvements as detailed on the approved construction plans and according to the specifications and standards on file in the office of the Hubbard Public Works Superintendent.

2. The Developer shall cause his engineer to provide all surveying services necessary to stake the project prior to construction and to prepare and furnish to the City as-built drawings within thirty (30) days following completion of the project. All such work shall be in conformance with Hubbard Standard Construction Specifications (Latest Edition).

3. The Developer shall complete required improvements in Six (6) months, or cause them to be completed within Eighteen (18) months of the date of this Agreement. Upon written request of the Developer, however, this Agreement may be extended for an additional period of Eighteen (18) months.

4. The Developer shall, after satisfactorily completing conditions 1 through 3, submit a maintenance bond or other written evidence in a form approved by the City Attorney and Public Works Superintendent, valued at a minimum amount of forty percent (40%) of the estimated construction cost, and guaranteeing the completed project construction for a period of one (1) year.

5. It is agreed between the City and the Developer that no building permits for any structures within the development will be issued until all of the required improvements have been constructed and all conditions of approval have been met by the Developer and accepted by the City.

6. The parties hereto agree that should any suit or action be filed to enforce the terms of this Agreement or the breach thereof, the losing party agrees to pay the prevailing party's reasonable attorney fees in an amount to be set by the court, including costs, disbursements and any such attorney fees, costs or disbursements associated with any appeal therefrom.

7. The Developer shall provide evidence that all off-site or non-platted easements have been recorded.

In witness whereof, the said City of Hubbard has caused this Agreement to be signed for the City of Hubbard, Oregon, and the Developer has caused this Agreement to be signed and sealed the same as the date and year first written above.

City of Hubbard, an
Oregon Municipal Corporation

By: _____
City Recorder

By: _____
Public Works Superintendent

STATE OF OREGON)
) SS
County of _____)

This instrument was acknowledged before me on _____,

by _____

_____
NOTARY PUBLIC FOR OREGON
My Commission Expires: _____

By:_____
Developer

STATE OF OREGON)
) SS
County of _____)

This instrument was acknowledged before me on _____,

by _____

_____
NOTARY PUBLIC FOR OREGON
My Commission Expires: _____

AFTER RECORDING RETURN TO:

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City of Hubbard
P.O. Box 380
Hubbard, OR 97032

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NO CHANGE

Original Deed **REEL** ____, **PAGE** ____

AMENDMENT TO IMPROVEMENT AGREEMENT

This Agreement, made and entered into this ____ day _____ by and between the City of Hubbard, an Oregon municipal corporation, hereinafter called the City and _____, hereinafter called the Developer.

WHEREAS, it is necessary to amend the Agreement made and entered into on _____ between the City of Hubbard and the Developer of the _____ ; and

WHEREAS, on _____, the Planning Commission granted conditional approval to the tentative plat of the _____, (Planning File No. _____); and

WHEREAS, certain conditions were imposed on the Developer as part of the approval of the Subdivision; and

WHEREAS, the Developer has completed the construction of the Public Improvements called for on the construction plans approved by the City Engineer on _____ under Public Works Project Number _____, with the following exceptions:

WHEREAS, the Developer wishes to plat and develop the _____ Subdivision and to obtain building permits on the lots within the development, the boundary of which is described as follows:

SEE ATTACHMENT "A"

NOW, THEREFORE, the Developer and the City agree to the following conditions for the development of this Subdivision to-wit:

1. The Developer shall complete or cause to be completed the improvements as detailed on the approved construction plans and according to the specifications and standards on file in the office of the Hubbard Public Works Superintendent.

2. The Developer shall cause his engineer to provide all surveying services necessary to stake the project prior to construction and to prepare and furnish to the City as-built drawings within thirty (30) days following completion of the project. All such work shall be in conformance with Hubbard Standard Construction Specifications (Latest Edition).

3. The Developer shall complete required improvements in Six (6) months, or cause them to be completed within Eighteen (18) months of the date of this Agreement. Upon written request of the Developer, however, this Agreement may be extended for an additional period of Eighteen (18) months.

4. The Developer shall, after satisfactorily completing conditions 1 through 3, submit a maintenance bond or other written evidence in a form approved by the City Attorney and Public Works Superintendent, valued at a minimum amount of forty percent (40%) of the estimated construction cost, and guaranteeing the completed project construction for a period of one (1) year.

5. It is agreed between the City and the Developer that the Improvement Agreement dated _____, recorded in reel _____, page _____, Marion County Deed Records, is amended to allow the City of Hubbard to issue building permits on all of the lots within the development with the exception of Lots _____.

6. The parties hereto agree that should any suit or action be filed to enforce the terms of this Agreement or the breach thereof, the losing party agrees to pay the prevailing party's reasonable attorney fees in an amount to be set by the court, including costs, disbursements and any such attorney fees, costs or disbursements associated with any appeal therefrom.

7. The Developer shall provide evidence that all off-site or non-platted easements have been recorded.

In witness whereof, the said City of Hubbard has caused this Agreement to be signed for the City of Hubbard, Oregon, and the Developer has caused this Agreement to be signed and sealed the same as the date and year first written above.

City of Hubbard, an
Oregon Municipal Corporation

By: _____
City Recorder

By: _____
Public Works Superintendent

STATE OF OREGON)
) SS
County of _____)

This instrument was acknowledged before me on _____,

by _____

_____
NOTARY PUBLIC FOR OREGON
My Commission Expires: _____

By:_____
Developer

STATE OF OREGON)
) SS
County of _____)

This instrument was acknowledged before me on _____,

by _____

_____
NOTARY PUBLIC FOR OREGON
My Commission Expires: _____

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Original Deed **REEL** ____, **PAGE** ____

NON-REMONSTRANCE AGREEMENT

This Agreement made this _____ day of _____, by and between the City of Hubbard, an Oregon municipal corporation, hereinafter called the City, and _____, hereinafter called the Owners of the following described real property, to wit:

See Exhibit "A"

Witnesseth:

Whereas, owners have applied to City for approval with respect to development of the subject property,

Whereas, approval has been conditioned upon Owner=s execution of this Non-Remonstrance Agreement in order to insure proper and efficient urbanization in the area and extension and construction of public improvements in compliance with the comprehensive plan and other applicable development standards and criteria: now, therefore,

In consideration of approval by City of Owner's application referenced above, the undersigned owner does hereby promise and agree as follows:

1) To waive the right to remonstrate against any local improvement project benefiting the subject property respecting _____, and the undersigned hereby fully and completely waives the right to later remonstrate against such improvement projects.

2) The undersigned further promises, agrees, declares, and dedicates that the agreement set forth above and the promises contained herein do constitute a covenant and restriction henceforth running with the land described above and shall henceforth be binding upon the undersigned, his, her or their heirs, successors or assigns and directs that this agreement shall be filed for record in the deed records of the appropriate county as affecting the title to the property described above.

IN WITNESS WHEREOF, the Owner's have executed the above as of the date first above written.

Owner(s)

Mailing address of Owner(s)

_____ _____

_____

STATE OF OREGON)
) SS
County of _____)

On this _____ day of _____,20__, Personally appeared _____ _____, who being duly swore did say that he/she is the_____ of _____, an Oregon corporation and that this instrument was signed and sealed on behalf of said corporation by authority of its Board of Directors, and acknowledged this instrument to be that Corporation's voluntary act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

_____
NOTARY PUBLIC FOR OREGON
My Commission Expires: _____

STATE OF OREGON)
) SS
County of _____)

THIS CERTIFIES that on the _____ day of _____20__, before me, the undersigned notary personally appeared _____, known to me to be the identical person(s) whose name(s) is/are subscribed to the within instrument and acknowledged that he/she/they executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

_____
NOTARY PUBLIC FOR OREGON
My Commission Expires: _____

Approved:

_____
Zoning Administrator

AFTER RECORDING RETURN TO:

City Recorder
City of Hubbard
P.O. Box 380
Hubbard, OR 97032

UNTIL A CHANGE IS MADE SEND ALL TAX STATEMENTS TO:

NO CHANGE

Original Deed **REEL** ____, **PAGE** ____

SATISFACTION OF IMPROVEMENT AGREEMENT

Know all men by these presents that the City of Hubbard, Oregon, declares the conditions and obligations set forth in that certain improvement agreement with _____ _____, for the _____, (Planning Files No. ____) dated the __ day of _____, 20___, made and executed by the Public Works Superintendent and recorded in Reel _____, Page _____, Deed Records of Marion County, have been fully satisfied and discharged.

Dated this ____ day of _____, 20__.

_____
Public Works Superintendent
City of Hubbard, Oregon

STATE OF OREGON)
) SS
County of _____)

This instrument was acknowledged before me on _____, 20__, by _____, as the Public Works Superintendent of the City of Hubbard, Oregon.

_____
NOTARY PUBLIC FOR OREGON
My Commission Expires: _____

AFTER RECORDING RETURN TO:

City Recorder
City of Hubbard
P.O. Box 380
Hubbard, OR 97032

UNTIL A CHANGE IS MADE SEND ALL TAX STATEMENTS TO:

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DEDICATION - PUBLIC ROADWAY

KNOW ALL MEN BY THESE PRESENT, that _____ hereinafter called the Dedicator, in consideration of payment of One and No/100's Dollars ($1.00) and other valuable consideration does hereby dedicate to the use of the public forever, for public roadway, sidewalk, and utility purposes, all the certain land described as follows:

SEE ATTACHMENT "A"

The Dedicator covenants and warrants to the City of Hubbard, its successors and assigns, that he/she/they is/are lawfully seized in fee simple of the above described premises, free from all encumbrances and that Dedicator will warrant and forever defend the said premises and every part and parcel thereof against the lawful claims and demands of all persons whomsoever.

In witness whereof, the Dedicator has executed this instrument this _____ day of _____, 20__.

_____

STATE OF OREGON)
) SS
County of _____)

This instrument was acknowledged before me on _____, 20__.

by _____.

_____
NOTARY PUBLIC FOR OREGON
My Commission Expires: _____

This dedication is accepted on behalf of the public by the City of Hubbard, however, the City of Hubbard does not accept responsibility to maintain the property described above and is not responsible for any damages resulting on the dedicated property prior to the date that improvements are completed and the property is opened for public use. By acceptance alone, the City of Hubbard does not open the subject property for public use.

_____

CITY RECORDER

Refer to Public Works Department
File No. _____

AFTER RECORDING RETURN TO:

City Recorder
City of Hubbard
P.O. Box 380
Hubbard, OR 97032

UNTIL A CHANGE IS MADE SEND ALL TAX STATEMENTS TO:

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PERMANENT PUBLIC UTILITY EASEMENT

The undersigned, _____, Grantor(s) do hereby grant to the City of Hubbard, Marion County, Oregon, a municipal corporation, referred to herein as City a permanent right-of-way and exclusive easement to construct, reconstruct, operate and maintain City utilities, including water, sanitary sewer, and other City utilities, and all necessary related facilities under and along the following described premises:

Legal Description here:

TO HAVE AND TO HOLD said easement and right-of-way unto said City, its successors and assigns.

The permanent right-of-way or easement shall include the right, privilege, and authority of City to excavate for, and to construct, install, lay, operate, maintain and remove underground pipelines and/or cables with all appurtenances incident thereto or necessary thereafter, for the purpose of supplying public utility service under and across the said premises, together with the right of City to place, install, maintain, inspect, add to the number of and relocate pipelines and/or cables and necessary appurtenances and make excavations therefore from time to time, in, under and through the above described premises within said right-of-way, and to cut and remove from said right-of-way any trees and other obstructions which may endanger the safety or interfere with the use of said pipelines and/or cables or appurtenances attached to or connection therewith; and the right of ingress and egress to and over said above described premises at any and all times for the purpose of patrolling the pipelines and/or cables, or repairing, renewing or adding to the number of pipelines and/or cables and appurtenances and for doing anything necessary, useful or convenient for the enjoyment of the easement hereby granted.

Upon the final acceptance of the installed system by the City, the City shall be responsible for all further restorations of the premises if at any time the City causes the utilities to be repaired or maintained. No trees, permanent structures or improvements, shall be placed or constructed on the easement by the Grantor or the Grantor's heirs, assigns or successors in interest. The City, upon each and every occasion that the same be repaired, maintained or removed shall restore the premise of the Grantor, by removing all debris and leaving the ground surface in a neat and presentable condition. Grass and

topsoil shall be restored as near as possible to as good a condition as the same were prior to any repair or maintenance by the City

IN WITNESS THEREOF, Grantors have executed this Easement as of this _____ day of 20__.

_____ _____

STATE OF OREGON)
) SS
County of _____)

On this ___day of _____, 20___, before me, a Notary Public in and for said County and State, personally appeared _____, known to me to be the identical person(s) whose name(s) is/are subscribed to the within instrument and acknowledged that he/she/they executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal on the day and year above written.

_____

_____
NOTARY PUBLIC FOR OREGON
My Commission Expires: _____

APPROVED:

By: _____
Public Works Superintendent

APPROVED AS TO FORM:

_____City Attorney

AFTER RECORDING RETURN TO:

City Recorder
City of Hubbard
P.O. Box 380
Hubbard, OR 97032

UNTIL A CHANGE IS MADE SEND ALL TAX STATEMENTS TO:

NO CHANGE

Original Deed **REEL** ____, **PAGE** ____

PUBLIC UTILITY EASEMENT

KNOW ALL MEN BY THESE PRESENTS, that _____ _____ ("Grantors"), for good and valuable consideration, the receipt of which is hereby acknowledged, does forever grant unto the CITY OF HUBBARD, a municipal corporation ("Grantee"), a permanent easement over and along the full width and length of the premises described as follows, to-wit:

An easement for Public Utility Purposes upon and across the following described land:

(Insert Legal Description)

TO HAVE AND TO HOLD the above-described permanent easement unto said Grantee for roadway improvements, sanitary sewer pipelines, domestic water pipe lines, and storm drainage facilities, and for the use and benefit of public utility companies furnishing electric power, natural gas, telephone, and cable television service in accordance with the conditions and covenants as follows:

The permanent easement shall include the right, privilege, and authority to the said City of Hubbard and such public utilities to access upon, excavate for, and to construct, build, install, lay, patrol, operate, maintain, repair, replace, and remove roadway improvements, underground sanitary sewer, storm drain, water pipeline or pipelines, electric power, transmission and supply cable, natural gas pipeline, cable television, and telephone communication fines with all appurtenances incident thereto or necessary therewith, including above ground valve boxes, fire hydrants, or manholes, for the purpose of carrying or conveying potable water or catching, carrying and conveying sewage waste and surplus waters, and for similar uses in, under, and across the said premises, and together with the right of said City of Hubbard and utility owners to access upon, place, excavate, replace, repair, install, maintain, operate, inspect, add to the number of and relocate such utilities and necessary appurtenances, and make excavations therefor from time to time, in, under, and through the above described premises within said easement, and to cut and remove from said easement any trees and other obstructions which may endanger the safety or interfere with the use of said pipelines or appurtenances attached to or connected therewith; and the right of ingress and egress to and over said above described premises at any and all times for the purpose of repairing, renewing, excavating, replacing, inspecting, maintaining the said pipeline and appurtenances, and for doing anything necessary, useful, or convenient for the enjoyment of the easement

hereby granted. No building or other permanent structure shall be constructed over the pipeline easement, and no earth fill or embankment shall be placed within this easement, nor over this pipeline without a specific written agreement between the Grantee and the Grantor, their successors or assigns.

Should such specific agreement be executed, Grantee will set forth the conditions under which such fill or embankment may be placed, including a stipulation that all risks of damage to the pipeline shall be assumed by Grantors, their successors or assigns.

Grantee will indemnify and hold harmless the Grantors, their heirs and assigns, from claims for injury to person or property as a result of the negligence of the Grantee, its agents or employees in the construction, operation or maintenance of said pipeline.

The CITY OF HUBBARD, upon the initial installation, and upon each and every occasion that the same be repaired, replaced, renewed, added to, or removed, shall restore the premises of the Grantors, and any improvements disturbed by the City, to a good condition as they were prior to any such installation or work, including the restoration of any topsoil and lawn.

IN WITNESS THEREOF, Grantors have executed this Easement as of this _____ day of _____ 20___.

_____ _____

STATE OF OREGON)
) SS
County of _____)

On this ___day of _____, 20___, before me, a Notary Public in and for said County and State, personally appeared _____, known to me to be the identical person(s) whose name(s) is/are subscribed to the within instrument and acknowledged that he/she/they executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal on the day and year above written.

_____

_____
NOTARY PUBLIC FOR OREGON
My Commission Expires: _____

APPROVED:

By: _____
Public Works Superintendent

APPROVED AS TO FORM:

_____City Attorney

AFTER RECORDING RETURN TO:

City Recorder
City of Hubbard
P.O. Box 380
Hubbard, OR 97032

UNTIL A CHANGE IS MADE SEND ALL TAX STATEMENTS TO:

NO CHANGE

Original Deed **REEL** ____, **PAGE** ____

PIPELINE EASEMENT
(Storm Drain Only)

KNOW ALL MEN BY THESE PRESENTS, that _____ _____ ("Grantors"), for good and valuable consideration, the receipt of which is hereby acknowledged, does forever grant unto the CITY OF HUBBARD, a municipal corporation ("Grantee"), a permanent easement over and along the full width and length of the premises described as follows, to-wit:

An easement for Storm Drain Purposes upon and across a strip of land ___ feet in width, being ___ feet on each side of the following described centerline: (Insert Legal Description).

TO HAVE AND TO HOLD the above described permanent easement unto said Grantee in accordance with the conditions and covenants as follows:

The permanent easement shall include the right to the said CITY OF HUBBARD, to excavate for, and to construct, place, operate, maintain, repair, replace, relocate, inspect, and remove a storm drain pipeline with all appurtenances incident thereto or necessary therewith, including any ground level catch basins, manholes, junction structures, etc. for the purpose of conveying surface runoff waters under the said premises and, make excavations therefore from time to time, in, under, and through the above described premises within said easement, and to cut and remove from said easement any trees and other obstructions which may endanger the safety or interfere with the use of said pipelines or appurtenances attached to or connected therewith; and the right of ingress and egress to and over said above described premises at any and all times for the purpose of repairing, renewing, excavating, replacing, inspecting, maintaining the said pipelines and appurtenances, and for doing anything necessary, useful, or convenient for the enjoyment of the easement hereby granted. No building or other permanent structure shall be constructed over the pipeline easement, and no earth fill or embankment shall be placed within this easement, nor over this pipeline without a specific written agreement between the Grantee and the Grantor, their successors or assigns.

Should such specific agreement be executed, Grantee will set forth the conditions under which such fill or embankment may be placed, including a stipulation that all risks of damage to the pipeline shall be assumed by Grantors, their successors or assigns.

Grantee will indemnify and hold harmless the Grantors, their heirs and assigns, from claims for injury to person or property as a result of the negligence of the Grantee, its agents or employees in the construction, operation or maintenance of said pipeline.

The CITY OF HUBBARD, upon the initial installation, and upon each and every occasion that the same be repaired, replaced, renewed, added to, or removed, shall restore the premises of the Grantors, and any improvements disturbed by the City, to a good condition as they were prior to any such installation or work, including the restoration of any topsoil and lawn.

IN WITNESS THEREOF, Grantors have executed this Pipeline Easement as of this ___ day of _____ 20___.

_____ _____

STATE OF OREGON)
) SS
County of _____)

On this ___day of _____, 20___, before me, a Notary Public in and for said County and State, personally appeared _____, known to me to be the identical person(s) whose name(s) is/are subscribed to the within instrument and acknowledged that he/she/they executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal on the day and year above written.

_____

_____
NOTARY PUBLIC FOR OREGON
My Commission Expires: _____

APPROVED:

By: _____
Public Works Superintendent

APPROVED AS TO FORM:

_____City Attorney

AFTER RECORDING RETURN TO:

City Recorder
City of Hubbard
P.O. Box 380
Hubbard, OR 97032

UNTIL A CHANGE IS MADE SEND ALL TAX STATEMENTS TO:

NO CHANGE

Original Deed **REEL** ____, **PAGE** ____

PIPELINE EASEMENT
(Water Line Only)

KNOW ALL MEN BY THESE PRESENTS, that _____ _____ ("Grantors"), for good and valuable consideration, the receipt of which is hereby acknowledged, does forever grant unto the CITY OF HUBBARD, a municipal corporation ("Grantee"), a permanent easement over and along the full width and length of the premises described as follows, to-wit:

> An easement for Water Line Purposes upon and across a strip of land ____ feet in width, being ___ feet on each side of the following described centerline: (Insert Legal Description).

TO HAVE AND TO HOLD the above described permanent easement unto said Grantee in accordance with the conditions and covenants as follows:

The permanent easement shall include the right to the said CITY OF HUBBARD, to excavate for, and to construct, place, operate, maintain, repair, replace, relocate, inspect, and remove a water pipeline with all appurtenances incident thereto or necessary therewith, including any ground level valve boxes and fire hydrants, for the purpose of conveying potable water under the said premises and, make excavations therefore from time to time, in, under, and through the above described premises within said easement, and to cut and remove from said easement any trees and other obstructions which may endanger the safety or interfere with the use of said pipelines or appurtenances attached to or connected therewith; and the right of ingress and egress to and over said above described premises at any and all times for the purpose of repairing, renewing, excavating, replacing, inspecting, maintaining said pipelines and appurtenances, and for doing anything necessary, useful, or convenient for the enjoyment of the easement hereby granted. No building or other permanent structure shall be constructed over the pipeline easement, and no earth fill or embankment shall be placed within this easement, nor over this pipeline without a specific written agreement between the Grantee and the Grantor, their successors or assigns.

Should such specific agreement be executed, Grantee will set forth the conditions under which such fill or embankment may be placed, including a stipulation that all risks of damage to the pipeline shall be assumed by Grantors, their successors or assigns.

Grantee will indemnify and hold harmless the Grantors, their heirs and assigns, from claims for injury to person or property as a result of the negligence of the Grantee, its agents or employees in the construction, operation or maintenance of said pipeline.

The CITY OF HUBBARD, upon the initial installation, and upon each and every occasion that the same be repaired, replaced, renewed, added to, or removed, shall restore the premises of the Grantors, and any improvements disturbed by the City, to a good condition as they were prior to any such installation or work, including the restoration of any topsoil and lawn.

IN WITNESS THEREOF, Grantors have executed this Pipeline Easement as of this ___ day of _____ 20___.

_____ _____

STATE OF OREGON)
) SS
County of _____)

On this ___day of _____, 20___, before me, a Notary Public in and for said County and State, personally appeared _____, known to me to be the identical person(s) whose name(s) is/are subscribed to the within instrument and acknowledged that he/she/they executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal on the day and year above written.

_____

_____
NOTARY PUBLIC FOR OREGON
My Commission Expires: _____

APPROVED:

By: _____
Public Works Superintendent

APPROVED AS TO FORM:

_____City Attorney

AFTER RECORDING RETURN TO:

City Recorder
City of Hubbard
P.O. Box 380
Hubbard, OR 97032

UNTIL A CHANGE IS MADE SEND ALL TAX STATEMENTS TO:

NO CHANGE

Original Deed **REEL** ____, **PAGE** ____

PIPELINE EASEMENT
(Sanitary Sewer Only)

KNOW ALL MEN BY THESE PRESENTS, that _____ _____ ("Grantors"), for good and valuable consideration, the receipt of which is hereby acknowledged, does forever grant unto the CITY OF HUBBARD, a municipal corporation ("Grantee"), a permanent easement over and along the full width and length of the premises described as follows, to-wit:

> An easement for Sanitary Sewer Purposes upon and across a strip of land _ feet in width, being ___ feet on each side of the following described centerline: (Insert Legal Description).

TO HAVE AND TO HOLD the above described permanent easement unto said Grantee in accordance with the conditions and covenants as follows:

The permanent easement shall include the right to the said CITY OF HUBBARD, to excavate for, and to construct, place, operate, maintain, repair, replace, relocate, inspect, and remove an underground sanitary sewer pipeline with all appurtenances incident thereto or necessary therewith, including manholes, for the purpose of conveying sewage waste under said premises, and make excavations therefore from time to time, in, under and through the above described premises within said easement, and to cut and remove from said easement any trees and other obstructions which may endanger the safety or interfere with the use of said pipelines or appurtenances attached to or connected therewith; and the right of ingress and egress to and over said above described premises at any and all times for the purpose of repairing, renewing, excavating, replacing, inspecting, maintaining the said pipeline and appurtenances, and for doing anything necessary, useful, or convenient for the enjoyment of the easement hereby granted. No building or other permanent structure shall be constructed over the pipeline easement, and no earth fill or embankment shall be placed within this easement, nor over this pipeline without a specific written agreement between the Grantee and the Grantor, their successors or assigns.

Should such specific agreement be executed, Grantee will set forth the conditions under which such fill or embankment may be placed, including a stipulation that all risks of damage to the pipeline shall be assumed by Grantors, their successors or assigns.

Grantee will indemnify and hold harmless the Grantors, their heirs and assigns, from claims for injury to person or property as a result of the negligence of the Grantee, its agents or employees in the construction, operation or maintenance of said pipeline.

The CITY OF HUBBARD, upon the initial installation, and upon each and every occasion that the same be repaired, replaced, renewed, added to, or removed, shall restore the premises of the Grantors, and any improvements disturbed by the City, to a good condition as they were prior to any such installation or work, including the restoration of any topsoil and lawn.

IN WITNESS THEREOF, Grantors have executed this Pipeline Easement as of this ___ day of _____ 20___.

_____ _____

STATE OF OREGON)
) SS
County of _____)

On this ___day of _____, 20___, before me, a Notary Public in and for said County and State, personally appeared _____, known to me to be the identical person(s) whose name(s) is/are subscribed to the within instrument and acknowledged that he/she/they executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal on the day and year above written.

_____

_____
NOTARY PUBLIC FOR OREGON
My Commission Expires: _____

APPROVED:

By: _____
Public Works Superintendent

APPROVED AS TO FORM:

_____City Attorney

AFTER RECORDING RETURN TO:

City Recorder
City of Hubbard
P.O. Box 380
Hubbard, OR 97032

UNTIL A CHANGE IS MADE SEND ALL TAX STATEMENTS TO:

NO CHANGE

Original Deed **REEL** ____, **PAGE** ____

PUBLIC UTILITY EASEMENT
(Sidewalk Only)

KNOW ALL MEN BY THESE PRESENTS, that _____ _____, ("Grantors"), for good and valuable consideration, the receipt of which is hereby acknowledged, does forever grant unto the CITY OF HUBBARD, a municipal corporation, ("Grantee"), a permanent easement over and along the full width and length of the premises described as follows, to-wit:

SEE EXHIBIT "A"

TO HAVE AND TO HOLD the above described permanent easement unto said Grantee in accordance with the conditions and covenants as follows:

The permanent easement shall include the right, privilege, and authority to the said City of Hubbard, to excavate for, and to construct, place, operate, maintain, repair, replace, relocate, inspect, and remove a sidewalk with all appurtenances incident thereto or necessary therewith, in, under, and through the above-described premises within said easement, and to cut and remove from said easement any trees and other obstructions which may endanger the safety or interfere with the use of said sidewalk or appurtenances attached to or connected therewith; and the right of ingress and egress to and over said above-described premises at any and all times for the purpose of repairing, renewing, excavating, replacing, inspecting, maintaining and for doing anything necessary, useful, or convenient for the enjoyment of the easement hereby granted. No building or other permanent structure shall be constructed over the easement, and no earth fill or embankment shall be placed within this easement, nor over this sidewalk without a specific written agreement between the Grantee and the Grantors, their successors or assigns. Should such specific agreement be executed, Grantee will set forth the conditions under which such fill or embankment may be placed, including a stipulation that all risks of damage to the sidewalk shall be assumed by Grantors, their successors or assigns.

Grantee will indemnify and hold harmless the Grantors, their successors, and assigns, from claims for injury to person or property as a result of the negligence of the Grantee, its agents or employees in the construction, operation or maintenance of said sidewalk.

The City of Hubbard, upon the initial installation, and upon each and every occasion that the same be repaired, replaced, renewed, added to, or removed, shall restore the premises of the Grantors, and any improvements disturbed by the City, to as good condition as they were prior to any such installation or work, including the restoration of any topsoil and lawn.

Witness my hand and seal this _____ day of _____, _____.

_____(SEAL)

_____(SEAL)

On this ___day of _____, 20___, before me, a Notary Public in and for said County and State, personally appeared _____, known to me to be the identical person(s) whose name(s) is/are subscribed to the within instrument and acknowledged that he/she/they executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal on the day and year above written.

_____

_____
NOTARY PUBLIC FOR OREGON
My Commission Expires: _____

APPROVED:

By: _____
Public Works Superintendent

APPROVED AS TO FORM:

_____City Attorney

CHAPTER 3

STANDARD SPECIFICATIONS

TABLE OF CONTENTS

CHAPTER 3

STANDARD SPECIFICATIONS

EARTHWORK

STREETS

WATER

SEWER

SECTION 02060

AGGREGATE BASE

PART 1 - GENERAL

RELATED SECTIONS:

Follow Section 02324 - Trench Excavation, Bedding, and Backfill for aggregate base requirements for trench excavation, bedding, and backfill.

QUALITY ASSURANCE:

Testing Service: The Developer shall provide testing for quality acceptance. The City Engineer reserves the right to perform additional tests. Allow access to materials and facilities.

PART 2 - PRODUCTS

AGGREGATE BASE:

Aggregate base shall consist of crushed gravel or crushed rock.

Gravel shall have at least one fractured face on 50 percent of the material retained on each sieve size 1-1/2 inch and above and 70 percent for the material passing the 1-1/2-inch sieve and retained on each of the sieves down to 1/4 inch.

The source material from which aggregate base materials are obtained, produced or manufactured, shall meet the following qualifying test requirements:

Test	Test Method	Requirements
Degradation:		
Passing No. 20 sieve	ODOT TM 208	30% Max.
Sediment Height:	ODOT TM 208	3" Max.
Abrasion:	AASHTO T 96	35% Max.

Sand Equivalent: Base aggregates shall have a sand equivalent of not less than 30 when tested in conformance with AASHTO T 176.

Liquid Limit and Plasticity: Aggregate base shall meet the following requirements:

Percent of Material Passing No. 40 Sieve	Liquid Limit (Maximum) AASHTO T 89	Plasticity Index (Maximum) AASHTO T 90
0.0 to 5.0, inclusive	33	6
5.1 to 10.0, inclusive	30	5
10.1 to 15.0, inclusive	27	4
15.1 to 20.0, inclusive	24	3
20.1 to 25.0, inclusive	21	2
Over 25.0	21	0 or N.P.

Grading Requirements: Aggregate base shall conform to the following grading requirements as determined by AASHTO T 27:

Designated Size:	2-1/2"-0	2"-0	1-1/2"-0	1"-0	3/4"-0
Sieve Size	**Percentages Passing (by weight)**				
3"	100				
2-1/2"	95-100	100			
2"		95-100	100		
1-1/2"			95-100	100	
1-1/4	55- 75				
1"		55- 75		90-100	100
3/4"			55- 75		90-100
1/2"				55- 75	
3/8"					55- 75
1/4"*	30- 45	30- 45	35- 50	40- 55	40- 60

- Of the fraction passing the 1/4-inch sieve 40 percent to 60 percent shall pass the No. 10 sieve.

PART 3 - EXECUTION

MATERIAL PLACEMENT PRIOR TO COMPACTION:

Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density. Do not place material on surfaces that are muddy, frozen, or contain frost or ice.

- Place material evenly to prevent wedging action against structures or displacement of piping or conduit.

MOISTURE CONTROL:

Native and imported materials should be compacted at +/- 2% of optimum moisture conditions. Where subgrade or fill material must be moisture conditioned before compaction, uniformly apply water to surface to prevent free water appearing during or subsequent to compaction operations.

- Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

COMPACTION:

The in-place density of materials shall be tested using with ASTM D 1556 or ASTM D 2922. Test once for every 300-feet, but a minimum of 2-tests shall be required for lengths less than or equal to 300-feet.

The maximum density will be determined by using ASTM D 698.

Place and compact materials in horizontal lifts using equipment and procedures that will produce the specified water content and density throughout the lift.

- Do not exceed the uncompacted lift thicknesses indicated.

Percentage of Maximum Density Requirements: Compact to not less than the percentages of ASTM D 698 maximum dry density shown in the standard details:

FIELD QUALITY CONTROL:

Allow the City Engineer to inspect and approve subgrades and fill layers before further construction work is performed.

Compaction: For each lift of material, conduct density tests to verify required percent compaction. Verification and approval of compaction between tested areas may be based on a visual comparison with tested areas.

- If, test reports and observations indicate materials are below specified density, provide additional compaction and retesting.

GRADING:

Uniformly grade aggregate base surfacing. Smooth finished surfaces within specified tolerances, compact with uniform slopes between points where elevations are indicated, or between such points and existing grades.

- Grade areas to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes and to within not more than 0.10' above or below required elevations. Provide final grades within a tolerance of 0.10' when tested with a 10' straightedge.

MAINTENANCE:

Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

- Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

- Where settling is measurable or observable at excavated areas during general project warranty period, remove surface pavement, landscape or other finish), add specified fill material, compact as specified, and replace surface treatment. Restore appearance, quality and condition of surface or finish to match adjacent work, and eliminate evidence of restoration.

END OF SECTION 02060

SECTION 02324

TRENCH EXCAVATION, BEDDING, AND BACKFILL

PART 1 - GENERAL

RELATED SECTIONS:

Refer to Section 02060 - Aggregate Base for aggregate base material specified herein for pipe bedding, pipe zone, and granular backfill.

DEFINITIONS:

Trench excavation is defined as the removal of all material encountered in the trench to the depths as shown in the standard details.

Trench foundation is defined as the bottom of the trench on which the pipe bedding is to lay and which provides support for the pipe.

Pipe bedding is defined as the furnishing, placing, and compacting the specified materials on the trench foundation to uniformly support the barrel of the pipe to the springline. The total bedding depth shall be a minimum of 6 inches below the outside bell of the pipe.

Pipe zone is defined as the furnishing, placing and compacting of specified materials for the full width of the trench from the top of the bedding to a point 12-inches above the top outside surface of the barrel of the pipe.

Trench backfill is defined as the furnishing, placing, and compacting of material in the trench between the top of the pipe zone material and the bottom of the pavement base rock, ground surface, or surface material.

- **Native Backfill:** Native material free of rocks larger than 3-inch and organic material larger than 1/2-inch in diameter and 6-inches long.

- **Granular Backfill:** Aggregate base meeting the requirements of Section 02060 - Aggregate Base.

- **Controlled Density Backfill (CDB):** A cementitious material mixed, transported, and delivered using normal ready mixed concrete operations. CDB is a mixture of aggregate (sand and course rock), Portland cement, and water that is flowable and requires no compaction. The mixture shall be proportioned such that the 28-day strength is between 50 and 100 psi. The material shall be capable of setting up within 24-hours to support paving operations and shall be capable of excavation by non-mechanical shoveling.

Surface removal and replacement is defined as the removal and/or replacement of surface material such as topsoil, sod, pavement, curbs, sidewalks, gravel, etc.

PART 2 - PRODUCTS

GENERAL:

Materials may be native or imported as indicated. Materials proposed for use in the work shall not be used without approval of the City Engineer.

TRENCH FOUNDATION:

Trench foundation shall be undisturbed native material. Where ground water or other unstable conditions exist, and the native material cannot support the pipe, additional excavation and trench stabilization material may be required.

TRENCH STABILIZATION MATERIAL: 1-1/2" - 3/4" crushed rock with little or no fines.

PIPE BEDDING:

Pipe bedding material shall be Granular Backfill material.

PIPE ZONE:

The pipe zone material shall be Granular Backfill material.

TRENCH BACKFILL:

- Provide native backfill under unpaved areas.
- Provide granular backfill under local street pavements, sidewalks, and shoulders.
- Provide Controlled Density Backfill (CDB) under arterial and collector street pavement.

SURFACE REMOVAL AND REPLACEMENT:

Topsoil: Stockpile topsoil for reuse. If existing topsoil cannot be stockpiled and reused, provide replacement topsoil of friable, fertile, natural surface loam consisting of sands, silts, clays and organic matter; free of noxious weeds, roots, refuse, sticks, lumps, and substances toxic to plant growth.

Asphalt: Asphalt shall be as specified in Section 02740 – Hot Mix Asphalt Concrete.

Concrete: Concrete shall be as specified in Section 02500 - Curbs, sidewalks, driveway drops, and end ramps.

PART 3 - EXECUTION

TRENCH EXCAVATION:

General:

All trench excavation and backfill operations shall conform to the requirements of regulatory agencies having jurisdiction over the work or within the work site.

Open Trench Limit:

The length of open trench shall be kept to a minimum. The City shall be the judge of the amount of trench allowed open based upon work conditions of the area. In normal cases, the open trench length shall not exceed 100-feet.

Saw Cutting:

Saw cut existing pavements, curbs, sidewalks, etc. and remove and legally dispose all demolished materials.

Trench Width:

Trench width shall be as shown or as required for bank stabilization and protection of workers.

Trench Grade:

Excavate the trench to the lines and grades shown or established by survey, with proper allowances for pipe thickness, pipe bedding, and foundation stabilization (if any). The foundation upon which the bedding is to be placed shall be firm, undisturbed, and true to grade. If the trench is excavated below indicated subgrade without authorization, restore the subgrade with pipe bedding material. The restoration material shall be placed over the full width of the trench, in compacted lifts not exceeding 6-inches.

DISPOSAL OF EXCESS MATERIAL:

All excess excavated material shall be legally deposed of off site.

TRENCH PROTECTION:

Provide materials, labor and equipment necessary to protect trenches at all times. The trench protection shall provide safe working conditions in the trench and protect the work, existing property, utilities, pavement, etc. **The method of protection shall be according to the Contractor's design.** Use a combination of shoring, overbreaking,

tunneling, boring, sliding trench shields, or other methods of accomplishing the work provided the method meets with the approval of all applicable local, state, and federal safety codes.

- Damages resulting from improper shoring, improper removal of shoring or from failure to shore shall be the sole responsibility of the Developer.

EXISTING ABANDONED FACILITIES:

When encountered during trench excavations remove and dispose of existing abandoned pipe, structures, and other facilities (if any) necessary to construct the project. The cost of such removal will be considered incidental to the project.

- Cap or plug all abandoned lines with suitable fittings designed for the pipe encountered.

ROCK EXCAVATION:

Where ledge rock or boulders and large stones are encountered during trench excavation, the rock shall be removed to provide a minimum of 6-inches of clearance to each side of and below all pipe and appurtenances.

The use of explosives will not be permitted.

Promptly remove and dispose of all water entering the trench during the time the trench is being prepared for the pipe laying, during the laying of the pipe and until the backfill at the pipe zone has been completed. Dispose of the water in a suitable manner without damage to adjacent property.

- Groundwater shall be controlled to prevent softening of the bottom of excavations or formation of "quick" conditions or "boils." Dewatering systems shall be designed and operated so as to prevent removal of the natural soils and so that the groundwater level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property.

TRENCH STABILIZATION:

When, in the judgment of the City Engineer, the existing material at subgrade is unsuitable for supporting the pipe, excavate below subgrade, as directed by the City Engineer. The excavated material shall be replaced with trench stabilization material.

PIPE BEDDING:

Spread the bedding smoothly to proper grade so the pipe is uniformly supported along the barrel and shall excavate bell holes at each joint to permit proper assembly and inspection

of the joint. Bedding under the pipe shall provide a firm, unyielding support along the entire pipe length. Place subsequent lifts not more than 1-foot in thickness up to the springline of the pipe, bringing lifts up together on both sides of the pipe. The material under the pipe haunches shall be thoroughly compacted, to the satisfaction of the City Engineer, by use of "tee bars" or other approved hand tamping tools.

- Compaction: Pipe Bedding shall be compacted to 90% of ASTM D698.

PIPE ZONE:

Pipe zone material shall be carefully placed around the pipe and thoroughly compacted in 6-inch layers to provide complete support of the pipe and to prevent deflection or damage. The Contractor shall prevent pipe from movement either horizontally or vertically during placement and compaction of pipe zone material.

- Compaction: Pipe Zone shall be compacted to 90% of ASTM D698.

TRENCH BACKFILL AND COMPACTION:

Take reasonable precautions to prevent excavated Native Backfill material, where indicated, from exceeding the optimum moisture limits and replace any Native Backfill material exceeding it's optimum moisture content with Granular Backfill material at no additional expense to the Owner.

- Backfill the trench above the pipe zone in successive lifts as required to obtain minimum compaction densities indicated below. Backfill shall not be allowed to free-fall into the trench until at least 1-foot of cover (pipe zone) material is provided over the top of the pipe.

- Compact each lift to the minimum density as follows:

  Native Backfill: 90% of ASTM D698*
  Granular Backfill: 90% of ASTM D698* to 3 feet below surface.
  Granular Backfill: 95% of ASTM D698* top 3 feet

  * at +/- 2% of optimum moisture content

Test each lift once for every 300-feet, but a minimum of 2-tests shall be required for lengths less than or equal to 300-feet.

The method of compaction shall be modified as necessary to protect the pipe. If the specified compaction is not obtained, use a modified compaction procedure and/or reduce the thickness of lifts. If approved materials meeting the specifications cannot be compacted to the required density regardless of compactive effort or method, the City Engineer may reduce the required density or direct that alternate materials be used.

Further excavation and pipe laying operations shall cease until backfill is compacted to the satisfaction of the City Engineer.

When the backfilling and compaction is complete, restore the surface area to original conditions.

SURFACE REMOVAL AND REPLACEMENT:

UNPAVED AREAS:

Topsoil: Remove existing topsoil and place the material in a stockpile. Do not mix the topsoil with other excavated material. After the trench has been backfilled, the topsoil shall be replaced.

- Maintain the finished grade of the topsoil level with the area adjacent to the trench until final acceptance by the City Engineer. Repair damage to adjacent topsoil by work operations. Remove all rock, gravel, clay, and any other foreign materials from the surface, regrade, and add topsoil as required.

- Rake topsoil and leave ready for seeding.

PAVED AREAS:

Asphalt: Follow Section 02740 – Hot Mix Asphalt Concrete.

Concrete: Follow Section 02500 - Curbs, Sidewalks, Driveway Drops and Endramps.

END OF SECTION 02324

SECTION 02221

ROADWAY SURFACE TREATMENTS

PART 1 - GENERAL

RELATED SECTIONS:

Follow Section 02060 - Aggregate Base for aggregate base.

Follow Section 02740 – Hot Mixed Asphalt Concrete (HMAC) for asphalt concrete pavement.

DEFINITIONS:

Roadway Surface Treatments:

Roadway surface treatments are defined as asphalt and aggregate roadway surfaces constructed over existing aggregate bases or bituminous roadway surfaces to obtain a surface thoroughly adhered to the base or existing roadway surface and placed to the contours and sections indicated or required to produce good ride and non-skid qualities.

Seal Coat:

Seal coat is defined as one or more applications of bituminous binder, either with or without a cover of aggregate.

Penetration Macadam:

Penetration macadam is defined as asphalt penetration of graded aggregates with bituminous material applied in successive spreads by the penetration method to bind the aggregates together into a firm surfacing.

PART 2 - PRODUCTS

ASPHALT:

Asphalt materials incorporated in the mix shall conform to requirements of **Section 02740 – Hot Mixed Asphalt Concrete (HMAC).**

AGGREGATES:

Aggregates shall conform to requirements of **Section 02060 - Aggregate Base** and to additional requirements contained herein.

- Aggregate shall have a record of approved performance, or be subject to the Stripping Test for Bituminous Aggregate Mixtures, AASHTO T 182, using a sample of asphalt to be used in the work. When so tested the retention of asphalt shall be above 95 percent. Aggregate failing to conform to this requirement will not be approved for use in the work except if approved anti-stripping additives or other approved measures correct the deficiency.

The gradation of aggregate required in the work shall be as follows:

Designated Sizes						
	2 ½"-11/4" (63.50-31.75mm)	1 ½"-3/4" (38.10-19.05mm)	1 1/4"-3/4" (31.75-19.05mm)	3/4"-½" (19.05-12.70mm)	½"-1/4" (12.70-6.35mm)	1/4"-No.10 (6.35mm)
Sieve Size Passing	Percentages (by weight)					
3" (76.02mm)	100					
2 ½" (63.05mm)	95-100					
2" (50.80mm)		100				
1 1/2" (38.10mm)		95-100	100			
1 1/4" (31.75mm)	0-10		90-100			
1" (25.40mm)				100		
3/4" (19.05mm)	0-1	0-15	0-15	90-100	100	
1/2" (12.70mm)		0-2	0-2	0-15	85-100	100
1/4" (6.35mm)				0-3	0-15	85-100
No 10					0-4	0-15
No 40						0-5

PART 3 - EXECUTION

SEAL COAT:

The rates of application for bituminous binders for the various types of seal coats shall be within the ranges specified in the following table. The exact rates will be as directed by the City Engineer.

Rate of Application Per Square Yard (0.8361 m^2)			
Seal Coat Types	Bituminous Size of Screenings	Screenings (pounds)	Binder (gallons)
Fog	N/A	N/A	0.05 to 0.10 (0.1893-0.3785L)
Fine	1/4" to No. 10 (6.35mm)	12 to 16 (5.4432-7.2576 kg)	0.15 to 0.30 (0.5677-1.1355L)
Coarse	½"-No. 4 (12.70mm)	25 to 35 (11.34-15.876kg)	0.25 to 0.35 (0.9462-1.3247L)
Double			
1st application	½"-No. 4 (12.70mm)	25 to 35 (11.34-15.876kg)	0.20 to 0.35 (0.757-1.3247L)
2nd application	1/4"-No. 10 (6.35mm)	12 to 16 (5.4432-7.2576kg)	0.15 to 0.25 (0.5677-0.9462L)

PENETRATION MACADAM:

The order and number of spreads, designated sizes of aggregates, and rates of spreads of aggregate and bituminous material shall be as shown on the table in the ODOT Standard Drawings entitled Asphalt Penetration Macadam.

Rates of spreads and quantities of materials are subject to variance as directed to adjust for variable conditions encountered or experienced during construction. Also, recognize that the nature of the work calls for equipment in varying number and versatility and modification of procedures to some extent. Generally, the ratio of bituminous cement to aggregate shall be held closely constant to that specified.

PREPARATION OF BASE:

Conform to the applicable requirements for preparation of bases in **Section 02740 – Hot Mix Asphalt Concrete (HMAC).**

PLACING:

Weather and Seasonal Limitations:

Do not place asphalt penetration macadam or seal coat on any wet surface, or when air temperature is below 60 degrees Fahrenheit (15.56°C), or when the City Engineer determines that weather conditions are detrimental to proper construction. Normally, work shall be done between May 1 and September 15.

Equipment:

The equipment to be used shall include approved power brooms, self-propelled aggregate spreaders, bituminous material distributor, and hauling vehicles, all of which shall be pneumatic tired. Provide equipment in such number and capacities that will provide coordinated and uniform progress.

- Mechanical spreaders for spreading aggregate of less than 1 inch (25.40 mm) in maximum size shall be of a design that will place the larger fraction ahead of the finer fraction of the aggregate.

- The bituminous material distributor shall provide controls for regulating and monitoring the spread of bituminous material at even heat on variable widths of surface up to 15 feet (4.572 m) at rates from 0.05 (.18925 L) to 2.0 gallons (7.57 L) per square yard (0.8361 m^2), with uniform pressure, and with an allowable variation from any specified rate not to exceed 0.02 gallon (0.0757 L) per square yard (0.8361 m^2). Distributors shall have a power unit for the pump and full circulation spray bars adjustable laterally and vertically.

- Use rollers of self-propelled pneumatic tire type capable of exerting a ground pressure of not less than 80 pounds (36.288 kg) per square inch (645.2 mm^2) of tire contact area. Steel wheel rollers shall be used only with prior approval.

Sequence of Operations:

The order of the several spreads of aggregates and bituminous material shall be as directed. In construction of a seal coat, place spreads of aggregate while the immediately preceding spread of bituminous material is at or near its application temperature. Each spread of designated size aggregate shall be shaped and compacted at established line and grade just prior to being covered. Do not apply the seal coat spread of bituminous material and aggregate until the underlying spreads have been in place for at least three days and have become stabilized.

Application of Bituminous Material:

The City Engineer may vary the amount of asphalt and aggregates to be applied to give the best results.

To ensure uniform distribution of asphalt, prior to beginning work, operate the distributor bar over a pit or vat. To avoid laps and ridges at transverse junctions of separate applications of asphalt, spread sufficient building paper over the treated surface to ensure that spray jets will be functioning normally when the untreated surface is reached. Omissions (skips) by the distributor must be immediately covered by hand patching with the same grade of asphalt.

Area covered by any one spread of asphalt shall be no more than can be covered with aggregate within ten minutes from the time of application upon any part of the spread.

Spread asphalt toward the source of aggregate to avoid injury to the freshly treated surface.

Before application to the roadway, heat asphalt materials to the temperatures directed, but within the applicable limits for material used, as shown in the following table:

Type and Grade of Asphalt	Spraying Temperature			
	Minimum		Maximum	
	Degree F	Degree C	Degree F	Degree C
Asphalt Cements:				
AR 1000	275	135.0	325	162.8
AR 2000	285	140.6	350	176.7
AR 4000	290	143.3	350	176.7
Liquid Asphalt:				
MC and RC 250	165	73.9	220	104.4
MC and RC 800	200	93.3	355	179.4
Emulsified Asphalt:				
CRS-1	75	23.9	130	54.4
CRS-2	100	37.8	160	71.1
CMS-2S	100	37.8	160	71.1
CMS-2	100	37.8	160	71.1
CMS-2h	100	37.8	160	71.1
CSS-1	75	23.9	130	54.4
CSS-1h	75	23.9	130	54.4

Building paper shall be placed over the end area of previously placed spreads and the adjoining application shall start on the paper, after which the paper shall be removed. Rates of application shall not vary from prescribed rates by more than 10 percent. Protect structures and vegetation from being splattered, stained, or marred. Remove any stains and remedy disfigurements as approved. Use hand application or other approved means on areas inaccessible to the distributor.

Hauling and Spreading Aggregates:

Do not operate hauling and spreading equipment on uncovered bituminous material. Hand spreading shall be done to correct deficiencies or on areas inaccessible to specified mechanical equipment. Hauling over aggregate-covered bituminous material shall be held to a practicable minimum until the surface has become firm. Perform hauling at moderate speeds on newly placed penetration macadam or seal coat materials to prevent loss of or hazardous movement of materials. Hauling shall be routed as uniformly as is practicable over the full width of material in place.

COMPACTION

Each spread of each designated size of aggregate shall be shaped and dry rolled until material is interlocked, firm, partially bound with underlying bituminous material, and does not creep or wave ahead of the roller. Begin rolling at the low side of the cross section and progress with passes parallel to roadway centerline, each pass overlapping the preceding pass by at least one-half the roller width. Places not accessible to rollers shall be tamped thoroughly with approved mechanical or hand tampers.

Irregularities in surface smoothness, uniformity of texture, segregation of materials, dirt pockets, spots of excess bituminous material, and other deficiencies and defects shall be corrected by removal, replacement, addition of material, repetition of construction operations, or other suitable means, as directed.

CURING AND MAINTENANCE

During the curing period when construction is open to traffic and for three days following completion of the final course, perform the following operations.

- Blade or broom the course to correct bleeding of asphalt, to provide coverage with aggregates, to keep the surface free of gravel, traffic grooves, holes, and other deformations and to eliminate other defects that may appear.

- Perform rolling and compacting of materials to maintain or restore firmness and stability to the materials.

- Trim abutting shoulders. Remove materials which come into side ditches or on to curbs, sidewalks, or driveways and dispose of as approved.

- Perform above operations under traffic and at frequencies directed to develop and establish the course to uniform firmness and stability throughout.

REMOVAL OF EXCESS MATERIAL:

Where excess rock has been applied, either remove it or drift it uniformly over the adjacent roadway by using an approved grader equipped with a wire broom mold board. Keep this type of brooming to a minimum, and where necessary, perform it very carefully so as not to disturb the mat in any way. Correct thin or bare spots in the spread of cover stone by hand spreading or by use of a grader as described above.

SURFACE TOLERANCE, PENETRATION MACADAM:

The surface, when finished and established, will be tested for trueness to specified grade and transverse slope at selected locations and shall not deviate at any point more than 0.03 foot (9.144 mm) from the bottom of a 10 foot (3.048 m) straightedge.

END OF SECTION

SECTION 02500

CURBS, SIDEWALKS, DRIVEWAY DROPS, AND END RAMPS

PART 1 - GENERAL

RELATED SECTIONS:

Refer to Section 02060 – Aggregate Base for aggregate base specified herein.

Refer to Section 02740 – Hot Mixed Asphalt Concrete (HMAC) for HMAC used for end ramps.

QUALITY ASSURANCE:

Comply with provisions of following codes, specifications, and standards.

- ACI 301 "Specifications for Structural Concrete."
- ACI 305 "Recommended Practice for Hot Weather Concreting."
- ACI 306 "Recommended Practice for Cold Weather Concreting."
- ACI 347 "Recommended Practice for Concrete Formwork."
- Concrete Reinforcing Steel Institute, "Manual of Standard Practice."

Testing Service: The Developer shall employ a testing service approved by the City Engineer to perform material evaluation tests. The City reserves the right to perform additional material evaluation tests.

PART 2 - PRODUCTS

SUBGRADE STABILIZATION MATERIAL: 1-1/2" - 3/4" crushed rock with little or no fines.

AGGREGATE BASE:

Refer to Section 02060 - Aggregate Base for aggregate base material.

FORM MATERIALS:

Form concrete surfaces with plywood, metal, metal-framed plywood, or other acceptable panel-type materials, faced to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.

Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

REINFORCING MATERIALS:

Reinforcing Bars: ANSI/ASTM A 615, Grade 60, deformed.

Steel Wire: ANSI/ASTM A 82, plain, cold-drawn, steel.

Reinforcement Supports: Provide supports for reinforcement including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars in place. Use wire bar type supports complying with CRSI recommendations.

PORTLAND CEMENT CONCRETE (PCC) MATERIALS:

Portland Cement: ANSI/ASTM C 150, Type II.

- Use one brand of cement throughout project.

Normal Weight Aggregates: ANSI/ASTM C 33, and as herein specified. Provide aggregates from a single source for exposed concrete.

Water: Potable.

Air-Entraining Admixture: ANSI/ASTM C 260.

RELATED PCC MATERIALS:

Premolded Expansion Joint Filler: resilient and non-extruding type premolded bituminous impregnated fiberboard units complying with ASTM D 1751, Type I.

Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound complying with ANSI/ASTM C 309, Type I, Class A.

Bonding Compound: Polyvinyl acetate, rewettable type.

PROPORTIONING AND DESIGN OF PCC MIXES:

Design mixes to provide normal weight concrete with the following minimum properties:

- 3000-psi 28-day compressive strength; 570-lbs. cement per cu. yd. minimum.

Admixtures: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having air content within following limits:

- 5% +/- 1% for maximum 1" aggregate.

Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

- All Concrete: 4" +/- 1" except extruded curbs and/or gutters shall have a maximum slump of 2-inches.

CONCRETE MIXES:

Ready-Mix Concrete: Comply with requirements of ANSI/ASTM C 94:

- Delete references for allowing additional water to be added to batch for material with insufficient slump. Addition of water to the batch will not be permitted.

During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ANSI/ ASTM C 94 may be required.

- When air temperature is between 85° F. and 90° F., reduce mixing and delivery time from 1-1/2 hours to 75-minutes, and when air temperature is above 90° F., reduce mixing and delivery time to 60-minutes.

- Chlorides shall not be permitted but fly ash may be used.

ASPHALT CONCRETE (AC):

Follow Section 02740 – Hot Mixed Asphalt Concrete (HMAC) for HMAC end ramp material.

PART 3 - EXECUTION

EARTHWORK:

Excavate to required width and depth to a firm, even surface. Remove all soft and unsuitable material and replace with subgrade stabilization material.. Backfill prior excavations in and around new structures with approved material placed and compacted in successive lifts to a dense and firm condition. Areas adjacent to the work shall be trimmed and shaped to a neat condition. Restore disturbed areas to their original condition.

AGGREGATE BASE:

Construct sidewalks and driveways on a 6-inch aggregate base course compacted to 95% of ASTM D 698 maximum dry density.

- When sidewalks and driveways are to be constructed on areas where approved aggregate material is already in place, such materials may be salvaged and reused.

- AC material removed by the cold plane pavement removal method may be used as a base course under sidewalks.

BASE FOR PCC CURBS:

Construct curbs on a 2-inch aggregate base course compacted to 95% of ASTM D 698 maximum dry density.

Curb base shall be firm and free of all deleterious matter. Thoroughly dampen surfaces upon which new concrete is to be placed.

BASE FOR AC END RAMPS:

Bring the base of new asphalt concrete to proper grade, firm, dry, and free of deleterious matter.

Where asphalt concrete is to come in contact with previously placed portland cement concrete, asphalt concrete, or bituminous surfaces apply a light coating of emulsified asphalt conforming to the requirements for Tack Coat in Section 02220 - Asphalt Concrete Paving

PCC FORMS:

Design, erect, support, brace and maintain formwork to support vertical and lateral loads until such loads can be supported by concrete. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position.

- Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

- Construct forms to sizes, shapes, lines and dimensions shown to obtain true alignment, location, grade, level and plumbness in finished structures. Provide for openings, offsets, keyways, recesses, anchorages, and inserts, and other features required in the work. Solidly butt joints and provide back up at joints to prevent leakage of cement paste.

- Fabricate forms for easy removal without hammering or prying against concrete surfaces.

- Chamfer exposed corners and edges where shown using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

- Edge Forms and Screed Strips for Flatwork: Set edge forms, bulkheads, and intermediate screed strips for flatwork to obtain required elevations and contours in finished surface.

- Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and to maintain proper alignment.

PLACING PCC REINFORCEMENT:

Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and support, and as follows:

- Clean reinforcement of loose rust, mill scale, earth, ice and other materials, which reduce or destroy bond with concrete.

- Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

- Place reinforcement to obtain at least minimum coverage for protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

EQUIPMENT:

The machine for extruding PCC curb shall be of the self-propelled type equipped with a material hopper, distributing screw, and adjustable curb forming devices capable of placing and compacting cement concrete to the lines, grades, and cross section as shown, in an even homogeneous manner. PCC curb shall be free of honeycomb and cracks.

Set top of PCC curb grade by an offset guideline using the survey marks established by the Engineer. The forming tube portion of the extrusion machine shall be readily adjustable vertically during the forward motion of the machine to provide, when necessary, a variable height of curb conforming to the predetermined curb grade. A grade line gauge or pointer shall be attached to the machine in such manner that a continual comparison can be made between the curb being placed and established curb grade as indicated by the offset guideline.

- In lieu of the above method for maintaining the curb grade, the extrusion machine may be operated on approved rails or forms set at the proper grade.

For AC end ramps, spread asphalt concrete by small or special pavers, by spreader boxes, or by blade graders. Compact with small, self-propelled rollers, vibratory compactors, or mechanical tampers. Spread or compact the mixture by hand methods only when approved by the City Engineer.

PLACING PCC:

Do not place material until the surface and forms, where used, have been inspected and approved.

PCC:

Construct PCC structures between approved forms or by an approved mechanical extrusion method. If forms are used, maintain a 2 to 4-inch slump, and thoroughly compact and strike off. If the structures are constructed by an approved mechanical extrusion method, maintain a maximum slump of 2-inches. Feed PCC into the extruding machine at a uniform rate and operate the machine under sufficient restraint in a forward motion to produce a welt-compacted mass of concrete.

PCC FINISHING:

General:

Construct all structures within 1/4-inch of true line, within 1/4-inch of established surface grade, cross section, and slope, and within 1/8-inch of specified thickness, and all finished surfaces shall be free from humps, sags, or other irregularities. When a straightedge 10 feet long is laid on a finished surface tangent, the surface shall not vary more than 1/4-inch from edge of the straightedge.

- Where PCC flat work is placed around or adjacent to manholes, pipe inlets, or other miscellaneous structures, do not construct said work to final grade until after the sidewalks have been constructed for an approved distance on each side of the structure.

Sidewalks and Driveway Drops:

Finish surface of PCC to grade and cross section with a bull float, trowel smooth, score if required and then finish with a broom. Use floats of not less than 10-feet in length for straight grade sections and not less than 6-inches in width. Finish concrete adjacent to expansion joints with an edger tool. Light brooming shall be transverse to the line of traffic and if water is necessary, it shall be lightly applied to the surface immediately in advance of brooming.

- The surface of flat work shall be marked into rectangles with a scoring tool, which will leave the edges rounded. Scoring and dimensions shall be as shown on the standard drawings. Sidewalks shall have a slope of 1/4-inch per foot from the top of curb to the back of walk unless otherwise shown.

Curbs:

Remove forms after the concrete has taken initial set and while the concrete is still green. Minor defects shall be repaired with mortar containing one part portland cement and two parts sand. Plastering will not be permitted on the faces and exposed surfaces. Honeycombed and other structurally defective concrete shall be removed and replaced. While the PCC is still green, finish exposed surfaces as required to provide a uniform texture and smooth surface.

- Furnish and install a minimum of two 3-inch PVC Schedule 40 pipe curb drains to serve each lot. Use 4-inch PVC pipe for blockouts. PVC pipe shall conform to ASTM D 2241.

CURING PCC:

After the PCC has been placed and finished in curb structures it shall be cured by application of a white pigmented liquid membrane-forming compound applied uniformly to the damp concrete by pressure spray methods, or by keeping the concrete protected and moist for at least 72 hours. The structure shall be kept from contact and strain for at least seven days.

JOINTS IN PCC:

Construction Joints: Locate and install construction joints at control joint locations to avoid cold joints.

- Construction joints will not be required if subsequent concrete pour is made within 20 minutes of last pour to avoid cold joints.

- **Cold joints are prohibited and if found will be cause for rejection, removal and reconstruction.**

Control Joints in Flat Work:

Form transverse control joints of the weakened plane or dummy type in the exposed surfaces of flatwork at such locations as are required to confine the control joint spacing to a maximum of 5-feet. The joints shall be formed to a depth of one-third of the thickness of concrete and to a width of about 1/2 -inch. Joint edges shall be tooled.

Control Joints in Curbs:

Place control joints in curbs at 10-foot intervals and coincident to sidewalk joints. Control joints shall be of the open joint type and shall be provided by inserting a thin, oiled steel sheet vertically in the fresh concrete to force coarse aggregate away from the joint. The steel sheet shall be inserted one-half the depth of the curb. After initial set has occurred in the PCC and prior to removing the front curb form, the steel sheet shall be removed with a sawing motion. Finish top of curb with a steel trowel and finish edges with a steel-edging tool.

Expansion Joints:

Provide expansion joints between PCC sidewalks and PCC driveways, around poles, boxes, and other fixtures that protrude through, into, or against the structure, and other locations as shown in the standard details. Place each expansion joint at right angles to the structure alignment, vertical to the structure surface, and provide complete separation between PCC surfaces.

- The width of joints and thickness of filler shall match those of the joints in abutting or

underlying concrete; elsewhere it shall be not less than 1/2-inch.

Existing Structures:

Cut back existing curbs, walks, driveways, and other structures to permit the new construction by saw cutting. Where new work is to be constructed against or within 4 inches of existing structures, the transition shall be shown the drawings.

- Furnish and place preformed expansion joint filler, minimum 1/2-inch thickness, between new and old PCC.

END OF SECTION 02500

SECTION 02740

HOT MIXED ASPHALT CONCRETE

PART 1 - GENERAL

RELATED SECTIONS:

Follow Section 02202 – Aggregate Base for aggregate base requirements.

QUALITY ASSURANCE:

Testing Service: The Developer shall provide testing for quality control/assurance. The City Engineer reserves the right to perform additional acceptance tests. Allow access to materials and facilities.

REFERENCED STANDARD:

Certain ODOT Standard Specifications for Highway Construction are referenced herein.

ABBREVIATIONS:

CDT	-	Certified Density Technician
HMAC	-	Hot Mixed Asphalt Concrete
ODOT	-	Oregon Department of Transportation
QC	-	Quality Control
WAQTC	-	Western Alliance for Quality Transportation Construction

DEFINITION:

Hot Mixed Asphalt Concrete (HMAC) is defined as a hot plant mixed, uniformly coated mixture of asphalt cement, graded aggregate, and additives.

QUALITY CONTROL:

Asphalt and aggregate will be subject to approval prior to mixing. Plant mixed mixtures will be subject to final approval after blending and mixing, either at the plant or at the place of delivery prior to rolling. Approval will be based on periodic sampling of the materials.

SUBMITTALS:

Samples: Submit samples of aggregates.

Mix Design: Submit HMAC mix design.

PART 2 - PRODUCTS

ASPHALT CEMENT:

Asphalt cement shall conform to applicable requirements of Section 00744 of the referenced standard and as follows:

- PG 64-22

AGGREGATES:

Aggregates shall conform to applicable requirements of Section 00744 of the referenced standard.

HOT MIXED ASPHALT CONCRETE:

Hot Mixed Asphalt Concrete shall conform to applicable requirements of Section 00744 of the referenced standard as follows:

Base Lift:

- Mix Type: Level 2 HMAC
- Broadband Limits: 3/4" Dense

Top Lift, Overlay, Trench Patch, or other:

- Mix Type: Level 2 HMAC
- Broadband Limits: 1/2" Dense

PART 3 - EXECUTION

SAW CUTTING:

Saw cut and remove existing HMAC pavement to permit trench operations and allow clean bonding of new HMAC.

INSTALLATION:

Conform to applicable requirements of Section 00744 of the referenced standard.

COMPACTION:
Provide a technician certified in density testing (CDT).

Immediately after the HMAC has been spread, struck off, and surface irregularities and other defects remedied, roll it uniformly until compacted as specified.

- **Temperature** - Complete breakdown and intermediate compaction before the HMAC temperature drops below 180 °F, unless otherwise directed or required based on the control strip. When the rolling causes tearing, displacement, cracking or shoving, make necessary changes in compaction temperature, type of compaction equipment, and rolling procedures.

- **Rolling** - Compact the HMAC with rollers conforming to 00744.24. Provide sufficient rollers of the types appropriate to compact the mixture while it is still within the specified temperature. Do not use equipment, which crushes the aggregate. Do not displace the line and grade of edges. Moisten steel roller wheels with a minimum amount of water, or other approved material, necessary to prevent the HMAC from sticking to them and spotting or defacing the HMAC.

  Operate rollers at a slow, uniform speed recommended by the manufacturer. Drive rolls or wheels shall be nearest the paver unless otherwise approved. Operate pneumatic rollers no faster than 3 mph. Operate vibratory rollers at frequencies of at least 2,000 vibrations per minute.

  Begin rolling at the sides and proceed longitudinally, parallel to the road centerline, gradually progressing to the center, unless otherwise directed. On superelevated curves, begin rolling at the low side and progress to the high side. When paving in echelon, or when abutting a previously placed lane, roll the longitudinal joint first, followed by the regular rolling pattern. Do not make sharp turns or park rollers on hot HMAC. Stop each pass at least 5 feet longitudinally from preceding stops.

  Perform finish rolling with rollers meeting the requirements of 00744.24(a) or 00744.24(b), and continue until all roller marks are eliminated.

- **Normal Pavement (Nominal Thickness 2 Inches or Greater):**
  Compliance with the density specifications for dense graded HMAC shall be determined by random testing of the compacted road surface with calibrated nuclear gauges. Construct a control strip at the beginning of work on each JMF on the project according to ODOT TM 306. The purpose of the control strip is to determine the maximum density that can be achieved for the JMF, paving conditions, and equipment on the project, and to establish a target density.

- **Establishing Target Density** - Determine the target density of the control strip according to ODOT TM 306 and WAQTC TM 8 by averaging the final results of five density tests taken with a nuclear gauge at random sites within the control strip selected according to ODOT TM 306.

- **Random Testing** - Determine the density by averaging five QC tests performed at random locations with the nuclear gauge operated in the backscatter mode. Test once for every 300-feet, but a minimum of 2-tests shall be required for lengths less than or equal to 300-feet. Do not locate the center of a density test less than 1 foot from the panel edge. Complete density testing before traffic is allowed on the new mat.

- **Compaction Requirement** - Compact the HMAC mixture to a density of at least 98.0% of the target density.

  Control of Operations - Stop paving if three consecutive control strips fail to achieve the target density. Take all necessary actions to resolve compaction problems. Do not resume paving without the approval of the Hubbard Public Works Department.

- **Test Results** - Provide density results to the Hubbard Public Works Department by the middle of the following working shift.

- **Thin Pavement** - Compaction to a specified density will not be required for leveling, patches, or where the nominal compacted thickness of a course of dense graded mixtures will be less than 2 inches.

Perform breakdown and intermediate rolling until the entire surface has been compacted by at least four coverages of the roller(s). Perform additional coverages, as directed, to obtain finish rolling of the HMAC.

END OF SECTION 02740

SECTION 02085

VALVES

PART 1 - GENERAL

RELATED SECTIONS:

Follow Section 02324 - Trench Excavation, Bedding and Backfill for trench excavation, bedding and backfill.

Follow Section 02513 - Water Distribution Pipe and Fittings for pipe and fittings.

Follow Section 02515 - Water Services and Meters for water services and meters.

Follow Section 02516 - Water System Disinfecting and Testing for disinfecting and testing.

QUALITY CONTROL:

Valves of the same style or type shall be furnished by a single manufacturer. Valves shall be installed in locations indicated on the drawings or by provisions of this section.

- Direct Buried Valves: Shall be mechanical joint (MJ).
- Exposed Valves (in vaults): Shall be flanged (F).

GATE VALVES (2" through 10"):

Valves shown 2" through 10" shall be gate valves conforming to AWWA C 509 (cast iron bodied), or C 515 (ductile iron bodied). Valves shall have resilient seats, non-rising stems, 2-inch square operating nuts, and be left hand (counterclockwise) opening. Valve stems shall seal by means of an "O" ring. Valves shall have the manufacturer's initials, pressure rating, and year of manufacture cast in the valve body.

BUTTERFLY VALVES:

Valves 12" and larger, shall be butterfly valves conforming to AWWA C 504, class 150 B, and rated by the manufacturer for 150 psi working (operating) pressures. Valves shall be suitable for direct burial with manual operators, fully gasketed, grease packed, and designed to with stand submersion in water to a pressure of 10 psi. The valve shall be left hand (counterclockwise) opening with a 2-inch square-operating nut. Minimum number of turns from fully open to fully closed shall be at least 2 turns per inch of valve size.

VALVE BOXES AND EXTENSIONS:

Paved Areas:

Valve boxes shall be Part No. VB910 cast iron valve box and cover marked "W" as manufactured by Olympic Foundry, Inc, Portland, OR, 971-281-3381, or equal. Valve box extensions shall conform to ASTM D3034, SDR 35.

Unpaved areas:

Valve boxes shall be No. 9VB-924B concrete valve box with cover No. 9VB-924C-P marked "WATER" as manufactured by Utility Vault® Wilsonville, OR, 503.682.2844, or equal. Valve box extensions shall conform to ASTM D3034, SDR 35.

DOUBLE CHECK VALVE ASSEMBLIES:

Double check valve assemblies shall consist of a bronze body with bronze caps. The body shall be a "Y" pattern design incorporating two spring loaded, center guided check assemblies. The assembly shall include threaded inlet and outlets, full port ball valve shutoff valves and four ball valve test cocks. All internal parts shall be corrosion resistant.

Double check valves shall be constructed so internal parts can be serviced without removing the assembly from the line. Seat discs shall be reversible. The assembly shall operate in any position, be rated to 175-PSI water working pressure, and water temperature from 32°F to 140°F. Assemblies shall conform to AWWA C510.

- Double check valve assemblies shall be Model 950XLT top access double check valve assembly as manufactured by Wilkins® Division of Zurn Industries, Inc., Paso Robles, CA (805.238.7100), or equal as approved by AWWA and the NSF.

AIR AND VACUUM VALVES:

Air and vacuum valves shall have cast iron bodies and covers with stainless steel floats, Buna N seats, and brass water diffusers.

Exterior bodies shall be painted. Valves shall be equipped with a double acting throttling device and be suitable for use on submersible pumps to release air and vacuum upon pump start up and stop. Valves shall be tapped with NPT threads.

METER BOXES FOR DOUBLE CHECK VALVE ASSEMBLIES:

Meter boxes shall be Number 66 as manufactured by Utility Vault™ Wilsonville, OR, 503.682.2844 or equal, with reinforced concrete cover and cast iron lids.

PART 3 - EXECUTION

INSTALLATION:

Install valves in accordance with manufacturer's instructions. Join pipe to valves as specified in Section 02513 - Water Distribution Pipe and Fittings.

VALVES:

Valves shall be installed so that the shafts are vertical. Joining procedures shall conform to applicable AWWA specifications.

VALVE BOXES:

Valve boxes shall be installed so as not to transmit shock or stress to the valve. The box cover shall be flush with the surface of the area in which installed. The valve-operating nut shall be readily accessible for operation through the opening in the box or vault.

- Valve boxes shall be centered on the valve shaft. Tracer wire shall rise on the outside of the extension until it reaches the valve box where it shall pass between the extension and valve box, terminating inside the box with at least 16" of excess wire coiled within the box.

METER BOXES:

Set meter boxes to line and grade.

DOUBLE CHECK VALVE ASSEMBLIES:

Double check valve assemblies shall be installed in meter boxes set to grade and line.

AIR AND VACUUM VALVES:

Air and vacuum valves risers shall terminate above ground.

END OF SECTION 02085

SECTION 02086

FIRE HYDRANTS AND BLOWOFFS

PART 1 - GENERAL

RELATED SECTIONS:

Follow Section 02324 - Trench Excavation, Bedding and Backfill for trench excavation, bedding and backfill.

Follow Section 02513 - Water Distribution Pipe and Fittings for pipe and fittings.

Follow Section 02085 - Valves for valves.

Follow Section 02516 - Disinfecting and Testing for disinfecting and testing.

PART 2 - PRODUCTS

HYDRANTS:

- Style: Conform to AWWA C502 requirements for, dry barrel, compression type fire hydrants with traffic model components.
- Ports: Hydrants shall be equipped with two 2½ N.S.T. bronze hose ports and one 4½ N.S.T. bronze steamer port. All ports shall be equipped with cast iron caps.
- Drain: Provide opening(s) at bottom of hydrant, to prevent water in barrel from freezing in cold weather.
- Inlet: Provide mechanical joint (MJ) conforming to AWWA C111/A21.11.
- Operating Stem: Provide 11/2-inch Pentagon, tapered, approximately 3/4-inch-wide on flats. Hydrant to open counterclockwise.
- Hydrostatic Test: Shall be capable of 150-psi working pressure and 300-psi test pressure.
- Lubrication of Operating Item: Provide by an oil or grease reservoir that is sealed from the water chamber. Hydrant design shall be such that water will not be permitted to enter the operating thread cavity.

MANUFACTURERS:

The City has standardized on products of the following manufacturers in accordance with ORS 279.017.

- Mueller Super Centurion 250 (Model A-423) as manufactured by Mueller Co., Decatur, IL (800.425.1213)

- Waterous 5-1/4" Pacer Traffic (Model WB67) as manufactured by American Flow Control, Birmingham, AL (205.325.7856)

- Kennedy 5-1/4" Guardian (Model K81D) as manufactured by Kennedy Valve Division of McWane, Elmira, NY (607.734.2211)

- M&H 5-1/4" Style 129 as manufactured by M & H Valve Company, Anniston, AL (256) 237-3521

EXTENSIONS:

Provide extensions, to set hydrant to proper grade.

- The breakaway flange shall be centered 8" above the edge of nearest pavement.

BASE BLOCK:

Provide solid precast concrete pier block having nominal dimensions of 16 inch x 16 inch x 8 inch.

GRAVEL FOR DRAINAGE:

Provide 3/4-inch crushed rock free of organic matter; sand, loam, clay, and other small particles that will tend to restrict water flow through the gravel.

CONCRETE FOR THRUST BLOCKING:

Provide a mix not leaner than 1 part cement, 2½ parts sand, 5 parts coarse aggregate, and just enough water to make a workable mix. Twenty-eight-day compressive strength shall be a minimum of 2,500 psi.

THRUST RESTRAINT, ADAPTORS, VALVE BOXES, VALVES, AND PIPE:

As shown on the standard details and specified in Section - Water Distribution Pipe and Fittings or Section - Valves.

BLOWOFFS:

GATE VALVES:

Follow Section 02085 Valves.

GALVANIZED PIPE:

Standard weight galvanized steel conforming to ASTM A53, with galvanized malleable iron fittings conforming to ASTM A47, Grade 32510 or 35018, with threads conforming to ANSI B16.4, Class 125.

PART 3 - EXECUTION

HYDRANT LOCATION AND POSITION:

Locate hydrants to provide complete accessibility to pedestrians. Improperly located hydrants or out of plumb hydrants shall be disconnected and reset.

- The steamer port shall point towards the public way.

OUT-OF-SERVICE HYDRANTS:

All new hydrants not yet activated and other hydrants that are out-of-service shall be completely bagged or covered in a manner that readily identifies the hydrant as inoperable. These bags will be removed by the City when activating the mains.

BASE BLOCKS:

Place on firm, level subbase to assure uniform support.

HYDRANTS:

Conform to provisions of appropriate Sections of AWWA C600.

- The depth of bury shall normally be 3 or 4 feet. Where conditions require greater depths, extensions shall be attached prior to installation.

Place carefully to prevent the base blocking from breaking. After hydrant is in place and connected to the pipeline, place temporary blocks to maintain the hydrant in a plumb position during subsequent work.

BLOWOFFS:

Conform to provisions of appropriate Sections of AWWA C600 and standard drawings.

Locate blowoffs to provide complete accessibility. Improperly located blowoffs shall be disconnected and reset.

THRUST BLOCKS:

Bearing surfaces shall rest against undisturbed soil. The required bearing areas for various soil bearing values are shown in the standard details.

END OF SECTION 02086

SECTION 02513

WATER DISTRIBUTION PIPE AND FITTINGS

PART 1 - GENERAL

RELATED SECTIONS:

Follow Section 02324 - Trench Excavation, Bedding and Backfill for trench excavation, bedding and backfill.

Follow Section 02085 - Valves for valves.

Follow Section 02516 - Testing and Disinfecting for testing and disinfecting.

PART 2 - PRODUCTS:

POLYVINYL CHLORIDE (PVC) PLASTIC PRESSURE PIPE:

PVC pressure pipe with diameters of 4 through 12 inches shall conform to AWWA C900, Class 165 (DR 25).

- All PVC pipe shall have elastomeric gasket joints conforming to ASTM D3139. Gaskets shall conform to ASTM F477.

TRACER WIRE

Tracer wire for nonmetallic pipe shall be stranded; #12 AWG minimum, with type THN or THWN insulation, color shall be blue.

SPLICES FOR TRACER WIRE:

Generally, tracer wire shall run continuously (without splices) between each valve box. In the event splices are required, because valve boxes are spaced greater than a full reel of wire or because of an accidental break in the wire, splices shall be made by means of the following:

- Provide DBY splice kit, part number 054007-09053, as manufactured by the Electrical Products Division of 3M, 800.926.6766, or equal.

FITTINGS:
Provide ductile iron fittings conforming to AWWA C153 (Ductile-Iron Compact Fittings). Cement lining shall conform to AWWA C104. All fittings shall have minimum pressure ratings of 150 psi. AWWA does not recommend the use of flanged fittings for buried applications.

- Direct Buried Fittings: Provide mechanical joint (MJ) fittings.
- Exposed Fittings: Provide flanged (F), fittings.

RETAINER GLANDS:

Retainer glands for restrained mechanical joint fittings and valves shall be Series 2000 PV Megalug (for AWWA C-900 PVC) retainer glands as manufactured by Ebaa Iron Sales, Inc., 800.433.1716, or approved equal.

ADAPTERS:

Adapters for direct restrained connection of mechanical joint valves and fittings shall be Foster Adapters as manufactured by Infact Corporation, 615.799.2198, or approved equal.

JOINT LUBRICANT:

Joint lubricant, when required, shall be in accordance with the pipe or joint manufacturer's recommendations and shall be water soluble and non-toxic.

NUTS, BOLTS AND WASHERS:

Unless otherwise noted all nuts, bolts and washers shall be ductile iron or zinc coated steel. Zinc coating shall be by the hot-dip process and shall conform to ASTM B6.

THRUST BLOCKS:

Portland cement concrete for thrust blocks shall attain a minimum compressive strength of 3,300 psi at 28 days.

PART 3 - EXECUTION

GENERAL:

The horizontal separation of a water main paralleling a sewer main shall be 10 feet and the water service shall be installed above the crown elevation of the sewer. When a water and sewer line crosses, the water line shall be higher than the sewer line and the vertical separation shall not be less than 18 inches. In addition, the water service shall be installed with no joints within 7 feet of the sewer. Where there is less than 18 inches of clearance, the sewer line shall be replaced with ductile iron pipe for 9 feet on each side of the crossing. Horizontal separation of 3 feet with all other utilities is required. Refer to OAR 333-061-0050 (10) *Crossings- Sanitary Sewer and Water Lines* for more information.

HANDLING AND STORAGE:

All material shall be handled with care to avoid damage. Material shall not be dropped, bumped, or allowed to impact on itself. Provide safe storage for material until it has been incorporated into the work. The interior of all pipe, couplings, rings, fittings, and other accessories shall be kept free from dirt and other foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing. Damaged materials shall be replaced.

ALIGNMENT AND GRADE:

All pipe shall be laid to and maintained at the lines and grades required by the Engineer. Fittings, valves, air vents, and hydrants (if any) shall be installed at the required locations with joints centered, spigots home, and valve and hydrant stems plumb.

PVC PIPE:

Installation of PVC pipe shall conform to AWWA C 605.

VALVES, FITTINGS, PLUGS AND CAPS:

Valves, fittings, plugs, and caps shall be set and joined to the pipe in the manner shown.

Valves shall be installed in conformance with manufacturer's instructions.

Valves shall not be used to bring misaligned pipe into alignment during installation.

THRUST BLOCKS:

Construct thrust blocks in accordance details and tables shown on the standard drawings. Soil bearing values shall be assumed to be 2,000 psf unless otherwise determined by the City Engineer.

TRACER WIRE FOR NONMETALLIC PIPE:

Tracer wire for nonmetallic pipe shall be placed on the side of the pipe and secured with duct tape at 10-foot intervals (5-feet from each standard length joint). Tracer wire shall be pulled taut with enough slack to install future service saddles. Splices shall be made with waterproof splice kits in strict accordance with the splice kit manufacturer's instructions. The location of all discontinuities requiring splices shall be reported to the Engineer who retains the right to require all tracer wire to be replaced, if excessive discontinuities are present. Tracer wire shall be tested for continuity and traceability by the City who shall report tests results promptly to the City Engineer.

END OF SECTION 02513

SECTION 02515

WATER SERVICES AND METERS

PART 1 - GENERAL

RELATED SECTIONS:

Follow Section 02324 - Trench Excavation, Bedding and Backfill for trench excavation, bedding and backfill.

Follow Section 02085 - Valves for valves, including backflow prevention devices.

Follow Section 02516 – Testing and Disinfecting for testing and disinfecting and testing.

PART 2 - PRODUCTS

WATER SERVICE PIPE:

Water service pipe shall be seamless copper tubing conforming to ASTM B88, Type K for potable water transmission.

- Pipe shall not be less than 3/4-inch.

SERVICE SADDLES:

Service saddles shall be AWWA taper thread made of epoxy coated ductile iron with stainless steel straps, washers, and nuts.

- Service saddles shall be as manufactured by Romac Industries, Inc., Bothell, WA (800.426.9341), as the City has standardized on products of this manufacturer in accordance with ORS 279.017.

- Provide Romac Model 101S on services up to 2" Model 202S on services greater than 2"

CORPORATION STOPS:

Corporation stops shall be ball style and conform to AWWA C800 (normal pressure) and ASTM B62 or B584, 3/4-inch minimum size and have AWWA taper inlets and packed compression outlets sized for seamless copper tubing conforming to ASTM B88, Type K.

- Corporation stops shall be as manufactured by any of the following:
  Mueller Co., Decatur, IL (800.425.1213)
  Ford Meter Box Company, Inc., Wabash, IN (219.563.3171)
  A.Y. McDonald Mfg. Co., Dubuque, IA (800.292.2737)

METER VALVES:

Provide ball style angle meter valves, conforming to AWWA C800 (normal pressure) and ASTM B62 or B584. Inlets shall packed compression type, sized for seamless copper tubing conforming to ASTM B88, Type K and have meter swivel nut outlets.

- Meter valves shall be as manufactured by any of the following:

  Mueller Co., Decatur, IL (800.425.1213)
  Ford Meter Box Company, Inc., Wabash, IN (219.563.3171)
  A.Y. McDonald Mfg. Co., Dubuque, IA (800.292.2737)

METERS:

Meters shall be Sensus SR II ™ or SR™ (for 1 1/2-inch and 2-inch services), and shall be of the "touch read" type as the City has standardized on products of this manufacturer in accordance with ORS 279.017

- The City will provide and install all meters on a time and material basis.

COUPLING TAIL PIECES AND SWIVEL NUTS:

Coupling tailpieces and swivel nuts shall be copper alloy conforming to AWWA C700 and be supplied with the meter by the meter manufacturer. The tailpiece shall sized according to the meter and be threaded NPT.

METER BOXES:

Meter boxes shall be as manufactured by Utility Vault™ Wilsonville, OR (503.682.2844), or equal, with reinforced concrete cover and cast iron "touch read" lids.

- Series 38 meter boxes shall be used for 5/8-inch x 3/4-inch and 1-inch meters.
- Series 66 meter boxes shall be used for 1 1/2-inch and 2-inch meters.

LARGE METER INSTALLATIONS (3 INCHES AND LARGER):

Vaults for meter installations 3-inch and larger shall be as manufactured by Utility Vault™ (503.682.2844) Model 575 Solid Wall with 57-T-2-332P locking galvanized steel doors centered over the meter, or equal. Each vault shall have a permanently installed ladder located for safe access without being a hindrance when installing, removing, or testing the meter. The pipe entering the vault shall enter with the bottom of the pipe being at a minimum of 12 inches and a maximum of 30 inches from the vault floor. Elbows, tees, and crosses shall be no closer than 10 pipe diameters of straight pipe of the same nominal diameter as the meter upstream and 5 diameters downstream. All joints in the vault and openings for the pipe shall be sealed watertight. A perimeter drainage system shall be installed.

PART 3 - EXECUTION

GENERAL:

The horizontal separation between water services paralleling a sewer line shall be 10 feet and the water service shall be installed above the crown elevation of the sewer. When a water and sewer line crosses, the water line shall be higher than the sewer line and the vertical separation shall not be less than 18 inches. In addition, the water service shall be installed with no joints within 7 feet of the sewer. Where there is less than 18 inches of clearance, the sewer line shall be replaced with ductile iron pipe for 9 feet on each side of the crossing. Horizontal separation of 3 feet with all other utilities is required. Refer to OAR 333-061-0050 (10) *Crossings - Sanitary Sewer and Water Lines* for more information.

- Follow Section 02700 - Sewer Pipe and Fittings for ductile iron pipe sanitary sewer replacement.

All taps will be made at a position of 10 o'clock or 2 o'clock.

Threaded fittings shall be connected with the aid of TeflonJ tape.

Service connections will extend to and include the meter valve and meter box.

BORING OR PUSHING:

Services shall be bored or pushed under existing pavements unless otherwise approved by the City Engineer.

PIPE:

Provide and use proper tools for the safe and convenient prosecution of work. Handle materials to prevent damage.

Clean pipe and fittings and wire brush if necessary. Wipe pipe clean and dry and free from oil, dirt, grease, and other foreign matter.

Do not allow foreign material to enter the pipe while being placed.

- When pipe laying is not in progress, close open ends of pipe with a watertight plug. **Do not allow trench water or animals to enter the pipe.** These provisions shall apply during breaks and lunch hours as well as overnight. If water is in the trench, keep the plug in place until the trench is pumped dry. Do not lay pipe in water or when in the opinion of the Engineer, trench conditions are unsuitable

Cut pipe for inserting valves, fittings, or closure pieces in a neat and workmanlike manner without damaging the pipe, fittings, or interior coatings, and leave a smooth end at right angles to the axis of the pipe. Dress cut ends of pipe to remove sharp edges or projections, which may damage fittings or valves.

HYDROSTATIC TESTING:

Services shall be testing concurrently with the main. Leakage on any service line shall be corrected to the satisfaction of the City Engineer.

END OF SECTION 02515

SECTION 02516

WATER SYSTEM TESTING AND DISINFECTING

PART 1 - GENERAL

RELATED SECTIONS:

Follow Section 02513 - Water Distribution Pipe and Fittings for pipe and fittings.

Follow Section 02515 - Water Services and Meters for water services and meters.

Follow Section 02085 - Valves for valves.

Follow Section 02086 - Fire Hydrants and Valves for fire hydrants and valves.

PART 2 - PRODUCTS

Provide all temporary appurtenances and equipment required for testing and disinfecting.

PART 3 - EXECUTION:

The Developer shall perform pressure tests for pressure piping. The Engineer shall witness all testing procedures.

PRESSURE PIPING:

All AWWA C900 pressure piping, interior and exterior, shall be tested under 150 PSI hydrostatic pressure. Test shall be made after the pipe has been installed, and the test pressure shall be maintained for a minimum of two hours or as required to permit inspection of the system. During the test, pipe, fittings, and valves with flanged joints shall be completely tight. Pipe, fittings, and valves with mechanical joints shall have a measured loss not to exceed the rate given in the following formula:

$L = ND(P)^{1/2}/7,400$ (Note: formula valid for AWWA C900 only)

Where:

L = Allowable leakage in gallons per hour
N = Number of joints in the length of line tested.
D = Nominal diameter of pipe in inches
P = Average test pressure during the test in pound per square inch (gauge)

DISINFECTING:

The Developer will perform disinfecting. Laboratory test samples will be taken and delivered to the lab by the Developer. Cost of testing will be borne by the Developer.

- After pressure testing and repairing where necessary, all potable water piping shall be thoroughly flushed, cleaned, and disinfected by the Developer in accordance with the following:

  Oregon State Health Department - Drinking Water Section Regulations.

  AWWA C 651

The developer shall dispose of chlorinated water in accordance with Appendix B of AWWA C651 and Department of Environment Quality (DEQ) regulations.

Check with the City of Hubbard Sewer Department for conditions of disposal into a sanitary sewer.

END OF SECTION 02516

SECTION 02082

MANHOLES AND CATCH BASINS

PART 1 - GENERAL

RELATED SECTIONS:

Follow Section 02202 - Aggregate Base for aggregate base material.

Follow Section 02210 - Trench Excavation, Bedding, and Backfill for excavation and backfill requirements.

Follow Section 02700 - Sewer Pipe and Fittings for sewer pipe and fittings.

Follow Section 02750 - Work on Existing Sewers for work on existing sewers.

PART 2 - PRODUCTS

FOUNDATION STABILIZATION MATERIAL:

Follow Section 02210 Trench Excavation, Bedding, and Backfill for trench stabilization material herein referred to as foundation stabilization material.

AGGREGATE BASE:

Follow Section 02202 - Aggregate Base for aggregate base material.

FORMS:

Forms shall be steel or plywood.

MANHOLES:

Precast Manhole Sections: Provide sections conforming to the details shown and ASTM C478. Manhole cone sections shall have the same wall thickness as barrel sections and conform to all the requirements of ASTM C478 except steel reinforcement may be replaced with Fibermesh® I or equal. The minimum length of the fibers shall be 2 inches with a minimum of 1.6 pounds of fiber per cubic yard of concrete. Top and bottom of all sections shall be parallel.

- Prior to the delivery, conduct yard permeability tests at the point of manufacture. The sections to be tested will be selected at random from the stockpiled material which is to be supplied for the job. All test specimens will be mat tested, and shall meet the permeability test requirements of ASTM C14 and ASTM C497.

- Precast base sections may be used provided all details of construction are approved prior to fabrication.

Manhole Grade Rings: Concrete grade rings for extensions shall be a maximum of 6-inches high.

Joint Materials:

Mortar shall conform to the requirements of ASTM C387, or be proportioned one part Portland cement to two parts clean, well-graded sand that will pass a 1/2-inch screen. Admixtures may be used not exceeding the following percentages of weight of cement: hydrated lime, 10 percent; diatomaceous earth, or other inert materials, 5 percent. The consistency of the mortar shall be such that it will readily adhere to the precast concrete if using the standard tongue-and-groove type joint. Mortar mixed for longer than 30 minutes shall not be used.

Non-metallic cementitious commercial grout shall exhibit zero shrinkage per ASTM C27. Grout shall not be amended with cement or sand and shall not be reconditioned with water after initial mixing. Unused grout shall be discarded after 20 minutes and shall not be used.

- Non-shrink grouts shall be placed or packed only with the use of an approved commercial concrete bonding agent applied to all cured concrete surfaces being grouted. The bonding agent shall be compatible with the brand of grout used. Water shall not be used as a substitute for the commercial bonding agent.

- Non-shrink grout shall be equal to Sika 212, Euco N-S, or Five-Star.

Preformed Flexible Joint Sealants shall conform to ASTM C990.

Rubber Gaskets shall conform to ASTM C443.

Flexible Pipe to Manhole Connectors:

Manufacturers offering approved Flexible Pipe to Manhole Connectors include the following:

A-Lok®-XP™, A-LOK Products, Inc., Tullytown, PA, 800.822.2565
Kor-N-Seal®, NPC Inc., Milford, NH 603.673.8680

Field-fabricated water stops or improvised connectors shall not be used.

MANHOLE FRAMES AND COVERS:

General:

Castings shall be true to size, weight and tolerances shown in the standard details. Delivered weight shall be ± 5 percent of the specified weight. Bearing seats shall not rock when checked by the test jig. Castings shall be free of porosity, shrink cavities, cold shuts, or cracks, or any defects that would impair serviceability. **Repair of defects by welding, or any other method will not be permitted.** Castings shall be shot or sandblasted. Application of paint or other coating will not be permitted. Casting shall have distinctly cast initials of the manufacturer and the year of manufacture with characters having a minimum 1 1/4-inch height and an 1/8-inch relief.

Materials:

Conform to ASTM A48, Class 30B, Test Bar B.

- Foundry shall certify that the casting was made, sampled, tested, and inspected in accordance with ASTM A48.

CATCH BASINS:

Provide cast-in-place catch basins as shown in the standard details.

- Concrete for catch basins shall obtain 3,300-psi compressive strength in 28 days.

STANDARD FRAMES AND GRATES FOR CATCH BASINS:

Type 1 & 2 Catch Basins: Frames and grates for Type 1 & 2 Catch Basins shall cast iron or cast steel conforming to ASTM A48, Class 30B, Test Bar B or, ASTM A27, Class 65-35 respectively, in accordance with the standard details. Bearing seats shall not rock when checked by the test jig. Castings shall be free of porosity, shrink cavities, cold shuts, or cracks, or any defects that would impair serviceability. **Repair of defects by welding, or any other method will not be permitted.** All castings shall be shot or sandblasted. Application of paint or other coating will not be permitted. Castings shall have distinctly cast initials of the manufacturer and the year of manufacture with characters having a minimum 1 1/4-inch height and a 1/8-inch relief.

Type 3 Catch Basins: Frames and grates for Type 3 Catch Basins shall be fabricated of steel conforming to ASTM A6, A36, or A573 in accordance with the standard details. All connections shall be welded. Welding shall conform to requirements of the current code for welding in building construction of the American Welding Society. Frames and gratings shall be tested one within the other and there shall be no more than 1/16-inch rock. When checked by a test jig, the bearing seat of either component shall have no more than 1/16-inch rock. Test jigs shall be furnished by the fabricator.

PIPE AND FITTINGS:

Conform to requirements of Section 02700 - Sewer Pipe And Fittings.

PART 3 - EXECUTION

EXCAVATION AND BACKFILL:

Conform to applicable provisions of Section 02210 Trench Excavation Bedding, and Backfill for manhole and catch basin excavation and backfill requirements. Backfill around manholes and catch basins shall be of the same quality as the trench backfill immediately adjacent.

FOUNDATION STABILIZATION MATERIAL:

If material in bottom of excavation is unsuitable for supporting manholes and catch basins, excavate below subgrade and backfill to required grade with Trench Stabilization Material as specified in Section 02210 Trench Excavation, Bedding, and Backfill.

AGGREGATE BASE:

Place aggregate base thoroughly compacted to the required thickness and density.

MANHOLES:

Base and Sections:

Construct manholes as shown on the standard details. Consolidate the concrete base by vibrating or working as approved and screed to provide a level, uniform bearing for precast sections.

- Construct manhole inverts with smooth transitions to ensure an unobstructed flow through manhole. Where a full section of pipe is laid through a manhole, break out the top section to the full width of pipe and diameter of the manhole. Cover exposed edges of pipe completely with mortar. Trowel all mortar surfaces smooth.

Deposit sufficient mortar on base to assure watertight seal between base and manhole sections or place the first section in cast-in-place concrete base before concrete has set.

- First section shall be properly located and plumb.

- When installing a precast base or assembling precast manhole sections, use preformed flexible joint sealants or rubber gaskets at joints to provide a compression seal that will be watertight when complete. Grout the joint at the inside surface to provide a smooth surface.

- All lift holes shall be thoroughly wetted, then completely filled with mortar, and smoothed and pointed both inside and out to ensure watertightness.

Preformed flexible joint sealants or rubber gaskets shall be used on all sanitary manholes. Mortar will be allowed on storm manholes, and on 24-inch extension rings above cones. All mortar joints between precast elements shall be thoroughly wetted, then completely filled with mortar. On future street grades, a minimum of one 24-inch precast riser will be required between the cone and manhole cover frame.

When a keyed joint is used, it is the intent that the void between the tongue-and-groove be completely filled with mortar and that the interior and exterior surfaces of the joint be seated fully on the previously placed section.

Prevent mortar from drying out; cure by applying an approved curing compound or comparable method. Chip out and replace all cracked or defective mortar. Other types of jointing materials may be used in lieu of mortar only when approved by the City Engineer.

Preformed flexible joint sealants or rubber gaskets shall be installed in strict accordance with the manufacturer's recommendations. Primer, if recommended, shall be approved by the sealant or gasket manufacturer. When using sealants or gaskets, manhole sections with chips or cracks in the jointing surfaces shall not be used. Completed manholes shall be rigid and all sanitary sewers manholes shall pass the hydrostatic test.

Pipe Connections:

Special care shall be taken to assure pipe openings are watertight. All pipe shall be connected to manholes according to the manufacturer's recommendations. All pipe entering or leaving the manhole shall be provided with flexible joints within 1-foot of the manhole structure and shall be placed on firmly compacted bedding.

- Concrete pipe connections to sanitary manholes shall be grouted watertight with non-shrink grout.

- PVC pipe shall be connected to sanitary manholes using an approved adapter specifically manufactured for the intended service. Adapters requiring the use of grout for installation shall be anchored and finished using non-shrink grout.

PIPE STUBOUTS:

Install pipe stubouts for future connections at manholes where shown. Grout pipes into manhole walls or manhole base to provide watertight seal around pipes. Provide plugged ends on all stubouts.

MANHOLE GRADE RINGS:

Manhole grade rings shall be installed in such a manner as to prevent infiltration of surface or ground water between the grade rings and the manhole section. All mortared manhole joints shall be constructed using an approved commercial concrete bonding agent applied to all cured concrete surfaces being mortared.

Install grade rings as shown to the height directed. Lay grade rings in mortar with sides plumb and tops level. Seal joints with mortar as specified for manhole sections. Extensions shall be watertight.

Finish grade for manhole covers shall conform to finished ground or street surface.

MANHOLE FRAME AND COVERS:

Manhole frames and covers shall be installed in such a manner as to prevent infiltration of surface or ground water between the frame and the concrete of the manhole section. All mortared sanitary sewer manhole frames shall be constructed using an approved commercial concrete bonding agent applied to all cured concrete surfaces being mortared.

Set frames in a bed of mortar with the mortar carried over the flange of the frame as shown. Set frames so tops of covers are flush with surface of adjoining pavement or ground surface, unless otherwise shown or directed.

SANITARY SEWER MANHOLE HOLE VACUUM TESTING:

Sanitary sewer manholes shall be tested for acceptance after the trench has been backfilled, compaction requirements have been met, road base rock has been installed and the street paved. If the manholes have passed the tests and the castings have been disturbed by construction activities and need to be reinstalled, the manholes shall be re-tested.

Furnish all necessary testing equipment and perform the tests in a manner satisfactory to the City Engineer. Any arrangement of testing equipment that will provide observable and accurate measurements of air leakage under the specified conditions will be permitted. Gauges for air testing shall be calibrated with a standardized test gauge.

The test will consist of plugging all inlets and outlets. The test head shall be placed at the inside of the top of the cone shall include grade rings and castings, and the seal inflated in accordance with the manufacturer's recommendations. A vacuum of 10-inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 9-inches. The manhole shall pass if the time for the vacuum reading to drop to 9-inches meets or exceeds the values indicated in the table on the following page:

VACUUM TESTING TABLE

Depth of Manhole in Feet	Allowable Time By Diameter (seconds)		
	48-inch	60-inch	72-inch
8	20	26	33
10	25	33	41
12	30	39	49
14	35	46	57
16	40	52	65
18	45	59	73
20	50	65	81
22	55	72	89
24	59	78	97
26	64	85	105
28	69	91	113
30	74	98	121

Repair all manholes that do not meet the leakage test, or are unsatisfactory from visual inspection, to conform to the requirements herein.

CAST-IN-PLACE CATCH BASINS:

Conform to details shown and with applicable provisions herein.

Remove and keep all water clear from the excavation. Construct forms to the dimensions and elevations required. Forms shall be tight and well braced. Remove all water and foreign material from the forms prior to placing the concrete. Moisten forms just prior to placement. Bar splices shall be 24 diameters, but in no case less than 12 inches. Wire tie all splices and intersections. Obtain approval prior to placing concrete.

Place concrete so that there is no segregation of the aggregate and vibrate or work concrete as approved to prevent rock pockets. **Do not place concrete when the ambient temperature is below 40 degrees Fahrenheit without special protection as approved.** Screed the top surface of the exposed slabs and trowel to a smooth finish free from marks or irregularities. Finish exposed edges with a steel-edging tool. Cure concrete for seven days in an approved manner. After removal of the forms, patch all rock pockets, form tie holes, and irregularities with a stiff mixture of Portland cement and sand mixed in the same proportion as the original mix. Finish exposed walls to produce a uniform, flat surface. Protect concrete from damage during the seven-day curing period.

CATCH BASIN FRAMES AND GRATES:

Set frames and grates at elevations shown.. Frames may be cast in, or shall be set in mortar. Bearing surfaces shall be clean and provide uniform contact. Anchor bolts and other fastenings shall be firmly bedded in concrete or otherwise secured as approved.

CLEANOUTS:

Install cleanouts using valve boxes as specified under Section 02610 - Valves. Lids shall have 1-inch high letters "C.O." cast as standard with the manufacturer. Cleanouts shall include the wye, 1/8 bend, riser section, valve box and cover, concrete frame encasement, pavement removal (if any) and replacement, and excavation and backfill.

CLEANING:

Clean each structure of all silt, debris, and foreign matter upon completion.

END OF SECTION 02740

SECTION 02700

SEWER PIPE AND FITTINGS

PART 1 - GENERAL

RELATED SECTIONS:

Follow Section 02210 – Trench Excavation, Bedding and Backfill for trench excavation, bedding and backfill requirements.

Follow Section 02082 –Manholes and Catch Basins for manholes and catch basins.

Follow Section 02750 –Work on Existing Sewers for work on existing sewers.

PART 2 - PRODUCTS

GENERAL:

Tracer wire and tracer wire splices required for non-metallic pipe shall be as specified in Section 02600 - Water Pipe and Fittings except:

- Tracer Wire for sewer pipe shall be green in color

Tee or wye fittings shall be provided in the sewer main for services. Fittings shall be of sufficient strength to withstand all handling and load stresses encountered. Fittings shall be of the same materials as the pipe.

Fittings shall be capped or plugged and gasketed with the same gasket material as used in the pipe joint, fitted with an approved mechanical stopper, or have an integrally cast knockout plug. The cap or plug shall be capable of withstanding test pressures without leaking and, when later removed, shall permit continuation of piping with jointing similar to joints in the installed line.

POLYVINYL CHLORIDE (PVC) PIPE (FOR GRAVITY MAINS):

PVC pipe shall conform to ASTM D3034 and have an SDR of 35.

PVC JOINING MATERIALS:

Gaskets for PVC pipe shall conform to the requirements of ASTM D3212 and F477.

PVC FITTINGS:

Fittings shall conform to applicable portions of ASTM D3034. Fitting joints shall be the same as pipe joints.

DUCTILE-IRON PIPE AND FITTINGS (FOR FORCE MAINS):

Ductile-iron pipe shall be cement-mortar lined and seal-coated and conform with ASTM 536, AWWA C151 (Ductile-Iron Pipe, Centrifugal Cast for Water and Other Liquids), AWWA C104 (Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water), and AWWA C111 (Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings). Ductile-iron pipe shall be Class 150. Fittings shall have mechanical joints, or restrained mechanical joints.

PART 3 - EXECUTION

INSTALLATION:

Comply with manufacturer's instructions for installation of pipe and fittings.

LINE AND GRADE:

Variance from established line and grade shall not be greater than 1/32 inch per inch of pipe diameter and not to exceed 1/2 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 1/2inch maximum.

PIPE DISTRIBUTION AND HANDLING:

Unload and distribute pipe in strict adherence to the manufacturer's printed instructions and recommendations.

Pipe and fittings shall be inspected prior to lowering into the trench to insure cracked, broken, or otherwise defective materials are not used. Clean ends of pipe thoroughly, remove foreign matter and dirt from inside of pipe, and keep the pipe clean during laying and joining operations.

LAYING PIPE ON CURVES:

Lay pipe on horizontal or vertical curves in accordance with the manufacturer's instructions and recommendations.

CONCRETE CLOSURE COLLARS:

Concrete closure collars (if required) shall be used only when approved by the City Engineer, and then only to make connections between dissimilar pipe or where standard rubber gasketed joints are impractical. The collars shall be placed using an approved commercial concrete bonding agent applied to all surfaces in contact with the collar. Where concrete closure collars are necessary to join PVC pipe, the PVC surface shall first be prepared for bonding to the concrete by applying a dense coating of clean mortar sand to the pipe using PVC solvent cement. After the cement has cured, an approved commercial concrete bonding agent shall be applied to the sand surface prior to placement of the concrete.

SERVICE TEES AND WYES:

Provide a compacted base of pipe bedding material under all service tees, wyes and branch fittings, extending to the spring line of the fittings.

Service lines may not be connected to manholes.

All service lines shall be capped with watertight plugs or caps suitable for resisting the pressures of hydrostatic or air testing.

The maximum line or grade change accomplished with any one fitting shall not exceed 45 degrees and shall be accomplished with long radius curves or bends.

- The sum of the fittings in degrees shall not exceed 135° in any run without installing a cleanout.

GENERAL PIPE PLACING AND JOINING:

Pipe laying shall proceed upgrade with spigot ends facing the direction of flow. Joints shall be assembled in accordance with the recommendations of the pipe manufacturer. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between joints.

Prevent excavated or other foreign material from entering the pipe. Plug or close off pipes that are stubbed off for future connection. When cutting and/or machining of pipe is necessary, use only the tools and methods recommended by the pipe manufacturer.

PVC PIPE:

The pipe shall be joined in conformance with the manufacturer's instructions and recommendations.

Cut pipe in a neat manner, at right angles to the axis of the pipe, and shall dress the cut end in conformance with the pipe manufacturer's instructions and recommendations.

DEFLECTION AT JOINTS:

When deflecting the pipe from a straight line, either in the vertical or horizontal plane, the amount of deflection shall not exceed that recommended by the pipe manufacturer.

REQUIREMENTS PRIOR TO TESTS:

All gravity systems and appurtenances shall successfully pass an air test prior to acceptance and shall be free of visible infiltration of water.

- Manholes shall be tested as specified in Section 02082 – Manholes and Catch Basins.

All tests shall be witnessed by the City Engineer or Public Works Superintendent.

PLUGGING OF TEES, WYES, STUBS, AND SERVICE CONNECTIONS:

Plug all wyes, tees, stubs, and service connections with gasketed caps or plugs securely fastened or blocked to withstand test pressures.

TESTING EQUIPMENT:

Furnish all necessary testing equipment and perform the tests in a manner satisfactory to the City Engineer. Any arrangement of testing equipment that will provide observable and accurate measurements of air leakage under specified conditions will be permitted. Gauges shall be calibrated and certified to the satisfaction of the Engineer. Calibration certifications shall be available for each gauge.

CLEANING AND FLOW DIVERSION:

Prior to the testing and inspection of the system, flush and clean all parts of the system and remove all debris to the satisfaction of the City Engineer or Public Works Superintendent.

- Divert all upstream flows and flows tributary to each section of sewer being inspected.

PIPE AND JOINT TESTING:

After completion of the system, including service connections, and backfilling and compaction, conduct a low-pressure air test. Provide all equipment and personnel for testing. Tests shall be conducted during normal working hours.

The method, equipment, and personnel used in testing shall be subject to the approval of the City Engineer. The City Engineer may, at any time, require a calibration check of the instrumentation used. The City Engineer may require testing of manhole-to-manhole sections as they are completed in order to expedite the acceptance of the system and allow connections.

SAFETY PRECAUTIONS:

Only qualified and experienced personnel will be permitted to conduct the test. All plugs used to close the sewer for the testing shall be capable of resisting the expected internal pressures and shall be securely braced.

Testing equipment shall be placed above ground. Personnel will not be permitted to enter a manhole or trench while a line is pressurized. Air pressure shall be released before plugs are removed.

AIR TESTING:

The pressure gauge used in air testing shall have minimum divisions of 0.10 psi and have an accuracy of 0.0625 psi (one ounce per square inch). Air shall pass through a single control panel. Joints may be exposed to facilitate leak detection.

- The Contractor may wet the lines prior to testing.

Air testing shall be by the Time Pressure Drop Method. The test procedures are described as follows:

- If present, determine the average height of ground water over the line. The 4.0 psig required test pressure shall be increased 0.433 psi for each foot of average water depth over the exterior crown of the pipe.

- Add air slowly to the section of system being tested until the internal air pressure is raised to 4.0 psi. Increase test pressure 0.433 psi for each foot of average ground water depth over pipe crown.

- After the test pressure is reached, allow at least two minutes for the air temperature to stabilize, adding only the amount of air required to maintain test pressure.

- After the two-minute period, disconnect the air supply.

- The sewer will be considered acceptable if the test pressure holds 4.0 psi (or more if ground water is present) for 15 minutes.

DEFLECTION TESTING FOR FLEXIBLE PIPE:

For pipe laid straight between manholes, a set of mirrors, approved by the City Engineer, shall be used to direct and observe sunlight through the pipe. A "full moon" visible in the observation mirror shall render the line acceptable.

For pipe laid through horizontal or vertical curves, the deflection testing shall be conducted by pulling a mandrel, approved by the City Engineer, through the completed pipeline. The diameter of the mandrel shall be 95 percent of the pipe inside diameter.

Testing shall be conducted on a manhole-to-manhole basis and shall be done after the line has been completely flushed out with water. The test shall be conducted not less than 30 days after the trench backfill and compaction has been completed and may be conducted concurrently with television inspection.

TELEVISION INSPECTION:

Upon completion of all sewer construction, air and deflection testing and repairs, conduct a TV inspection of all installed lines.

- Inspections shall be in color and shall be conducted in a season of high groundwater condition.

Written reports shall be made at the time of the television inspection. The reports shall include identification of individual groundwater infiltration sources such as sewer laterals, building sewer connections, and construction defects.

Television inspection shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed circuit color television. Television inspection shall include the following:

- Calibrate camera above ground in the presence of the City Engineer or Public Works Superintendent each day.

  Camera shall have a rotating head; equipment shall produce color videotapes.

- Submit videotape directly to the City Engineer immediately after inspection.

  Provide original videotape upon completion of each section of sewer with a voice description, as appropriate, concordant with stationing of services indicated. Data and stationing shall be provided on video.

Videotapes shall become property of the City. Should any portion of the videotape be of inadequate quality or coverage, as determined by the City Engineer, have the portion re-video taped.

REPAIRS:

Locate and repair any sections failing to pass the required tests and inspections and repeat the specified tests and inspections on those sections.

Following a successful air test, visible infiltration of ground water in any section shall be considered evidence that the original test was in error or that failure of the section has occurred. Correct such failures, and retest the repaired sections.

END OF SECTION 02700

SECTION 02750

WORK ON EXISTING SANITARY SEWERS AND STORM DRAINS

PART 1 - GENERAL

Follow Section 02210 – Trench Excavation, Bedding and Backfill for trench excavation, bedding and backfill requirements.

Follow Section 02700 – Sewer Pipe and Fittings for sewer pipe and fittings.

Follow Section 02082 – Manholes and Catch Basins for manholes and catch basins.

PART 2 - PRODUCTS

Provide products as specified in applicable Series 02700 Sections and as specified in Part 3 - Execution of this section.

PART 3 - EXECUTION

SCREENING MANHOLES:

Prior to excavation install a 1.5-inch x 14 ga. expanded metal screen, or equal, on the outlet of a manhole downstream of the construction work to prevent debris and other foreign objects from entering the sanitary/storm sewer system. The screen shall remain in-place until excavation is backfilled and/or when work is being done in an upstream manhole.

- Prior to the end of the workday enter, inspect, and clean the screening manhole. Additionally, the screen shall be maintained in such a way that sewer/drain flow is accommodated at all times.

- The Developer will be charged for all maintenance expenses and/or damage resulting from entry of debris or foreign objects into the sanitary/storm sewer facilities of the City.

MANHOLES OVER EXISTING SEWERS:

Advise City Engineer of plans for diverting sewage flow and obtain approval before starting. Approval does not relieve Developer of his responsibility for maintaining adequate capacity for flow at all times and adequately protecting new and existing work.

Manholes shall be constructed over existing concrete sanitary sewers after first cleaning and applying approved commercial concrete bonding agent to all surfaces of the pipe that will be in contact with the manhole. Manholes shall be constructed over existing PVC sanitary sewers after first applying a dense coating of clean mortar sand to all pipe

surfaces that will be in contact with the manhole, using PVC solvent cement. After the cement has cured, a commercial concrete bonding agent shall be applied to the sand prior to placement of concrete.

- Sanitary sewer manholes shall be tested in accordance with Section 02080 – Manholes and Catch Basins.

- After completion of the manhole test, the top of the pipe shall be broken out to the spring line for the full width of the manhole. The exposed edge of the pipe shall be smoothed and pointed with mortar.

- Prevent broken material or debris from entering sewer flow. Maintain flow through existing sewerlines at all times. Protect new concrete and mortar for a period of seven days after placing.

CONNECTION TO EXISTING MANHOLES:

Construct openings in the existing manhole base or sections as required and construct connections that are watertight and will provide a smooth flow into and through the manhole. All sanitary sewer pipe connections, including those at invert level as well as penetrations for drop connectors, conduits, and carry-throughs, shall conform to these requirements.

Provide all diversion facilities and perform work necessary to maintain sewage flow in existing sewers during connection to the manhole. Break out existing manhole base for new flow channel and core drill existing manhole wall as necessary to accept new pipe. Grout in new pipe to provide watertight seal. All pipe connections to the manhole shall be watertight and shall preclude infiltration by inclusion of an elastomeric seal/waterstop unit grouted to or into the manhole. Repair any damage to existing base and channels.

Exercise caution in chipping out existing concrete base to prevent cracking of manhole walls. Prevent all material from entering the sewer flow. Pour new base to a minimum of 6 inches below the lowest projection of the pipe. Construct new channels conforming to standard details for channel construction. Repair cracks which occur as a result of work operations with new grout to form a watertight seal.

CONNECT PIPE TO EXISTING CATCH BASINS:

Break into existing catch basin and grout in a watertight seal between the new pipe and inlet wall.

MAINTENANCE OF FLOW IN EXISTING SEWERS:

The flow in the existing sanitary sewer may be restricted and/or pumped around the work site during construction as approved by the City Engineer. Flow shall be restored at the end of each day. Provide equipment and perform work required to divert flow around the

sections of pipes and manholes requiring diversion during construction of new and/or connection to existing manholes and gravity mains. The diversion shall be made by plugging the line at an existing upstream manhole and pumping the flow into a downstream manhole or adjacent system. The pump and bypass lines shall be of watertight construction, and of adequate capacity and size to handle the flow. Bypass volumes may vary throughout the sewer system and during the day. Be responsible for and provide pumps capable of handling the maximum flows.

Discharge or spillage of sewage onto or into the ground and bypassing of sewage to surface waters or drainage courses is prohibited. Penalties imposed on the City because of any bypass caused by the actions of the Developer, shall be borne in full by the Developer, including legal fees and other expenses of the City resulting directly or indirectly from the bypass.

The following restrictions shall apply to sewer services and reconnections:

- Dwelling occupants shall be notified in writing 48 hours in advance of sewer service interruptions. The notice shall include the following items:

  Day and date of prospective service interruption.
  Estimated time, in hours, sewer service will be interrupted.
  Approximate time service interruption will begin.

  A written record of these notifications shall be maintained and turned over to the City each day.

- No buildings shall be without sewer service longer than five hours in one day.

SAFETY:

Working in sewers and manholes where organic material is present may result in the formation of hydrogen sulfide gases. Hydrogen sulfide gas can be toxic in high concentrations. In addition, in high concentrations, hydrogen sulfide gas is odorless; therefore, it is not detectable without specialized equipment. Provide gas detection equipment that will detect the presence of hydrogen sulfide gas and/or the lack of oxygen. Provide ventilation equipment to insure that hazardous gases or conditions are eliminated prior to workers entering existing sewer manholes or sewer lines. Ensure that all personnel entering manholes wear a harness with attached safety line so that said personnel can be removed from the manhole if he/she is unable to climb out unassisted.

END OF SECTION 02750

CHAPTER 4

STANDARD DETAILS

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412 Main Line Chlorination Assembly
413 Fire Hydrant Installation
414 1-1/2" or 2" Domestic and Irrigation Water Service Installation
415 Automatic Meter Reader Lid

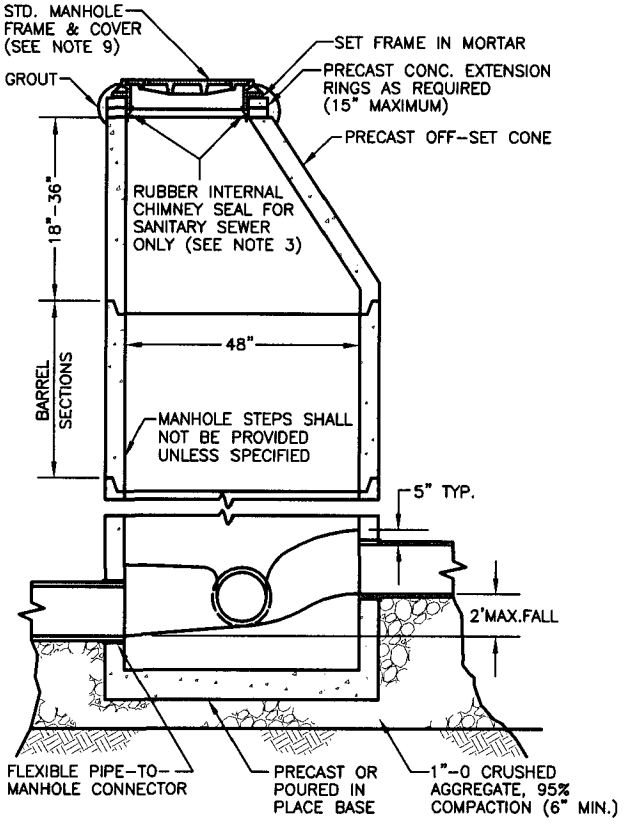
Miscellaneous

601 Pipe Trench
605 Pipe Zone

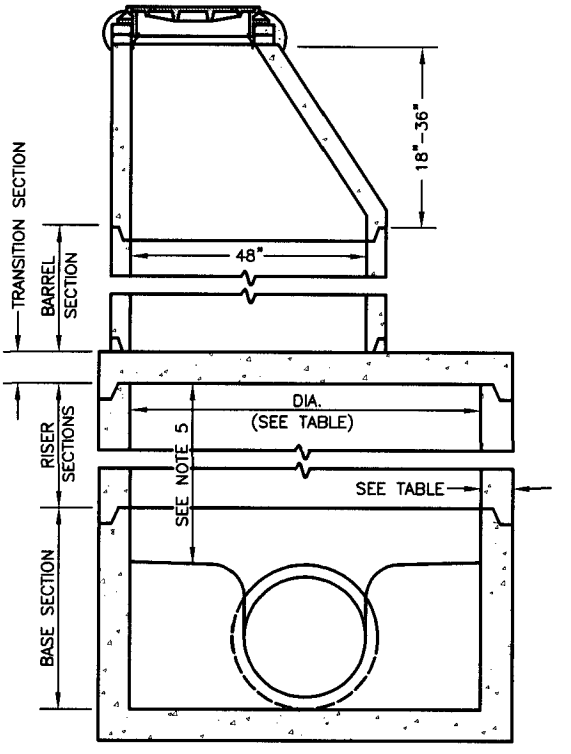
TABLE		
PIPE SIZE	MANHOLE DIAMETER	WALL THICKNESS
≤21"	48"	5"
24"–30"	60"	6"
36"–42"	72"	7"
48"–54"	84"	8"

NOTES:

1. CONCENTRIC CONE ALLOWED ONLY WHEN SPECIFIED.
2. FLEXIBLE PIPE–TO–MANHOLE CONNECTIONS SHALL BE INSTALLED ACCORDING TO MANUFACTURES SPECIFICATIONS.
3. INTERNAL RUBBER CHIMNEY SEAL SHALL BE FLEX–SEAL OR CRETEX OR APPROVED EQUAL. THE CHIMNEY SEAL MAY BE DELETED WHEN MANHOLE IS ADJUSTED AFTER PAVING PER STD. PLAN No.104.
4. WATER TIGHT JOINTS (GROUT JOINTS SMOOTH AT MANHOLE INTERIOR).
5. FOR ALTERNATE MANHOLE CONFIGURATION, PROVIDE 8 FT. OF HEADROOM WHENEVER POSSIBLE.
6. POSITION MANHOLE LID OVER OUTLET PIPE.
7. ALL SECTIONS MUST MEET OR EXCEED ASTM C 478.
8. FLAT–TOP MANHOLE ACCEPTABLE ALTERNATE (SEE STD. DETAIL NO. 205)
9. SEE STD. PLAN No.107. LOCK–DOWN MANHOLE COVERS PER STD. PLAN No.117 REQUIRED WHEN MANHOLES ARE LOCATED OUTSIDE OF PUBLIC RIGHT–OF–WAY.



STANDARD MANHOLE CONFIGURATION



ALTERNATE MANHOLE CONFIGURATION

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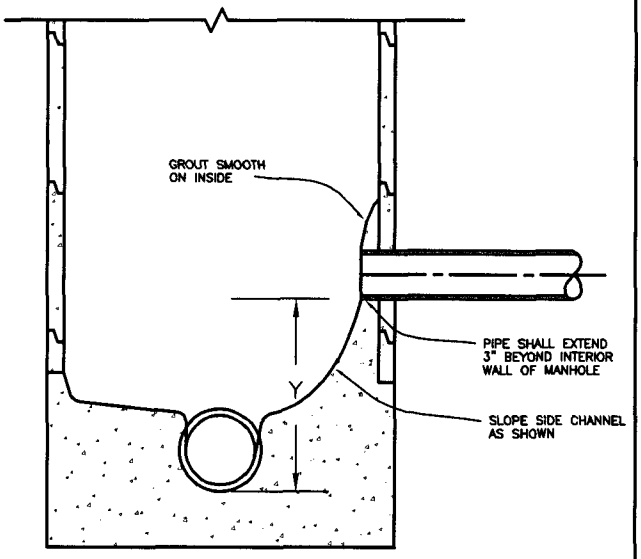
STANDARD DETAIL DRAWING

MANHOLE

DRAWN: K.L.C.	DATE: 9–16–08
APPROVED: W.I.P.	NO. 101



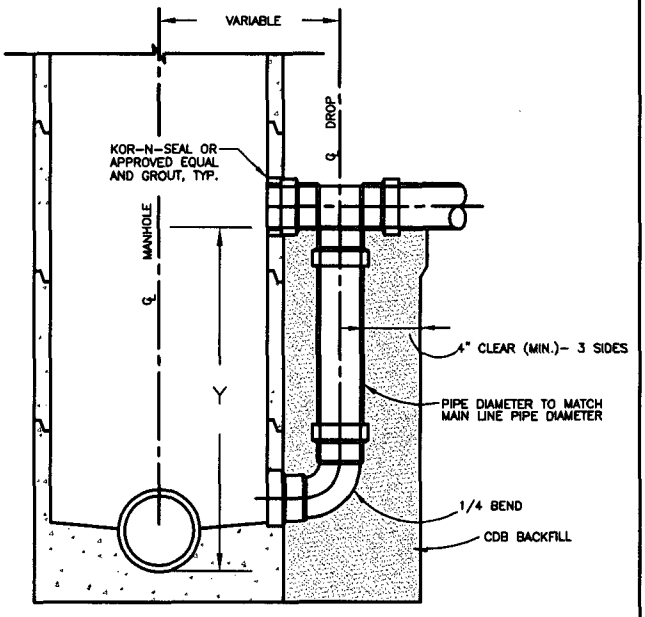
TYPE 'A'
LESS THAN 2'-0" FALL

TABLE

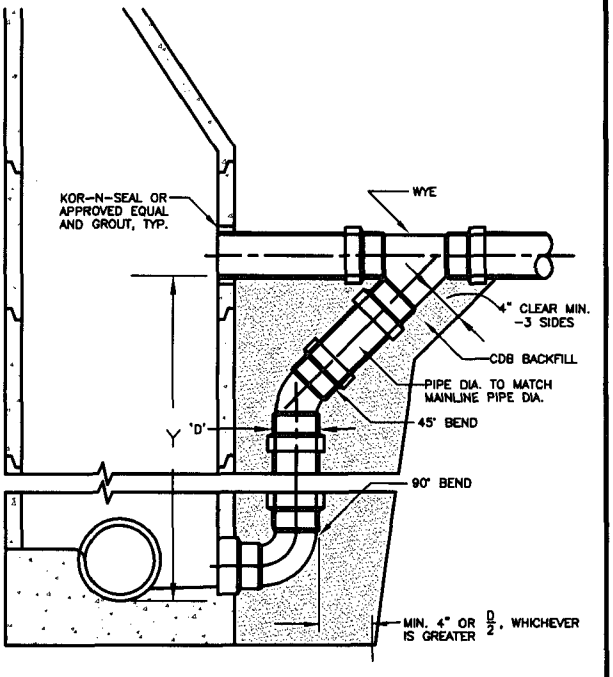
PIPE SIZE		8"	10"	12"	15"
TYPE 'A'	Y LIMITATIONS	24"OR LESS	24"OR LESS	24"OR LESS	24"OR LESS
TYPE 'B'		24" AND GREATER	31" AND GREATER	35" AND GREATER	42" AND GREATER
TYPE 'C'		30" AND GREATER	57" AND GREATER	65" AND GREATER	84" AND GREATER

NOTES:

1. SEE STANDARD DETAIL101 FOR ADDITIONAL MANHOLE DETAILS.
2. TYPE 'C' DROP MAY BE REQUIRED OVER TYPE 'B' IN LOCATIONS OF HIGH FLOW AND/OR STEEP GRADES.
3. ALL PIPE IS P.V.C.



TYPE 'B'
2'-0" MINIMUM FALL



TYPE 'C'
30" MINIMUM FALL

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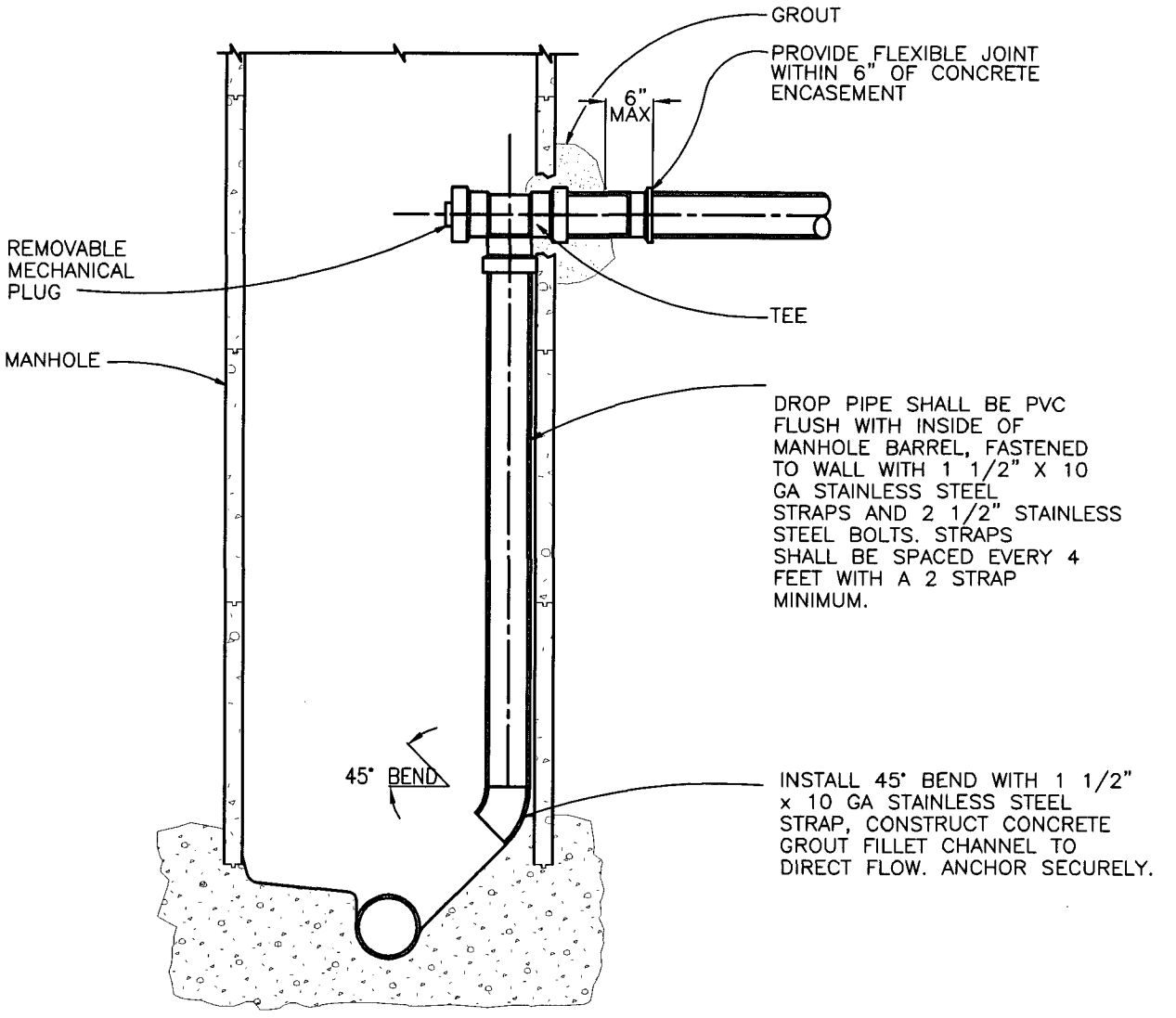
STANDARD DETAIL DRAWING

OUTSIDE MANHOLE DROP

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 102



NOTE:

1. ONLY ONE INSIDE DROP CONNECTION ALLOWED PER MANHOLE.
2. MINIMUM MANHOLE DIAMETER WITH DROP CONNECTION SHALL BE 48–INCHES.
3. MAXIMUM DROP PIPE DIAMETER SHALL BE 8–INCHES.
4. SEE STANDARD DETAIL 101 FOR OTHER MANHOLE DETAILS.
5. POSITION MANHOLE LID TO MAXIMIZE THE HORIZONTAL CLEAR DISTANCE FOR MAINTENANCE PERSONNEL.

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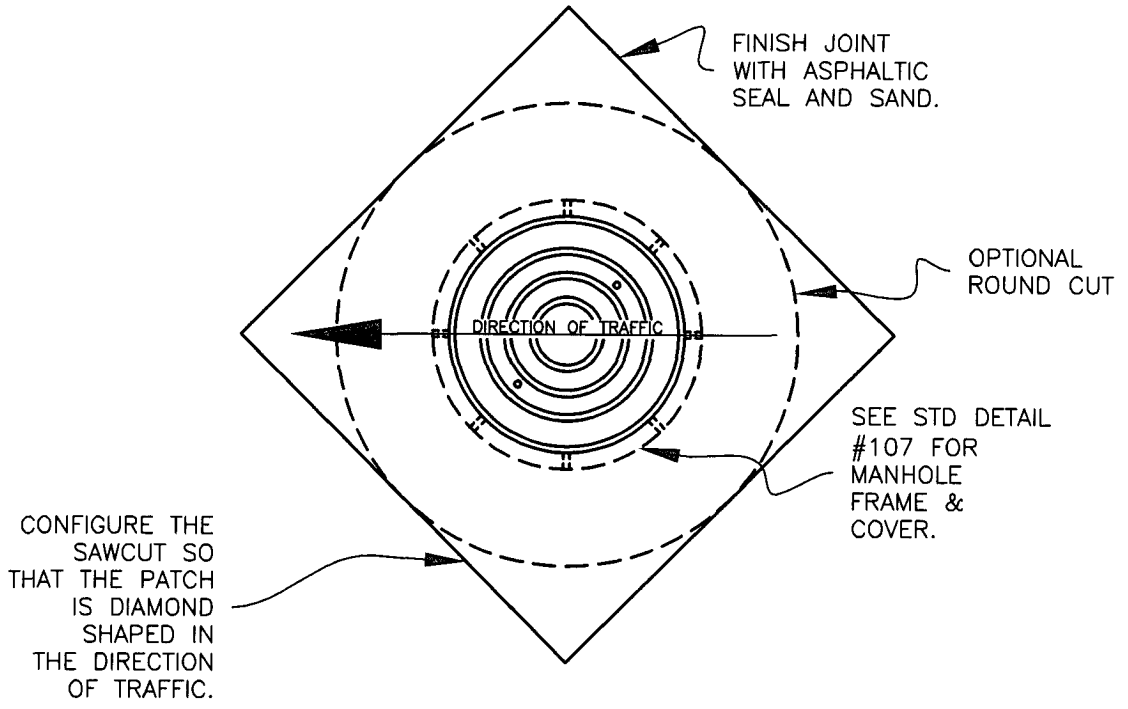
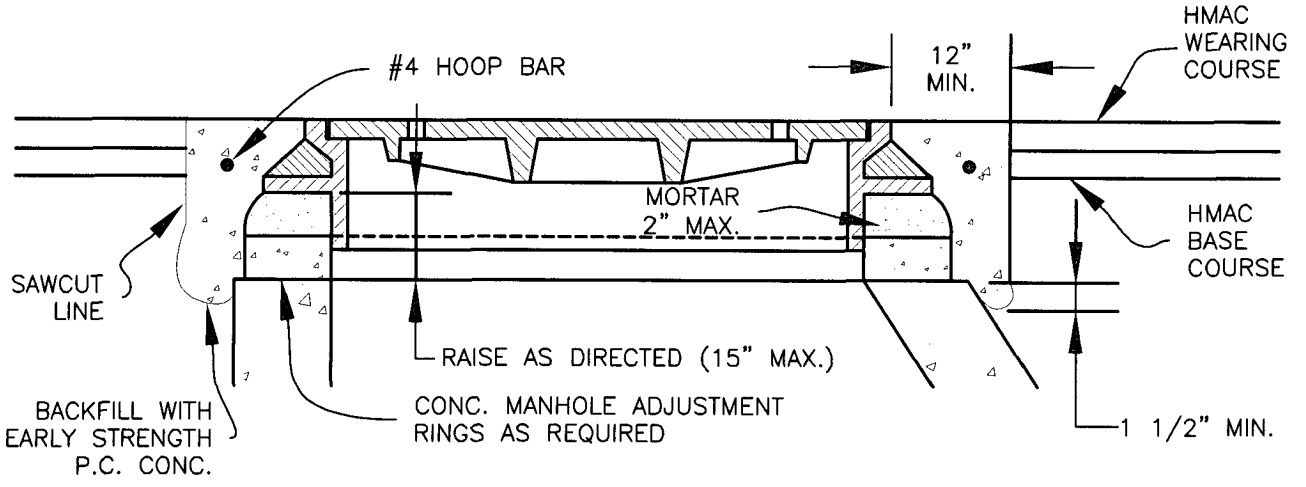
STANDARD DETAIL DRAWING

INSIDE MANHOLE DROP

DRAWN: K.L.C.	DATE: 9–16–08
APPROVED: W.I.P.	NO. 103





1. COVER MANHOLE WITH BUILDING PAPER AND CONSTRUCT HMAC BASE AND WEARING COURSES.
2. SAWCUT SQUARE OR CIRCULAR EXCAVATION AROUND MANHOLE 12" MINIMUM FROM MANHOLE FRAME.
3. RAISE MANHOLE FRAME AND COVER TO FINISH GRADE BY INSTALLING CONCRETE RINGS AND LEVELING MORTAR.
4. BACKFILL WITH EARLY STRENGTH P.C.C. TO FINISH GRADE.

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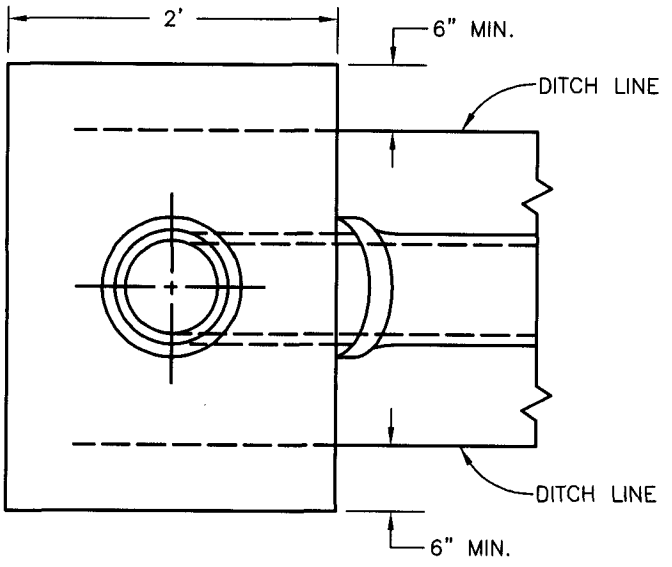
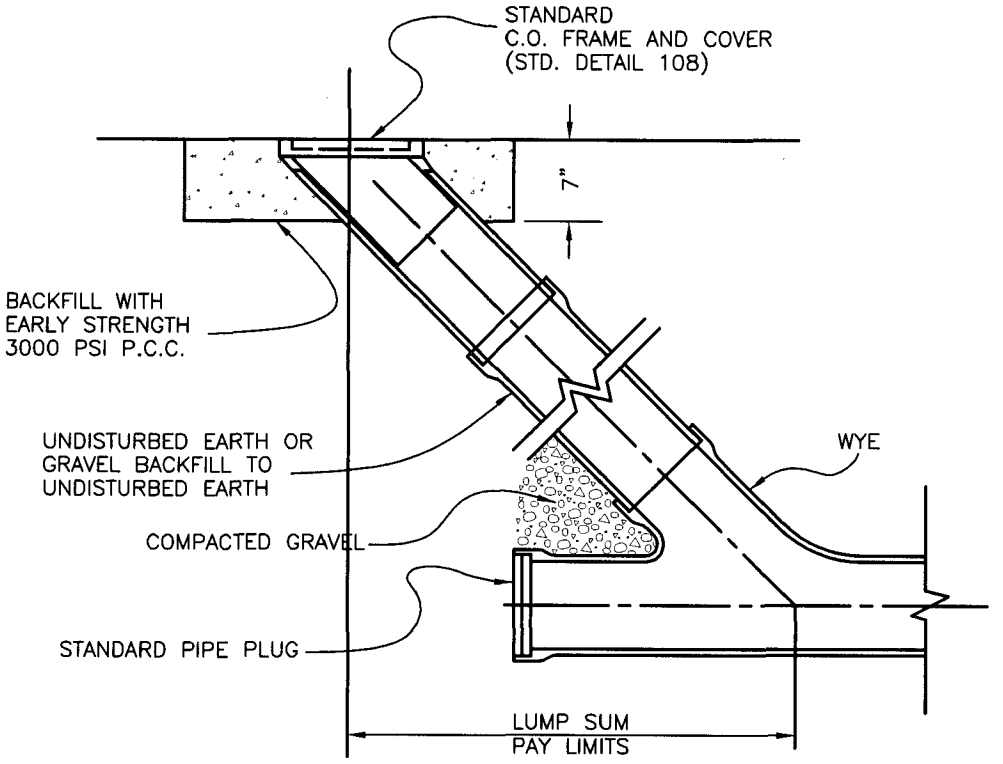
STANDARD DETAIL DRAWING

MANHOLE ADJUSTMENT SEQUENCE

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 104





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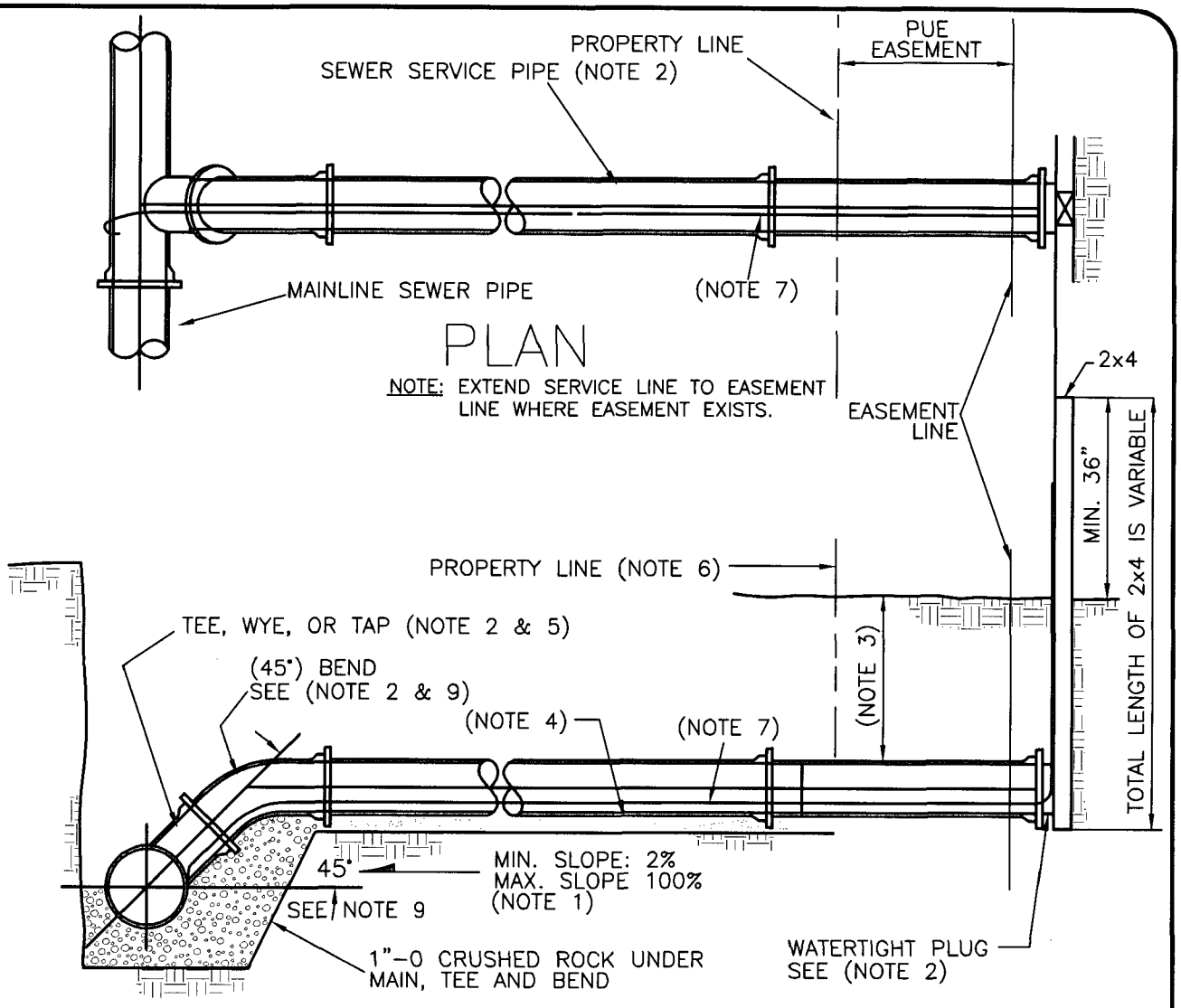
STANDARD DETAIL DRAWING

SANITARY SEWER CLEANOUT

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 105



SECTION

1. WHEN SLOPE EXCEEDS 20% USE ANCHOR BLOCKS. WHEN SLOPE EXCEEDS 100%, AND WITH SPECIFIC APPROVAL OF THE ENGINEER, USE DEEP CONNECTION RISER PER STD. DETAIL No.114. SLOPE MAY BE DECREASED TO 1% MINIMUM WITH SPECIFIC APPROVAL OF THE ENGINEER.
2. ASTM D3034 SDR 35.
3. MINIMUM DEPTH AT PROPERTY LINE 4 FEET.
4. BEDDING FOR SERVICE LINES SHALL BE MIN. 4-INCHES OF 1"-0 AGGREGATE BASE.
5. TAPPING OF SEWER MAINS TO BE DONE BY DEVELOPER - OBSERVED BY C.O.H.
6. IN NEW SUBDIVISIONS OR FOR UNUSED STUBS, MARK END OF SERVICE WITH WHITE PAINTED 2 x 4 STAKE. USING BLACK INDELIBLE MARKER, INDICATE DEPTH AND TYPE (SS FOR SANITARY), (SD FOR STORM DRAIN).
7. INSTALL A CONTINUOUS 12 GAUGE, GREEN, INSULATED COPPER TRACER WIRE ALONG THE SERVICE BETWEEN THE SEWER MAIN AND BUILDING OR PAINTED 2 x 4.
8. ADJACENT SERVICE LINES TO HAVE 18" MINIMUM HORIZONTAL SEPARATION AT THE MAIN.
9. WITH SPECIFIC APPROVAL OF THE COH, ANGLE AND BEND MAY BE REDUCED TO 22 1/2°.
10. STAMP CURB WITH AN "S" ABOVE LATERAL WHERE IT CROSSES CURB.

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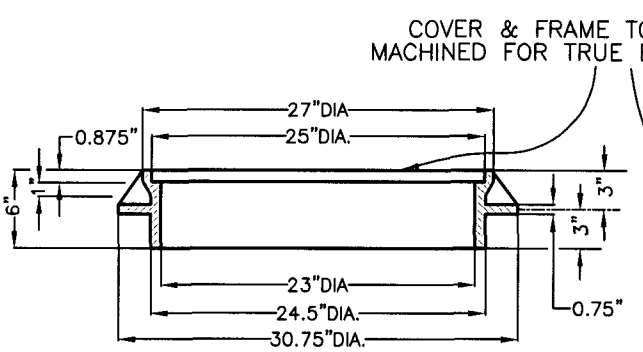
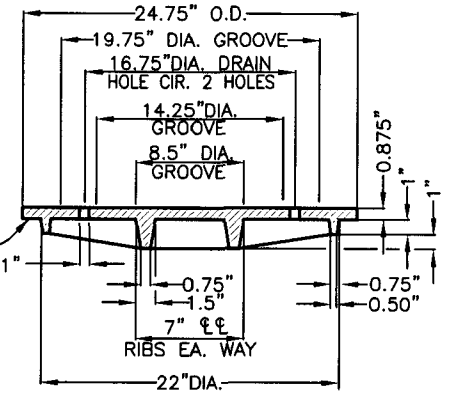
STANDARD DETAIL DRAWING

SANITARY & STORM DRAIN SERVICE

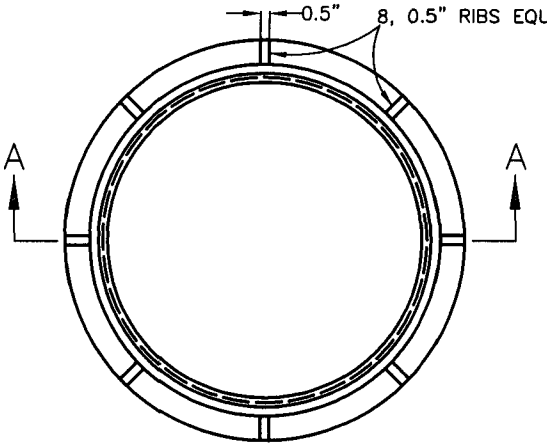
DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 106



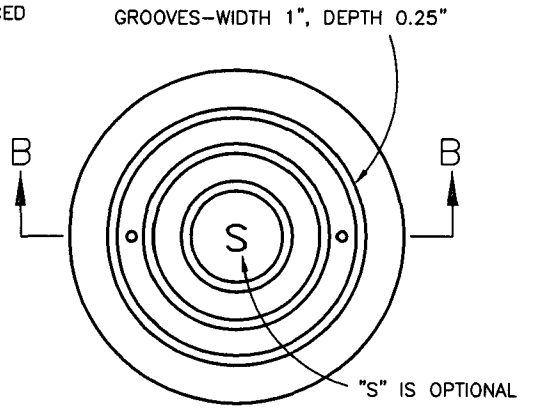
SECTION A–A



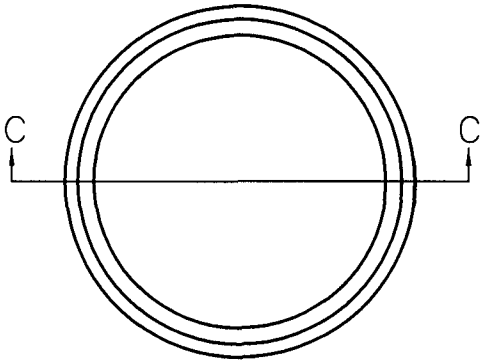
SECTION B–B



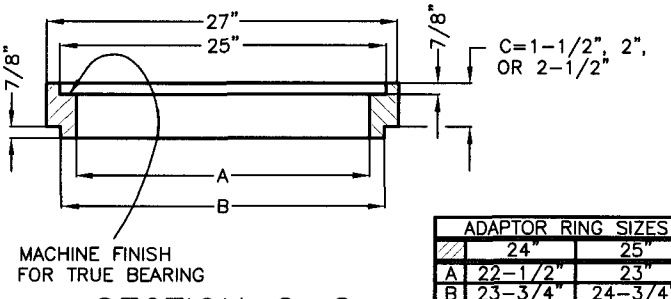
MANHOLE FRAME



MANHOLE COVER



ADAPTOR RING



SECTION C–C

ADAPTOR RING SIZES		
	24"	25"
A	22–1/2"	23"
B	23–3/4"	24–3/4"

1. MATERIAL: ASTM A 48 CLASS 30B GRAY IRON CASTING
2. STEEL PIVOTED EXPANDABLE MANHOLE RISER BY AMERICAN HIGHWAY PRODUCTS OR APPROVED EQUAL IS ALSO ACCEPTABLE

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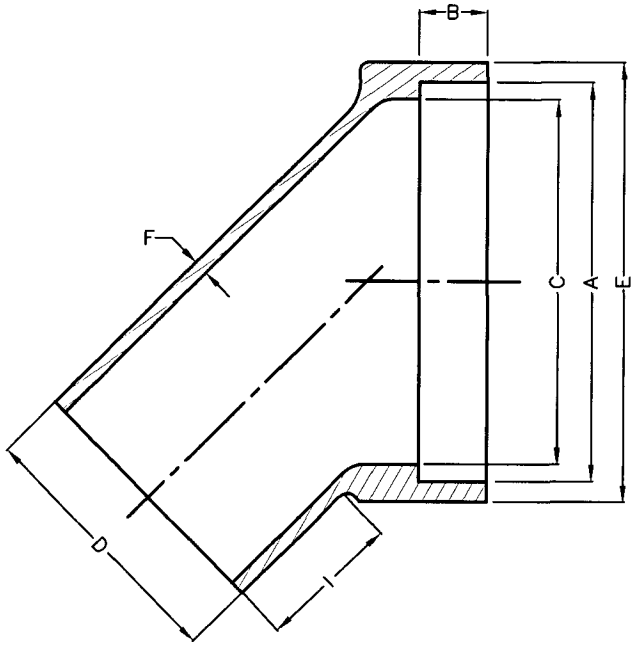
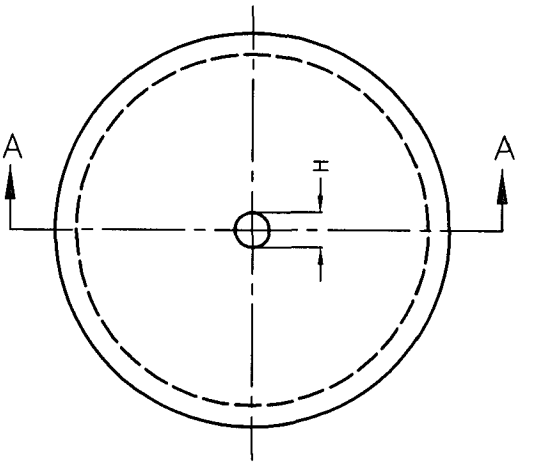
STANDARD DETAIL DRAWING

MANHOLE CASTING DETAIL

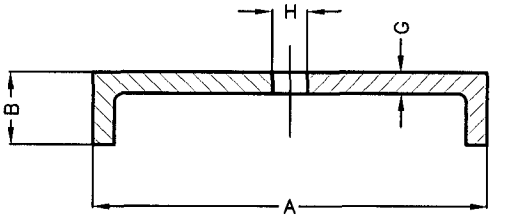
DRAWN: K.L.C.	DATE: 9–16–08
APPROVED: W.I.P.	NO. 107



FRAME



LID



SECTION A–A

LID DIMENSIONS				
SIZE	A	B	G	H
6"	8 9/16"	1 1/2"	1/2"	3/4"
8"	10 11/16"	1 1/2"	1/2"	3/4"

FRAME DIMENSIONS							
SIZE	A	B	C	D	E	F	I
6"	8 3/4"	1 1/2"	8"	5 7/8"	9 5/8"	5/16"	3 1/4"
8"	10 7/8"	1 1/2"	9 5/8"	7 7/8"	11 3/4"	5/16"	3 1/4"

MATERIAL: ASTM A–48 CLASS 30 CAST IRON.

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STANDARD DETAIL DRAWING

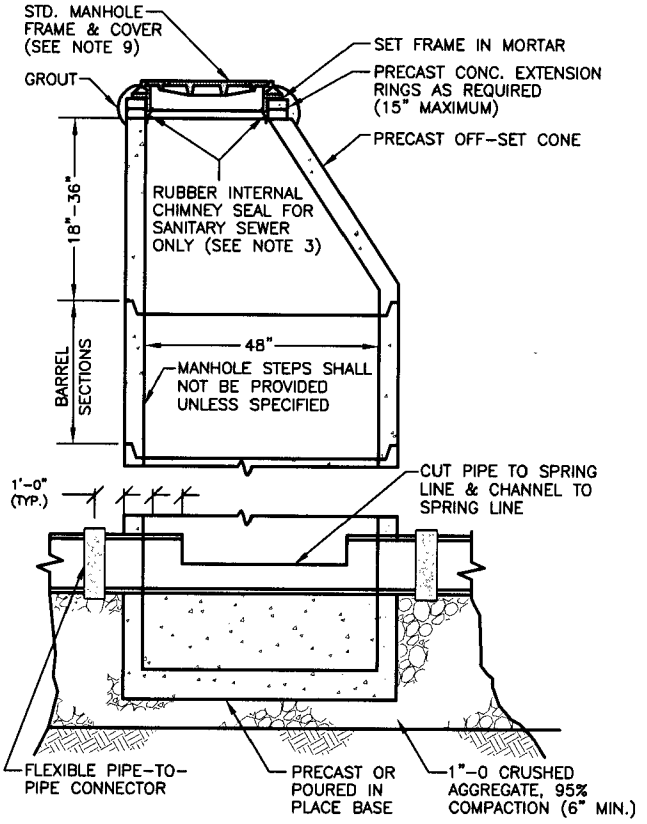
45° CLEANOUT FRAME & LID

DRAWN: K.L.C.	DATE: 9–16–08
APPROVED: W.I.P.	NO. 108

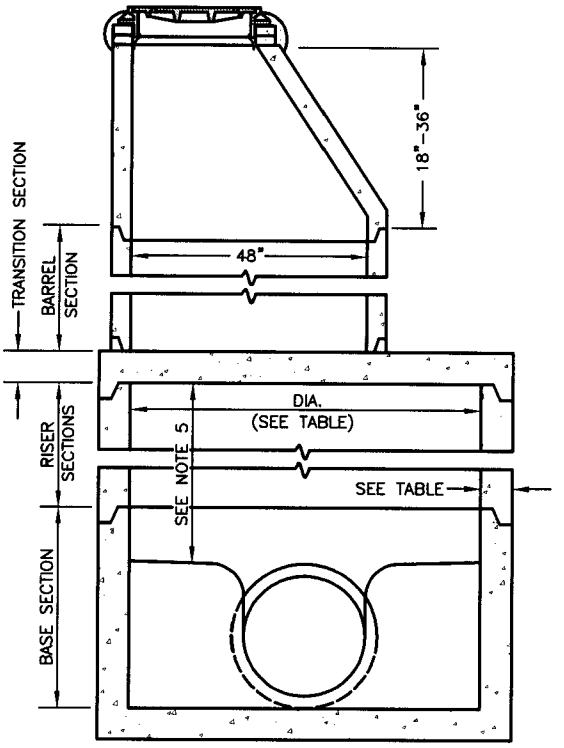
TABLE		
PIPE SIZE	MANHOLE DIAMETER	WALL THICKNESS
≤21"	48"	5"
24"–30"	60"	6"
36"–42"	72"	7"
48"–54"	84"	8"

NOTES:

1. CONCENTRIC CONE ALLOWED ONLY WHEN SPECIFIED.
2. FLEXIBLE PIPE–TO–PIPE CONNECTIONS SHALL BE INSTALLED ACCORDING TO MANUFACTURES SPECIFICATIONS.
3. INTERNAL RUBBER CHIMNEY SEAL SHALL BE FLEX–SEAL OR CRETEX OR APPROVED EQUAL. THE CHIMNEY SEAL MAY BE DELETED WHEN MANHOLE IS ADJUSTED AFTER PAVING PER STD. PLAN No.104.
4. WATER TIGHT JOINTS (GROUT JOINTS SMOOTH AT MANHOLE INTERIOR).
5. FOR ALTERNATE MANHOLE CONFIGURATION, PROVIDE 8 FT. OF HEADROOM WHENEVER POSSIBLE.
6. POSITION MANHOLE LID OVER OUTLET PIPE.
7. ALL SECTIONS MUST MEET OR EXCEED ASTM C 478.
8. FLAT–TOP MANHOLE ACCEPTABLE ALTERNATE (SEE STD. DETAIL NO. 205)
9. SEE STD. PLAN No.107. LOCK–DOWN MANHOLE COVERS PER STD. PLAN No.117 REQUIRED WHEN MANHOLES ARE LOCATED OUTSIDE OF PUBLIC RIGHT–OF–WAY.



MONITORING MANHOLE CONFIGURATION



ALTERNATE MANHOLE CONFIGURATION

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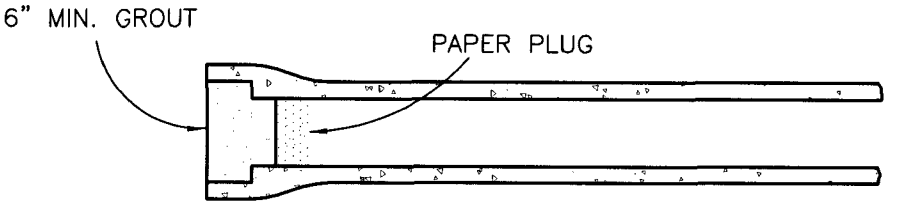
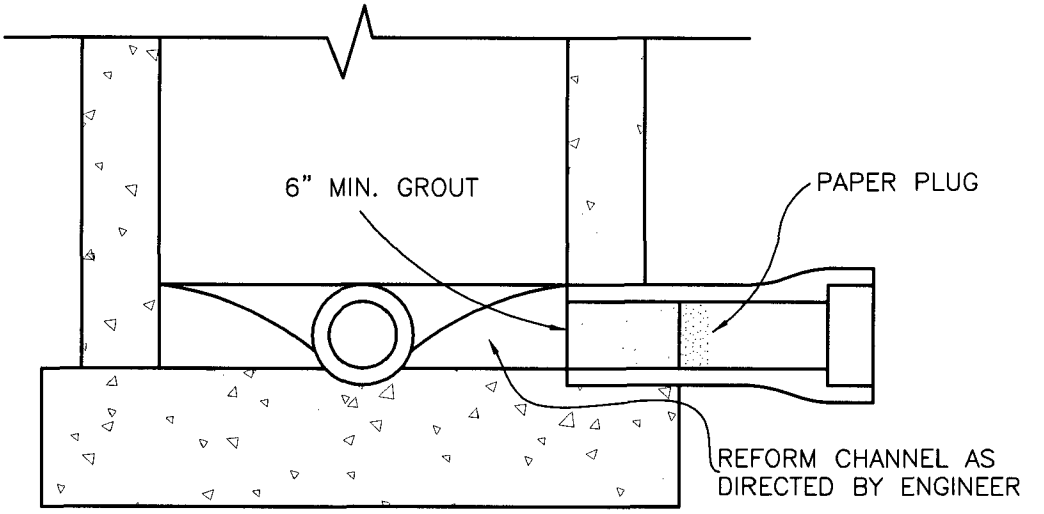
STANDARD DETAIL DRAWING

MONITORING MANHOLE

DRAWN: K.L.C.	DATE: 9–16–08
APPROVED: W.I.P.	NO. 109





NOTE:
THIS DRAWING DEPICTS CONCRETE PIPE.
USE MECHANICAL PLUGS WHEN ABANDONING PLASTIC PIPES.

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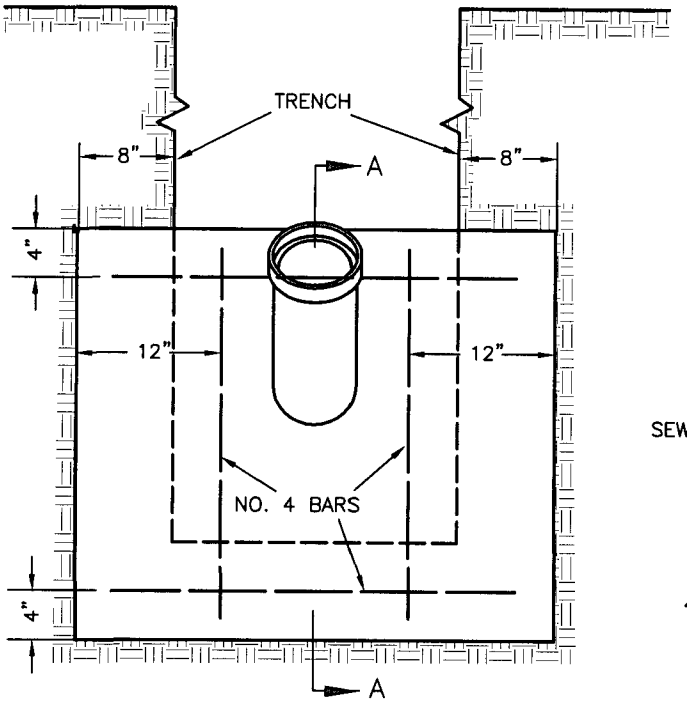
STANDARD DETAIL DRAWING

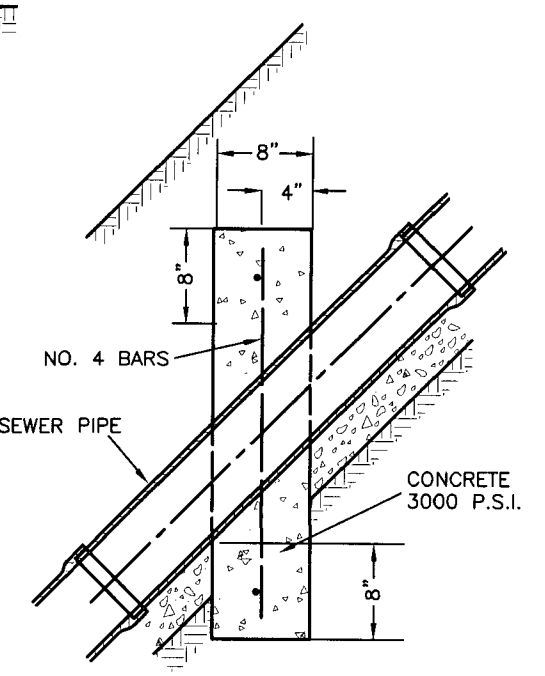
PLUGS FOR ABANDONING SANITARY SEWER

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 110

FOR SEWER PIPE 8"–12" DIAMETER



ELEVATION



SECTION A–A

SPACING FOR ANCHOR BLOCK FOR ALL SIZES

SLOPE %	MINIMUM SPACING (FT)
0–19.99	NO ANCHOR REQUIRED
20–34.99	35
35–50.99	25
51–MORE	15' OR SPECIAL DESIGN

NOTE:
1. FOR 4" SEWER PIPE, ANCHOR BLOCK IS REQUIRED AS SHOWN EXCEPT NO REINFORCEMENT IS REQUIRED
2. FOR PIPE LARGER THAN 12", ANCHOR BLOCK SHALL BE OF SPECIAL DESIGN.
3. ANCHOR BLOCK SHALL ALWAYS BE LOCATED ALONG THE BARREL OF THE PIPE AND NOT AT THE JOINT.
4. OTHER PIPE SLOPE ANCHOR SYSTEMS WILL BE CONSIDERED FOR APPROVAL UPON REQUEST TO ENGINEER.

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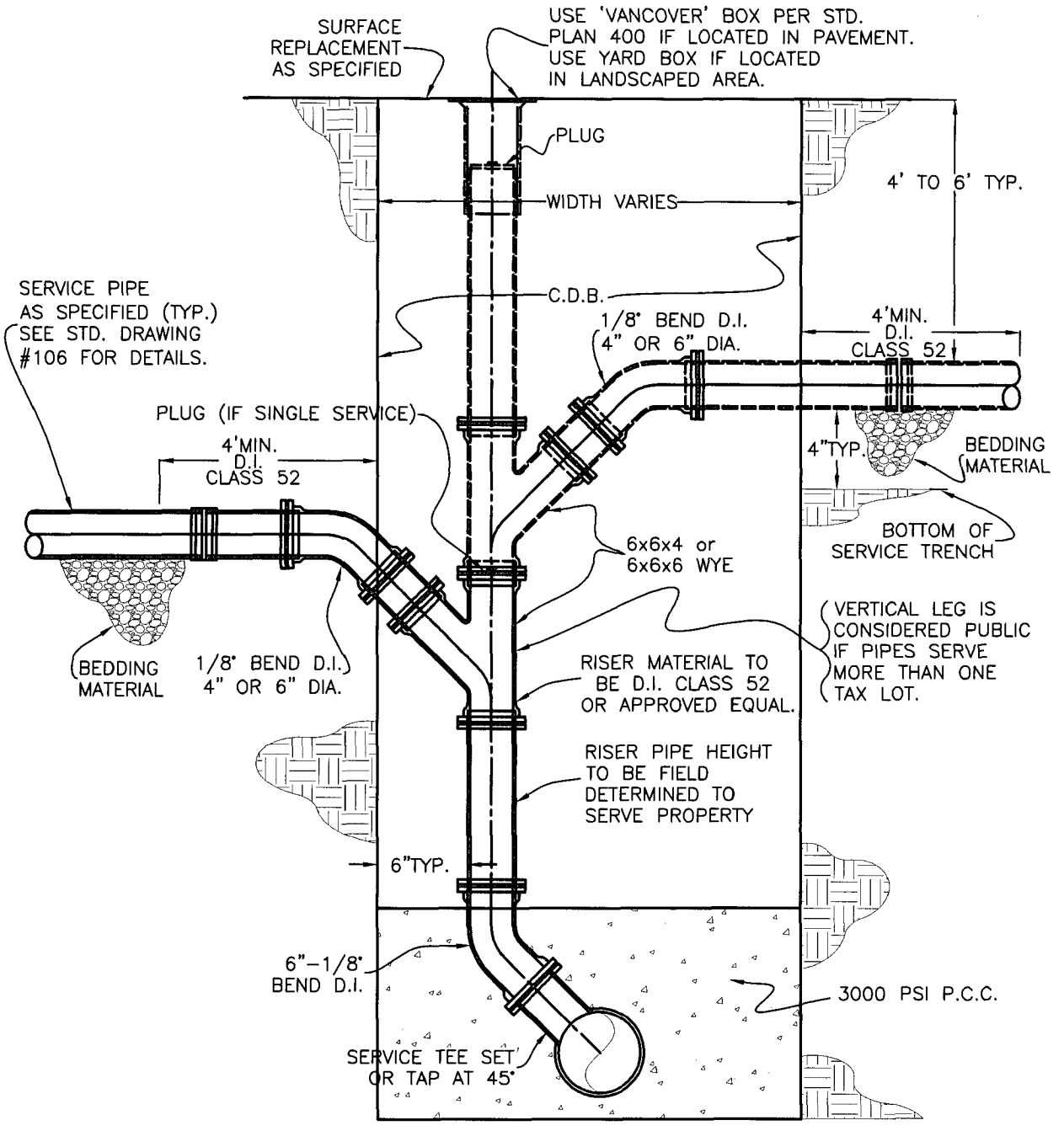
STANDARD DETAIL DRAWING

ANCOR BLOCK DETAIL
SANITARY SEWER

DRAWN: K.L.C.	DATE: 9–16–08
APPROVED: W.I.P.	NO. 113



NOTE:
1. THE DEEP CONNECTION RISER MAY ONLY BE USED WHEN THE SERVICE PIPE SLOPE WOULD BE OVER 100% SLOPE AND WITH SPECIFIC APPROVAL OF THE ENGINEER.
2. USE 6" RISER, MAX. 4 SERVICES.
3. CDB AND 3000 PSI P.C.C. SHALL EXTEND 2 FEET MINUMUM EACH WAY FROM RISER ALONG MAINLINE TRENCH.

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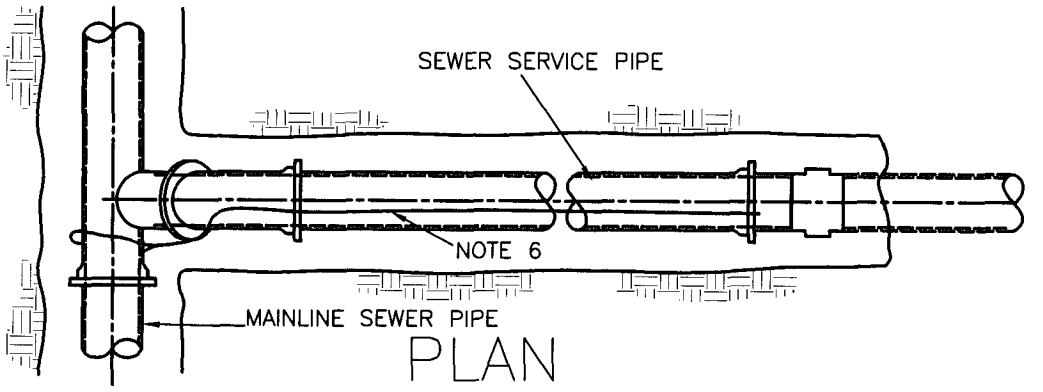
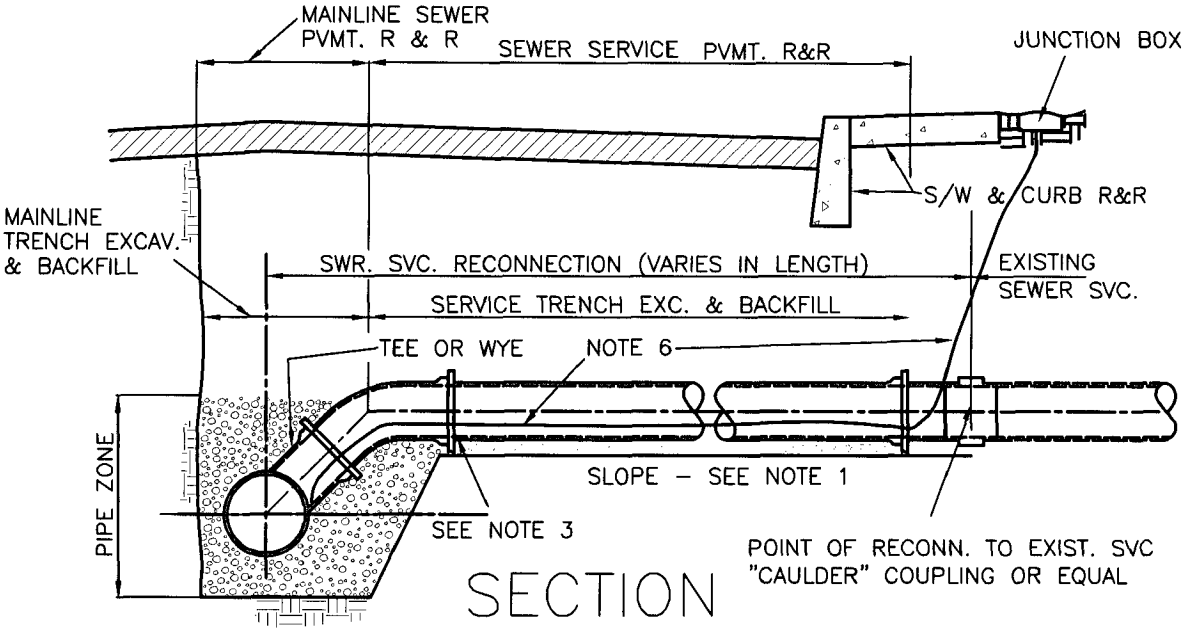
STANDARD DETAIL DRAWING

DEEP CONNECTION RISER (CHIMNEY)

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 114



PLAN



SECTION

1. WHEN SLOPE EXCEEDS 20%, USE ANCHOR BLOCKS, SEE STD DETAIL 113. IF SLOPE EXCEEDS 100%, USE CHIMNEY, SEE STD PLAN 114
2. FOR APPROVED MATERIALS SEE SPECIFICATIONS/PLANS.
3. BEDDING MATERIAL FOR SERVICE LINES SHALL BE 1"–0 CRUSHED ROCK
4. IN ADDITION TO OTHER DETAIL SHOWN THIS DRAWING IS INTENDED TO SHOW THE LIMITS OF MEASUREMENT FOR PAY ITEMS INCLUDED IN CONSTRUCTION CONTRACT.
5. TAPPING OF SEWER MAINS, IF NECESSARY, TO BE BY DEVELOPTER – OBSERVED BY COH.
6. INSTALL A CONTINUOUS 12 GAUGE, GREEN, INSULATED COPPER TRACER WIRE ADJACENT TO SEWER SERVICE BETWEEN THE SEWER MAIN AND CONECTION POINT AND BROUGHT TO GRADE.

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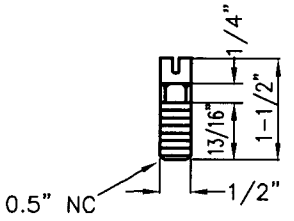
STANDARD DETAIL DRAWING

SANITARY SERVICE RECONNECTIONS

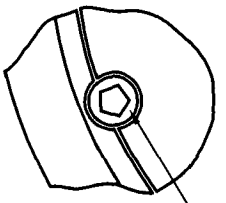
DRAWN: K.L.C.	DATE: 9–16–08
APPROVED: W.I.P.	NO. 115

HEX FOR WRENCH OR SLOT
TOP FOR SCREWDRIVER



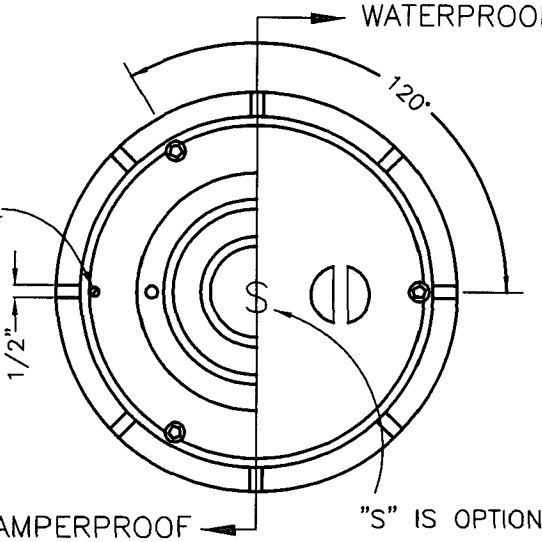
STUD DETAIL

1 STUD REQUIRED PER COVER
STUD TO BE 60° COUNTER-
CLOCKWISE FROM A CAP SCREW.

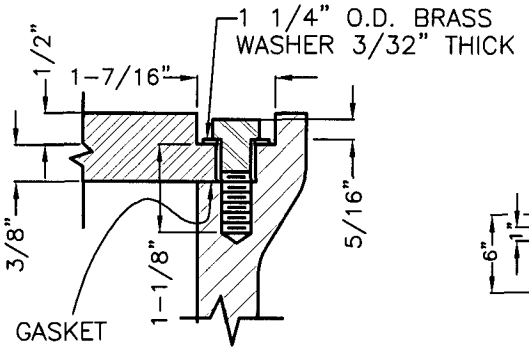


1/2"-13-1" LONG BRASS OR
BRONZE PENTAGON-HEAD CAP
SCREW

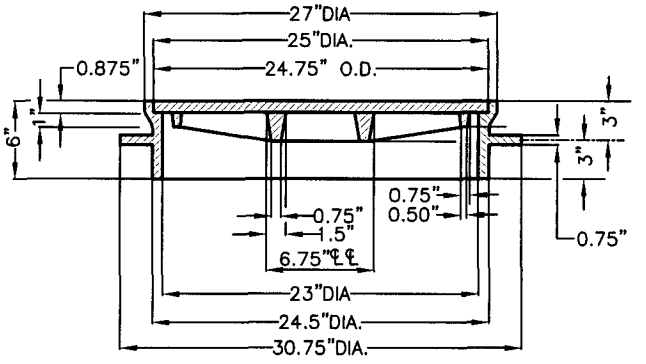
LOCATING STUD. DRILL
25/64" HOLE AND
TAP FOR 1/2" STUD
(SEE NOTE 3)



PLAN



X-SECTION



CAP SCREW DETAIL

NOTE:

1. BEARING SURFACES TO BE MACHINED.
2. COVER USED OUTSIDE VEHICLE TRAVELED AREAS SHALL BE ALUMINUM.
3. LOCATING STUD NOT REQUIRED WITH ALUMINUM LIDS.

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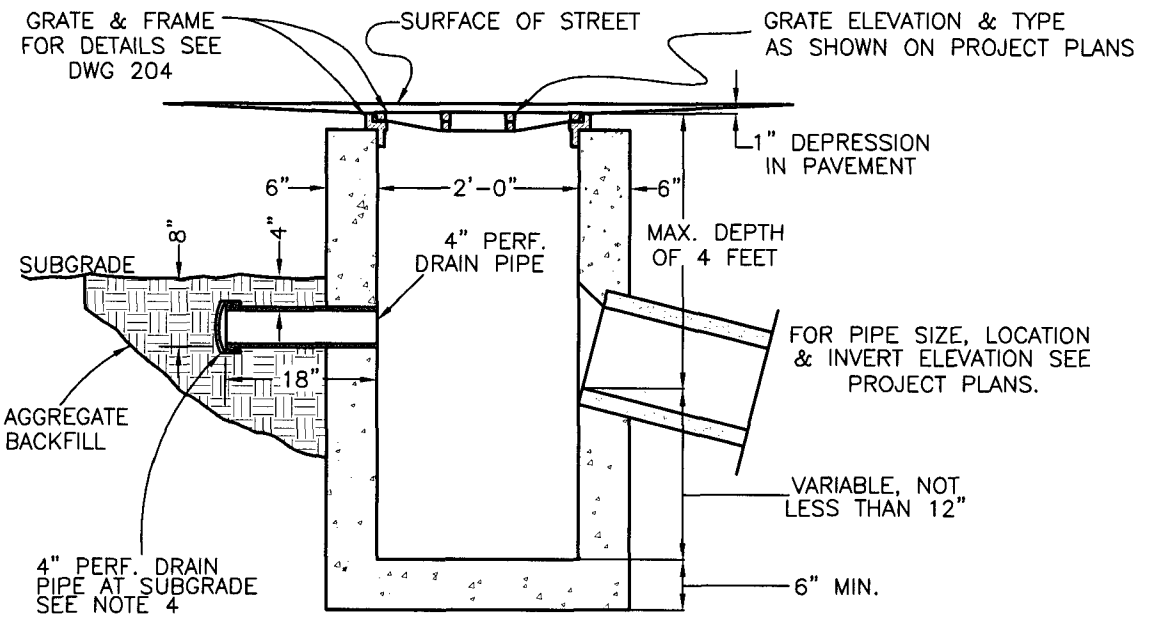
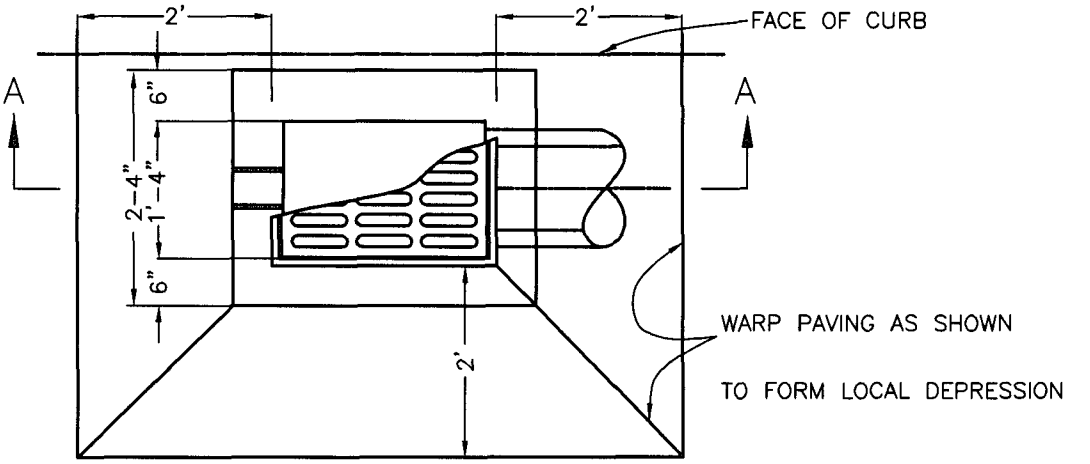
STANDARD DETAIL DRAWING

TAMPERPROOF/WATERPROOF MANHOLE FRAME AND COVER

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 117



SECTION A–A



PLAN

NOTES:

1. REQUIRED WHEN CURB INLET OR GUTTER INLET IS NOT PRACTICAL AS DETERMINATION BY THE CITY ENGINEER.
2. PIPE(S) CAN BE PLACED IN ANY WALL.
3. STATION SHOWN ON PROJECT PLANS IS TO CENTERLINE OF C.B.
4. ALL CONCRETE SHALL BE CLASS 3000 P.S.I.
5. DRAIN SHALL BE P.V.C. (SCH. 40) WITH CAP. DRAIN PIPE SHALL HAVE 6–3/8" DIAMETER HOLES IN LOWER SIDE. CAP SHALL HAVE 4–3/8" DIAMETER DRILL HOLES. TWO DRAINS REQUIRED WHEN C.B. LOCATED AT SAG VERTICAL CURVE.
6. TO CONSTRUCT CLEANOUT, REPLACE GRATE WITH 1'–3 1/2" x 1"–11 1/2" STEEL PLATE 3/4" THICK. DRILL ONE, 1" DIA. LIFT HOLE NEAR ONE END OF PLATE.

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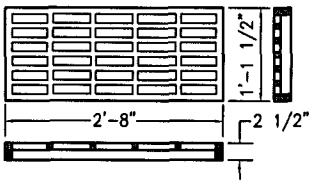
STANDARD DETAIL DRAWING

HORIZONTAL CATCH BASIN (AND CLAENOUT)

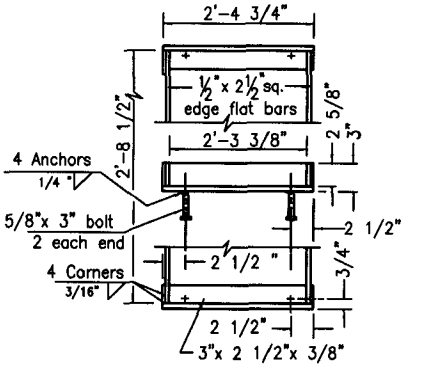
DRAWN: K.L.C.	DATE: 9–16–08
APPROVED: W.I.P.	NO. 200



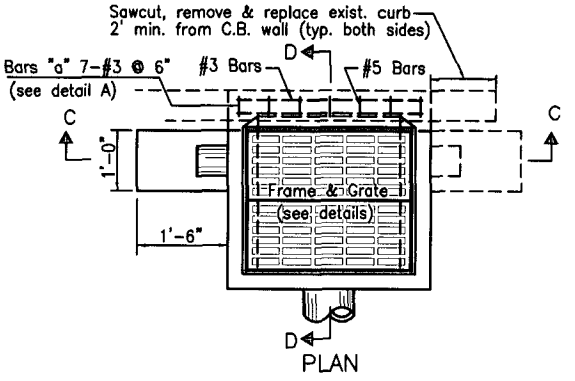
GRATE
NO SCALE

1.) Grates shall be ductile iron suitable for traffic loading as MFD. BY INLAND FOUNDRY.

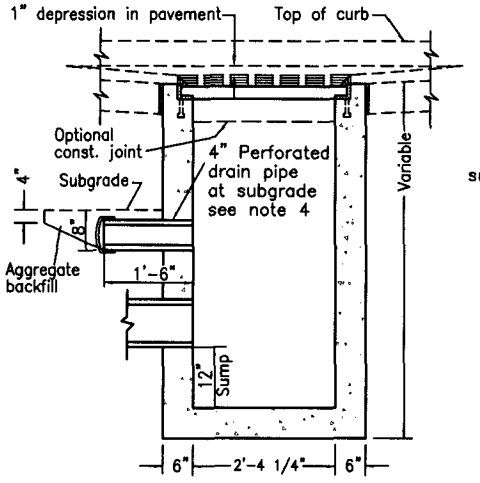
2.) 2 Grates required for each C.B.



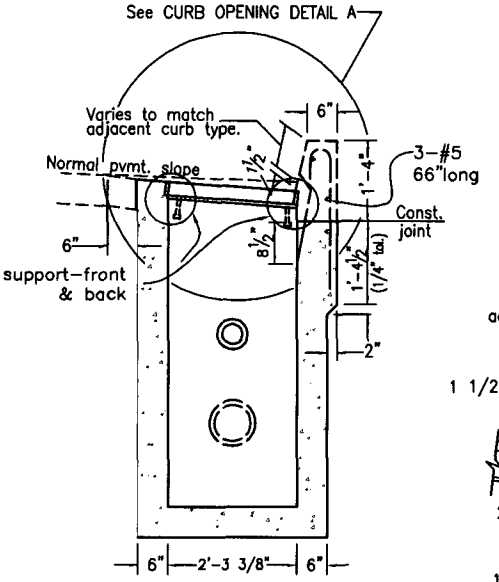
FRAME
NO SCALE



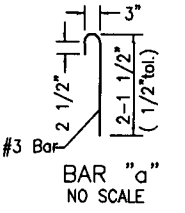
PLAN



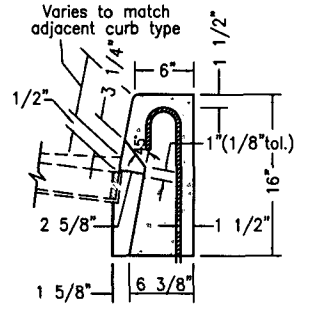
SECTION C-C



SECTION D-D



BAR "a"
NO SCALE



CURB OPENING DETAIL A
NO SCALE

NOTES:

1. Required when curb inlet catch basin is not practical as determined by the city engineer.
2. Reinforcing steel
   a.) As per Sec. 603 of S.C.S.
   b.) No. 3 bars to be placed during curb construction.
   c.) All bars to be placed 1/2" clear of nearest face of concrete unless shown or noted otherwise.
   d.) All bar splices shall be 20 dia.
3. All concrete to be 3,000 p.s.i.
4. Materials for frames and grates shall conform to Sec. 02450 of Standard Specifications for Highway Construction by Oregon State highway division, 1991.
5. Drain shall be P.V.C. (Sch. 40) with cap. Drain pipe shall have 6-3/8" diameter holes in lower side. Cap shall have 4-3/8" diameter drill holes. Two drains required when C.B. located at sag vertical curve.
6. This detail not for use on private property.

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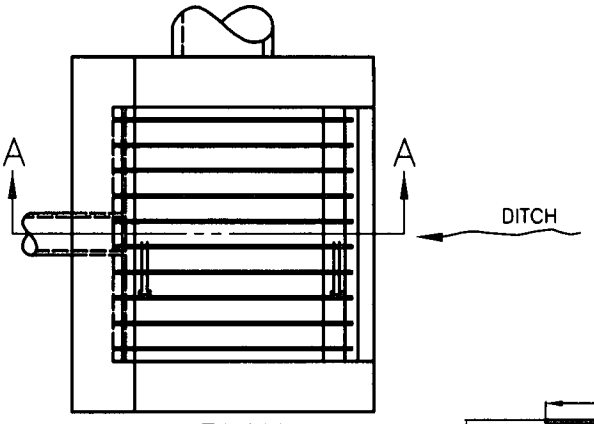
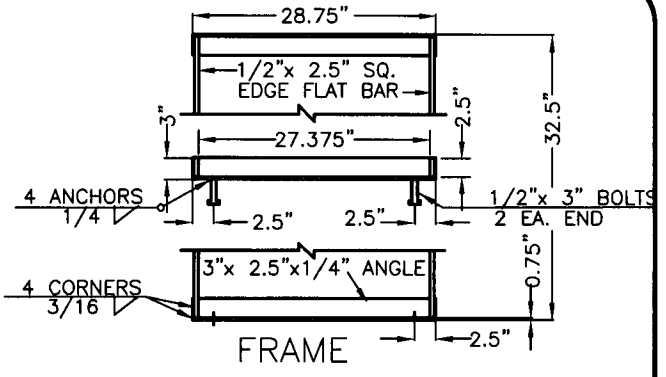
STANDARD DETAIL DRAWING

GUTTER INLET CATCH BASIN

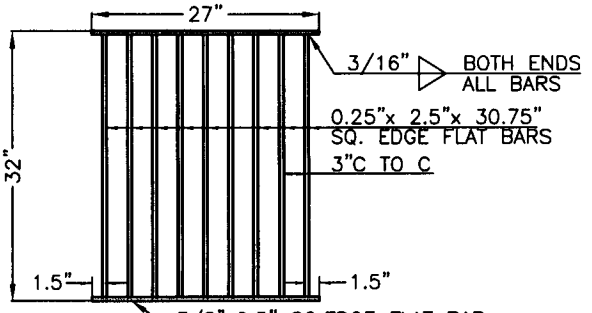
DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 201



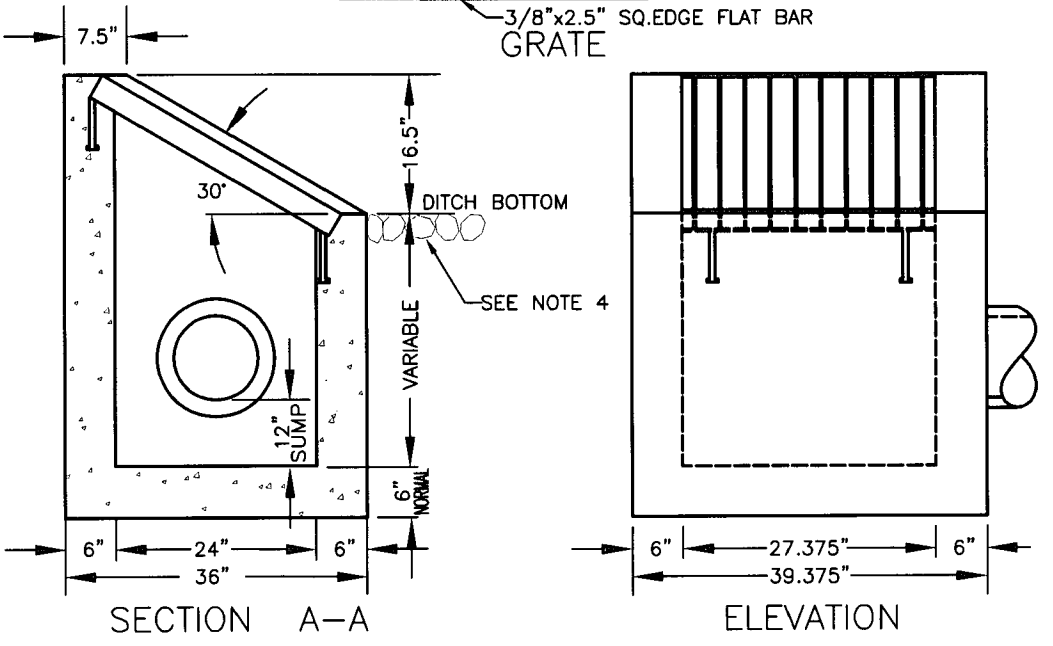
PLAN



FRAME



GRATE



SECTION A–A ELEVATION

NOTES:

1. FOR PIPE SIZE, INVERT ELEVATION AND LOCATION SEE PROJECT PLANS.
2. ALL CONCRETE SHALL BE MIXED AND PLACED IN ACCORDANCE WITH THE SPECIFICATIONS FOR 3000 P.S.I.
3. FRAME AND GRATE MATERIAL SHALL BE STEEL (A.S.T.M. A–36) AND BE GALVANIZED IN ACCORDANCE WITH (A.S.T.M. A–123).
4. PLACE CLASS 50 RIP RAP IN FRONT OF CATCHBASIN. 4'–5' LONG 1' DEPTH.

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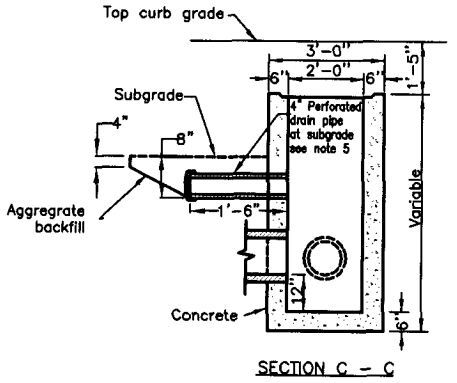
STANDARD DETAIL DRAWING

DITCH INLET CATCHBASIN

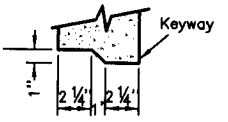
DRAWN: K.L.C.	DATE: 9–16–08
APPROVED: W.I.P.	NO. 202



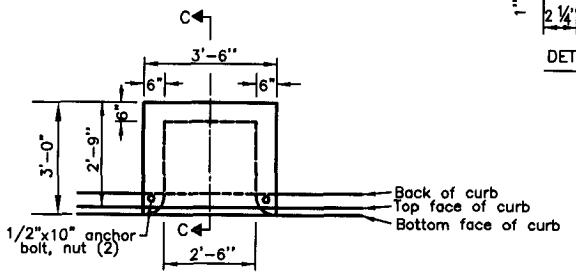
SECTION C – C

NOTE:

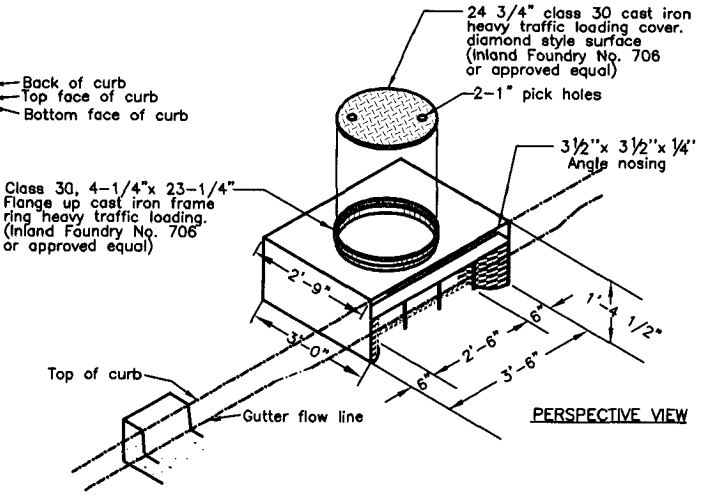
1. Generally required for all curbed street.
2. Concrete shall attain a strength of 3300 p.s.i. in 20 days.
3. Top shall be reinforced with 4"x4"–6–6 wire mesh.
4. All metal parts shall be hot dipped galvanized after fabrication.
5. Cover shall be ASTM A–48 Class 30 cast iron.
6. Drain shall be P.V.C. (Schedule 40) with cap. Drain Pipe shall have 6–3/8" diameter holes in lower side. Cap shall have 4–3/8" diameter drill holes. Two drains required when c.b. located at sag vertical curve.



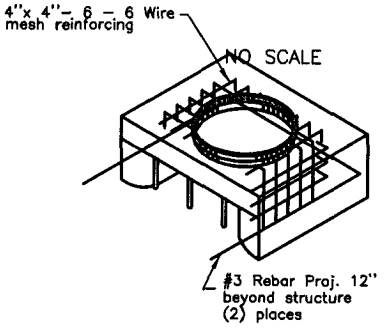
DETAIL 1



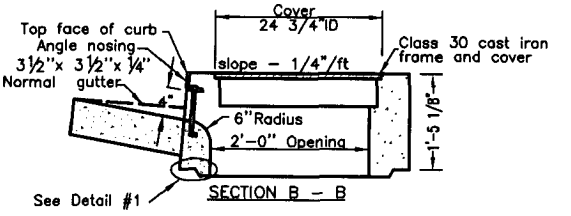
PLAN BASE SECTION



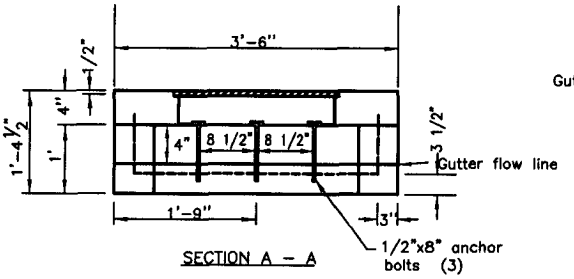
PERSPECTIVE VIEW



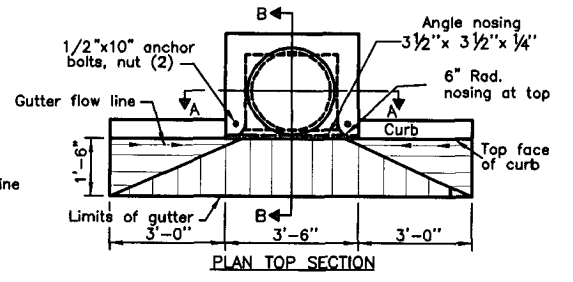
REINFORCING STEEL DETAIL



SECTION B – B



SECTION A – A



PLAN TOP SECTION

CITY OF HUBBARD

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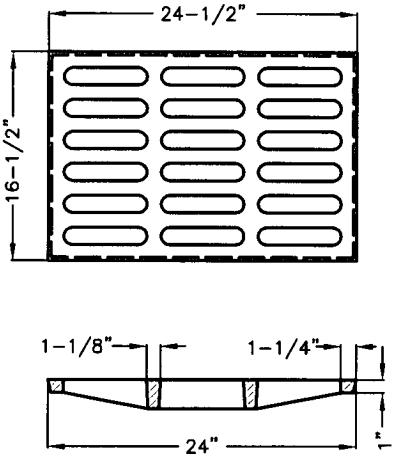
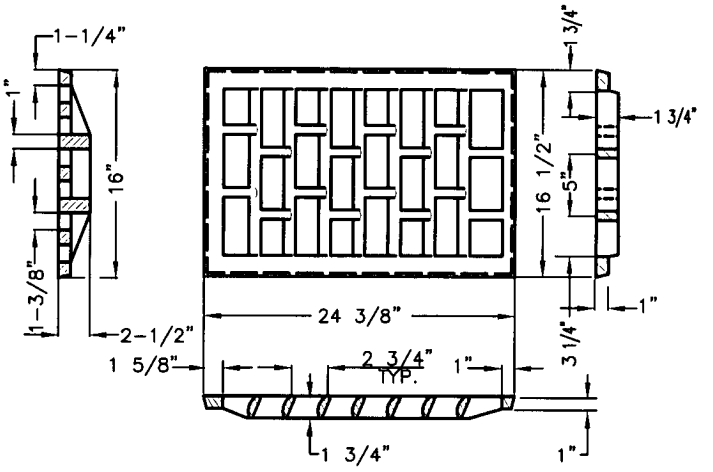
STANDARD DETAIL DRAWING

CURB INLET CATCHBASIN

DRAWN: K.L.C.	DATE: 9–16–08
APPROVED: W.I.P.	NO. 203

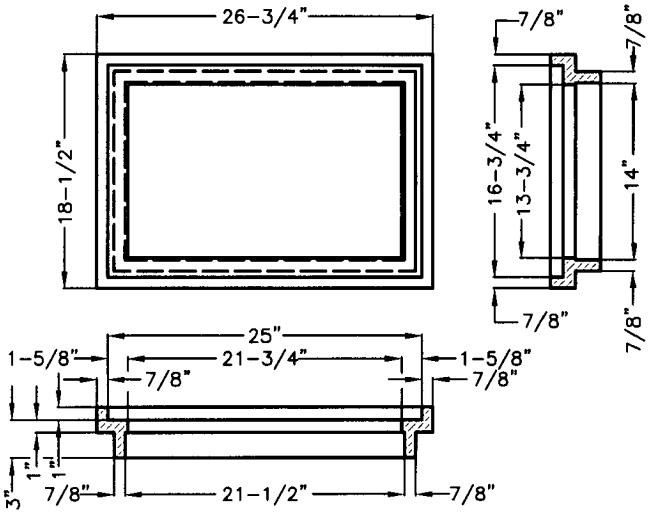


TYPE B GRATE
1-3/8" CLEAR SPACING

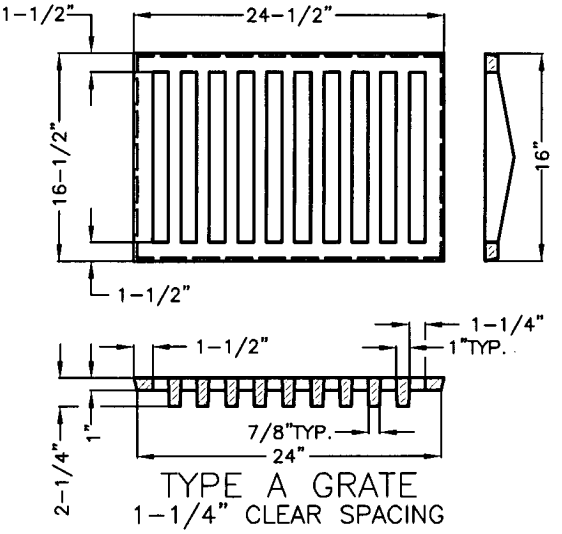


VANED GRATE
1-3/8" CLEAR SPACING

GRATE DETAILS



GRATE FRAME DETAILS



TYPE A GRATE
1-1/4" CLEAR SPACING

NOTES:

1. ALL GRATES AND FRAMES SHALL BE EITHER CAST IRON OR CAST STEEL.
2. ALL GRAY IRON CASTINGS SHALL CONFORM TO ASTM A 48, CLASS 30B OR AASHTO M 105, CLASS 30B.
3. ALL STEEL CASTINGS SHALL CONFORM TO ASTM A 27, GRADE 65-35, OR TO AASHTO M 103, GRADE 65-35.
4. ROUNDS, FILLETS, TAPERS AND OTHER MINOR MODIFICATIONS TO THE DIMENSIONS SHOWN FOR CASTINGS MAY BE MADE TO CONFORM TO COMMON SHOP PRACTICES.

CITY OF HUBBARD

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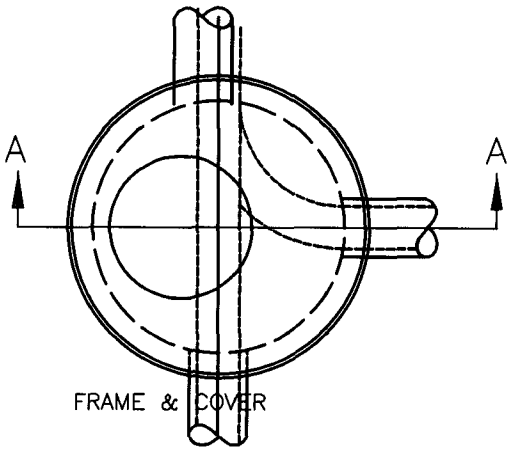
STANDARD DETAIL DRAWING

CATCH BASIN FRAMES AND GRATES TYPE A, B AND VANED

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 204

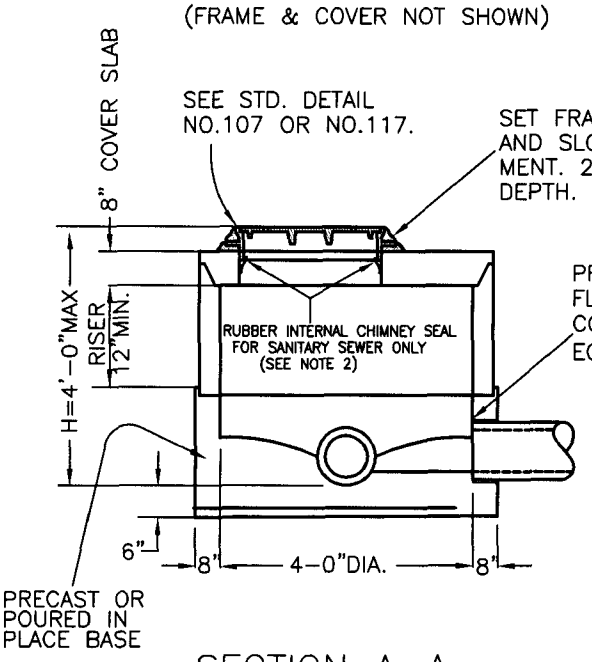


PLAN

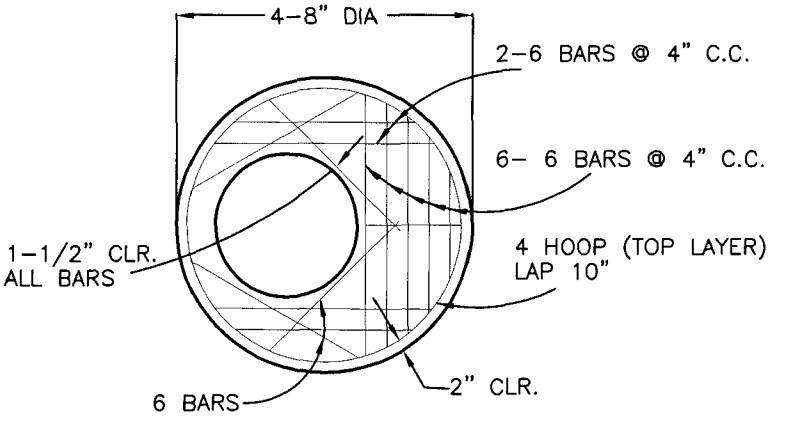
(FRAME & COVER NOT SHOWN)

NOTES:

1. FLEXIBLE PIPE–TO–MANHOLE CONNECTIONS SHALL BE INSTALLED ACCORDING TO MANUFACTURES SPECIFICATIONS.
2. INTERNAL RUBBER CHIMNEY SEAL SHALL BE 'INFI–SHIELD' OR APPROVED EQUAL. THE CHIMNEY SEAL MAY BE DELETED WHEN MANHOLE IS ADJUSTED AFTER PAVING USING CONCRETE EXTERNAL ENCASEMENT.
3. WATER TIGHT JOINTS (GROUT JOINTS SMOOTH AT MANHOLE INTERIOR)



SECTION A–A



COVER SLAB REINFORCEMENT

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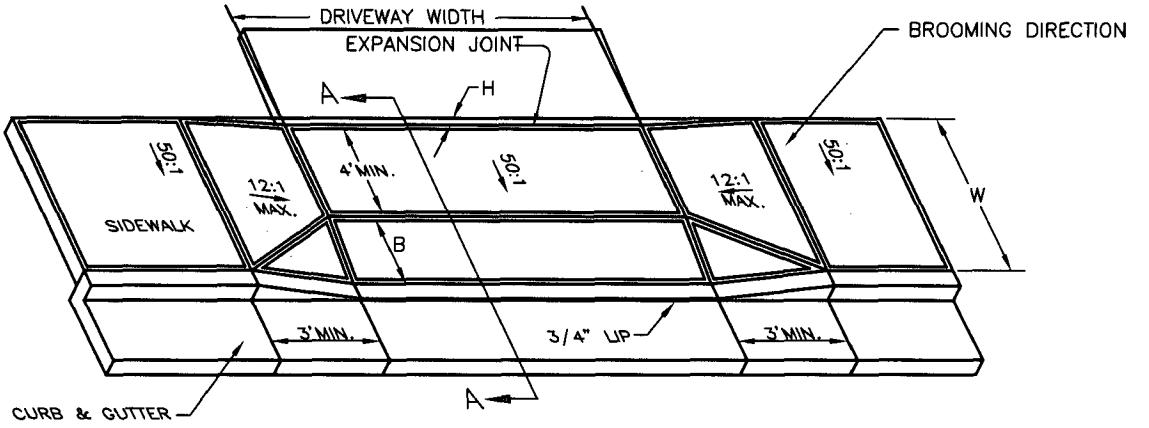
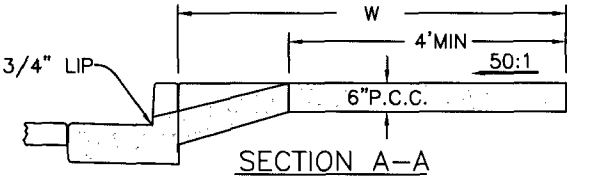
STANDARD DETAIL DRAWING

SHALLOW PRECAST MANHOLE (H LESS THAN 4'–0")

DRAWN: K.L.C.	DATE: 9–16–08
APPROVED: W.I.P.	NO. 205



W	B	H	
5'	1'	0.27'	(3-1/4")
6'	2'	0.23'	(2-3/4")
7'	3'	0.19'	(2-1/4")
8'	4'	0.08'	(1")



SECTION A-A

NO SCALE

NOTES:

1. DRIVEWAY WIDTH SHALL NORMALLY BE SHOWN ON PROJECT PLANS. THE DRIVEWAY WIDTH SHALL NOT EXCEED THE FOLLOWING LIMITS:
   SINGLE DWELLING UNITS: 36'-0" MAXIMUM WIDTH — 12'-0" MINIMUM WIDTH
   COMMERCIAL AND INDUSTRIAL: 36'-0" MAXIMUM WIDTH — 12'-0" MINIMUM WIDTH (SINGLE); 20'-0" MINIMUM WIDTH (DOUBLE)
2. SIDEWALKS, INCLUDING THAT PORTION CROSSING THE DRIVEWAY SHALL HAVE TRANSVERSE CONTRACTION JOINTS AT 5' INTERVALS AND TOOL ROUNDED BEFORE BROOMING. ALL EDGES SHALL BE TOOL ROUNDED AND SHINED (3") AFTER BROOMING.
3. WHEN EXISTING DRIVEWAY CANNOT BE MATCHED TO NEW DRIVEWAY WITHIN SLOPE LIMITATIONS SHOWN, ADJUST EXISTING DRIVEWAY-NOT CURB AND SIDEWALK GRADE.
4. THE DIMENSIONS OF DRIVEWAY APPROACH SHALL NOT BE ADJUSTED WITHOUT SPECIFIC PRIOR (BEFORE FORMING) APPROVAL OF THE INSPECTOR.
5. CONCRETE STRENGTH SHALL BE 3000 P.S.I. IN 28 DAYS.
6. THE 50H:1V CROSS-SLOPE OF SIDEWALK IS MEASURED FROM HORIZONTAL. THE 12H:1V SLOPE SIDEWALK TRANSITION TO DRIVEWAY IS RELATIVE TO THE RUNNING SLOPE OF THE SIDEWALK.
7. SEE SIDEWALK DETAILS FOR RESTRICTIONS AND SPECIFICATIONS NOT SHOWN.
8. NO LIP AT GUTTER IF USED AS SIDEWALK ACCESS RAMP. IF ACCESS RAMP, MAXIMUM SLOPE ON "B" IS 12H:1V INCREASE "H" VALUE IN TABLE ABOVE BY 0.12'.
9. CONFORM TO VISION CLEARANCE REQUIREMENTS AS FOUND IN COH DEVELOPMENT CODE.

CITY OF HUBBARD

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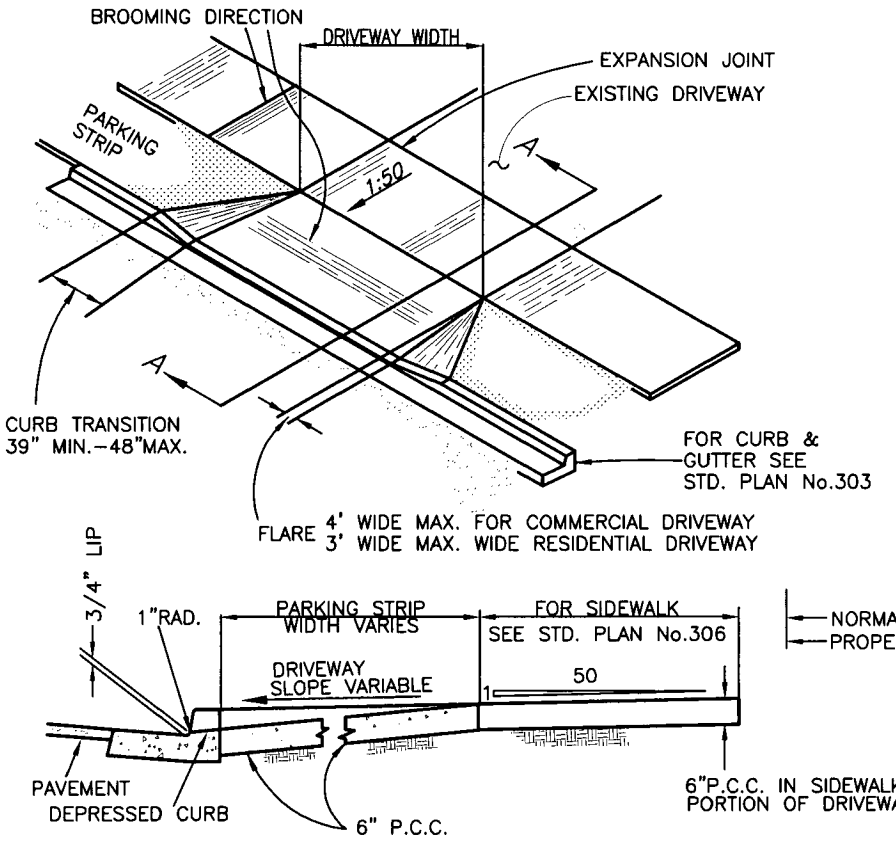
STANDARD DETAIL DRAWING

DRIVEWAY APPROACH
CURBLINE SIDEWALK

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 301



SECTION A-A
NO SCALE

NOTES:

1. DRIVEWAY WIDTH SHALL NORMALLY BE SHOWN ON PROJECT PLANS. THE DRIVEWAY WIDTH SHALL NOT EXCEED THE FOLLOWING LIMITS:

SINGLE DWELLING UNITS:	36'-0" MAXIMUM WIDTH	12'-0" MINIMUM WIDTH
COMMERCIAL AND INDUSTRIAL:	36'-0" MAXIMUM WIDTH	12'-0" MINIMUM WIDTH (SINGLE) 20'-0" MINIMUM WIDTH (DOUBLE)

2. SIDEWALKS, INCLUDING THAT PORTION CROSSING THE DRIVEWAY SHALL HAVE TRANSVERSE CONTRACTION JOINTS AT 5' INTERVALS AND TOOL ROUNDED BEFORE BROOMING. ALL EDGES SHALL BE TOOL ROUNDED AND SHINED (3") AFTER BROOMING.
3. WHEN EXISTING DRIVEWAY CANNOT BE MATCHED TO NEW DRIVEWAY WITHIN SLOPE LIMITATIONS SHOWN, ADJUST EXISTING DRIVEWAY-NOT CURB AND SIDEWALK GRADE.
4. EXPANSION JOINTS 1/2"X3 1/2" PREMOLDED JOINT MATERIAL AT LOCATIONS SHOWN.
5. THE DIMENSIONS OF DRIVEWAY APPROACH SHALL NOT BE ADJUSTED WITHOUT SPECIFIC PRIOR (BEFORE FORMING) APPROVAL OF THE INSPECTOR.
6. CONCRETE STRENGTH SHALL BE 3000 PSI IN 28 DAYS.
7. THE 50H:1V CROSS-SLOPE OF SIDEWALK IS MEASURED FROM HORIZONTAL.
8. SEE SIDEWALK DETAILS FOR RESTRICTIONS AND SPECIFICATIONS NOT SHOWN.
9. CONFORM TO VISION CLEARANCE REQUIREMENTS AS FOUND IN COH DEVELOPMENT CODE.

CITY OF HUBBARD

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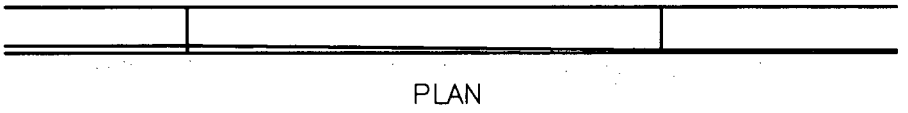
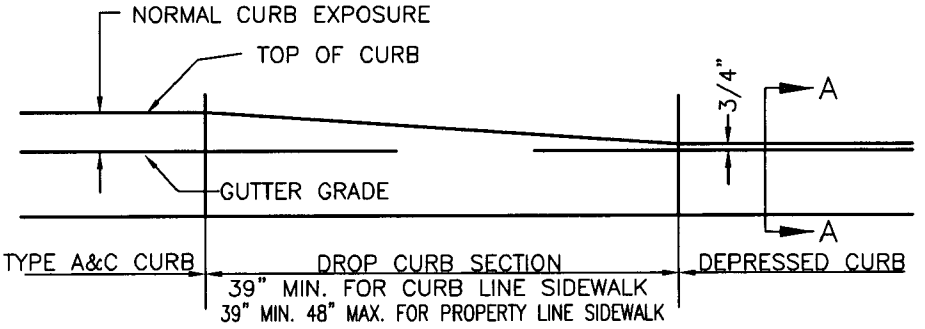
STANDARD DETAIL DRAWING

DRIVEWAY APPROACH
PROPERTY LINE SIDEWALK

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 302

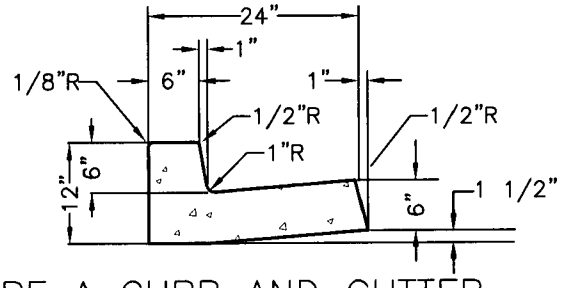


PLAN

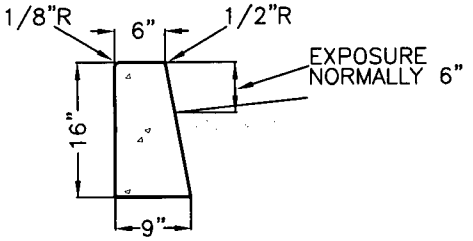


ELEVATION

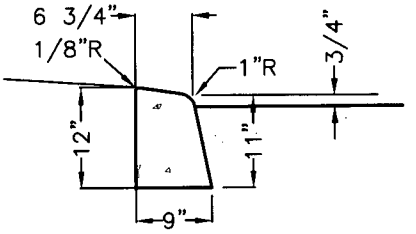
TYPICAL DRIVEWAY TRANSITION



TYPE A CURB AND GUTTER



TYPE C CURB



SECTION A–A

NOTES

1. CURBS AND GUTTERS SHOWN MAY BE USED WITH EITHER A.C. OR P.C.C. PAVEMENTS.
2. TRANSITION FROM ONE TYPE CURB TO ANOTHER WILL BE DETAILED ON PROJECT PLANS AS NECESSARY.
3. CONTRACTION JOINT TO BE INSTALLED EVERY 10'.

CITY OF HUBBARD

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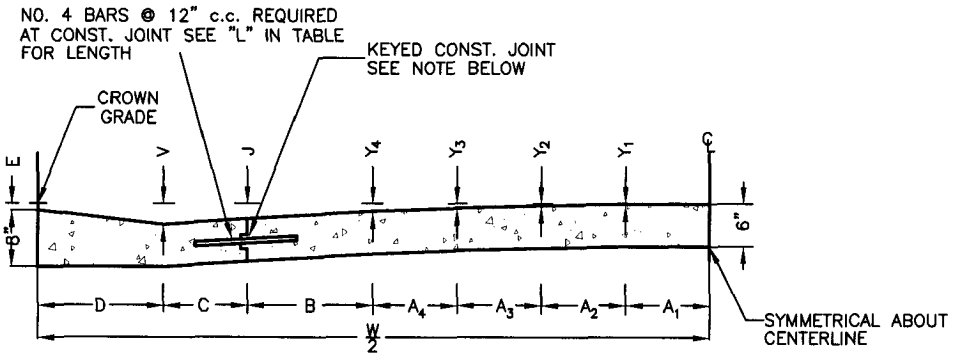
STANDARD DETAIL DRAWING

PCC CURB AND GUTTER DETAIL

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 303



HALF– SECTION OF P.C.C. ALLEY

ALLEY WIDTH – W	DIMENSIONS																		
	A_1	A_2	A_3	A_4	A_5	A_6	B	C	D	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	J	V	E	L
9'	1–0"	1–0"					1'–0"	8"	10"	0.012	0.047					0.107	0.160'	0.007	12"
12'	1–0"	1–0"	1–0"				1'–6"	8"	10"	0.006'	0.024'	0.053'				0.122'	0.160'	0.080'	12"
14'	1–0"	1–0"	1–0"	1–0"			1'–6"	8"	10"	0.005'	0.021'	0.048'	0.085'			0.160'	0.200'	0.120'	12"
16'	1–0"	1–0"	1–0"	1–0"			1'–6"	1–0"	1'–6"	0.006'	0.024'	0.053'	0.094'			0.180	0.250'	0.080'	16"
20'	1–0"	1–0"	1–0"	1–0"	1–0"	1–0"	1'–6"	1–0"	1'–6"	0.004'	0.018'	0.040'	0.071'	0.111'	0.160'	0.250'	0.320'	0.150'	16"

NOTES:

1. ALL CONC. SHALL BE CLASS 4000 P.S.I. MAX SLUMP 3" UNLESS OTHERWISE SPECIFIED BY THE ENGINEER
2. FOR FINISH, CURING AND OTHER REQUIREMENTS SEE SPECIFICATIONS.
3. ALLEY MAY BE POURED MONOLITHICLLY OR GUTTER SECTIONS MAY BE PLACED SEPARATELY AS SHOWN, IF THE SECTIONS ARE PLACED SEPARATELY THE CONSTRUCTION JOINT SHALL BE KEYED AND DOWELED

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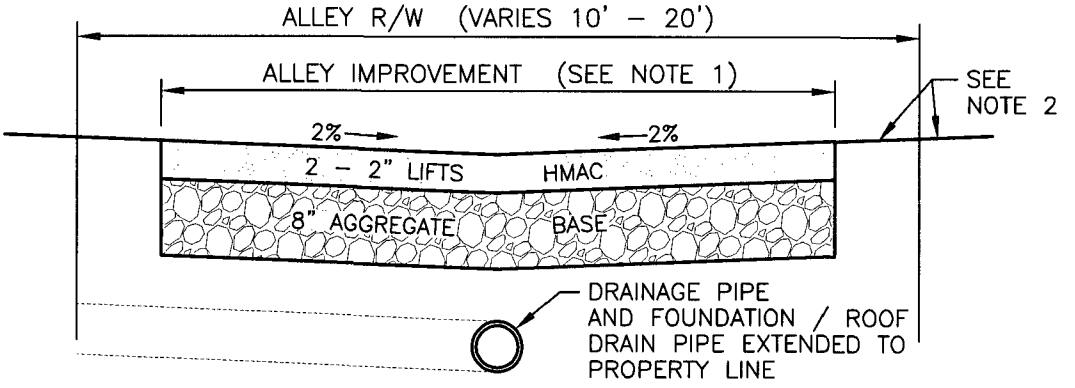
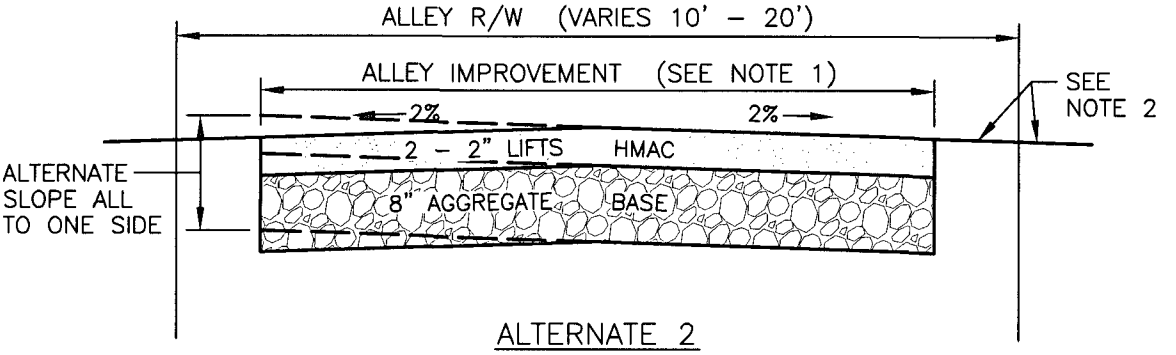
STANDARD DETAIL DRAWING

PCC ALLEY

DRAWN: K.L.C.	DATE: 9–16–08
APPROVED: W.I.P.	NO. 304



ALTERNATE 1



ALTERNATE 2

NOTES

1. ALLEY IMPROVEMENT WIDTH SHALL BE:
   FOR 10' R/W = 9' IMPROVEMENT
   FOR 12'–20' R/W = R/W WIDTH LESS 2'
2. EDGE BACKFILL MATERIAL TO MATCH ADJOINING MATERIAL
3. A.C. ALLEY WITH NO DRAINAGE (ALTERNATE 2) ONLY ALLOWED WITH SPECIFIC APPROVAL OF DIRECTOR OF PUBLIC WORKS; AND WITH WRITTEN CONSENT OF ABUTTING PROPERTY OWNERS (HEIRS, SUCCESSORS AND ASSIGNS) TO ACCEPT WATER FROM CITY OF HUBBARD ALLEY. CONSENT TO BE RECORDED WITH MARION COUNTY.

CITY OF HUBBARD

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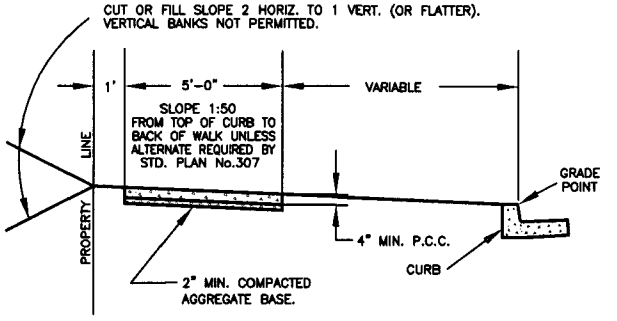
STANDARD DETAIL DRAWING	
HMAC ALLEY	
DRAWN: K.L.C.	DATE: 9–16–08
APPROVED: W.I.P.	NO. 305



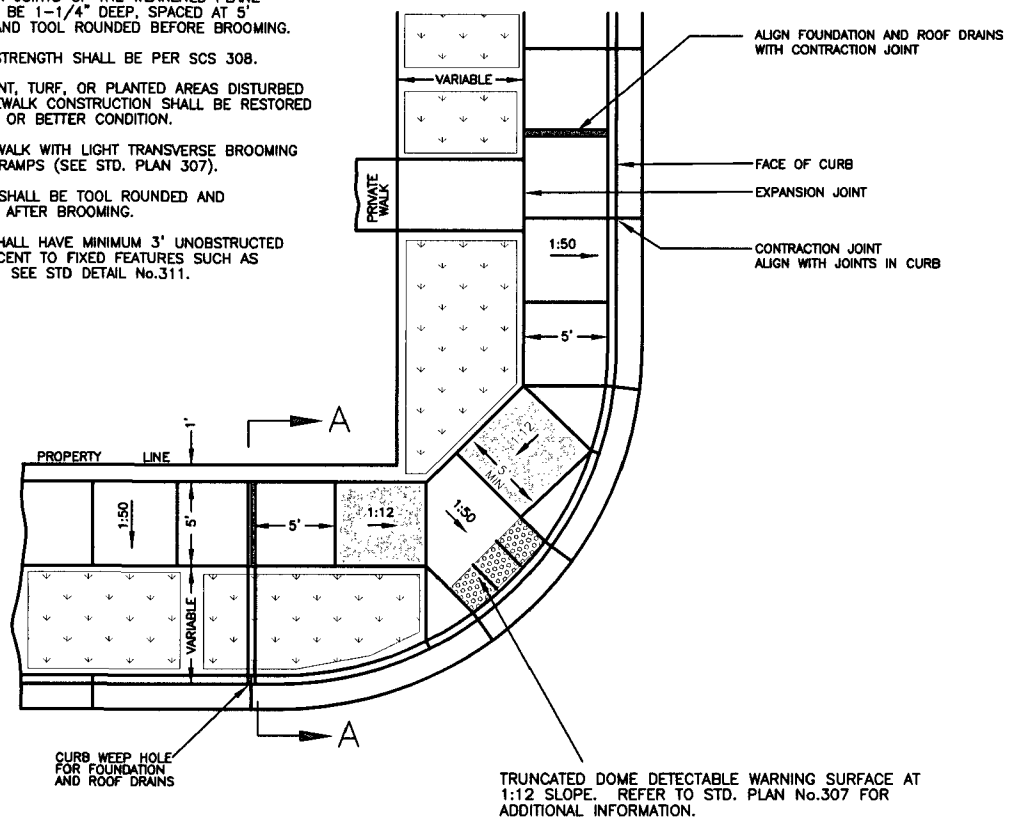
SECTION A–A

LEGEND

- EXPANSION JOINT LOCATIONS
- CONTRACTION JOINT LOCATION
- CONSTRUCT TRANSITION SLOPE TO SIDEWALK (AT 1:12 MAX. LONGITUDINAL SLOPE, BUT NOT EXCEEDING 12 FOOT TOTAL LENGTH).
- DETECTABLE WARNING SURFACE SEE STD. DETAIL 307
- LANDSCAPE AREA

NOTES:

1. EXPANSION JOINTS 1/2" X 3-1/2" PREMOLDED JOINT FILLER MATERIAL AT LOCATIONS SHOWN, HEREON AND ON STANDARD PLAN NO. 307 MATERIAL SHALL BE RECESSED OR CUT TO WITHIN 1/2" OF THE FINISHED CONCRETE SURFACE.
2. CONTRACTION JOINTS OF THE WEAKENED PLANE TYPE SHALL BE 1-1/4" DEEP, SPACED AT 5' INTERVALS AND TOOL ROUNDED BEFORE BROOMING.
3. CONCRETE STRENGTH SHALL BE PER SCS 308.
4. ALL PAVEMENT, TURF, OR PLANTED AREAS DISTURBED BY THE SIDEWALK CONSTRUCTION SHALL BE RESTORED TO ORIGINAL OR BETTER CONDITION.
5. FINISH SIDEWALK WITH LIGHT TRANSVERSE BROOMING EXCEPT AT RAMPS (SEE STD. PLAN 307).
6. ALL EDGES SHALL BE TOOL ROUNDED AND SHINED (3") AFTER BROOMING.
7. SIDEWALK SHALL HAVE MINIMUM 3' UNOBSTRUCTED WIDTH ADJACENT TO FIXED FEATURES SUCH AS MAILBOXES. SEE STD DETAIL No.311.



CITY OF HUBBARD

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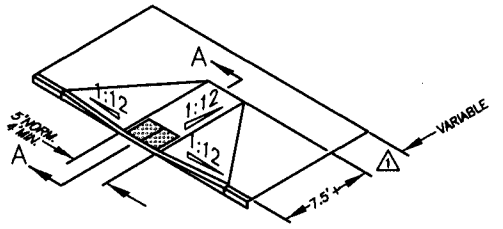
STANDARD DETAIL DRAWING

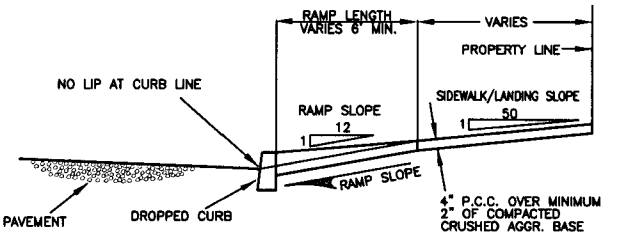
SIDEWALK DETAIL

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 306

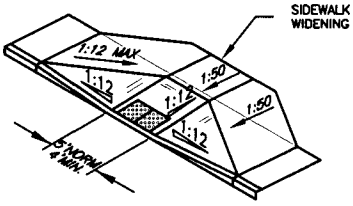


ALTERNATE CURBLINE SIDEWALK RAMP DETAIL
(SIDEWALK WIDTH 7.5' OR GREATER)

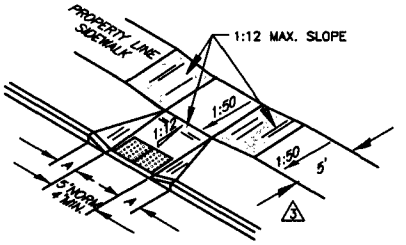
1 IF 4' OR GREATER THE SLOPE OF THE FLARED SIDES MAY INCREASE TO 1:10



SECTION A–A
NOT TO SCALE



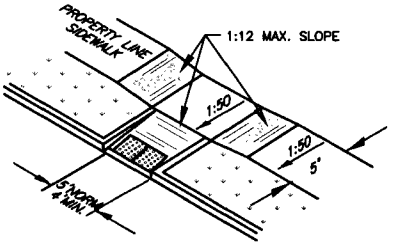
CURBLINE SIDEWALK RAMP DETAIL
(SIDEWALK WIDTH 5' OR LESS)



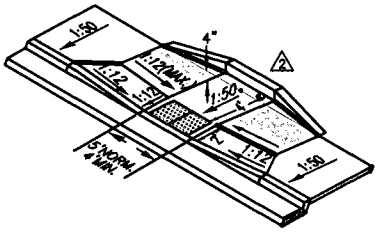
A = 24"MIN.,36"MAX.

PROPERTY LINE SIDEWALK RAMP DETAIL

3 IF THE "LANDSCAPED AREA" IS PAVED, TREAT TRANSITION LENGTH (A) THE SAME AS ALTERNATE CURBLINE SIDEWALK RAMP DETAIL.

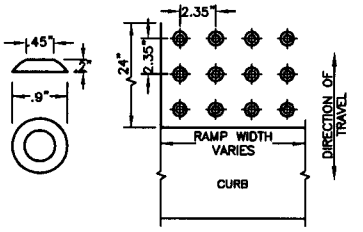


ALTERNATE PROPERTY LINE SIDEWALK RAMP DETAIL

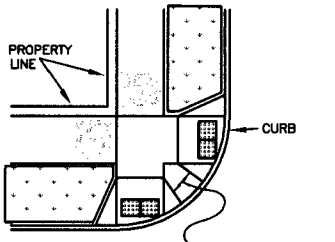


CURBLINE SIDEWALK MODIFIED SIDEWALK RAMP

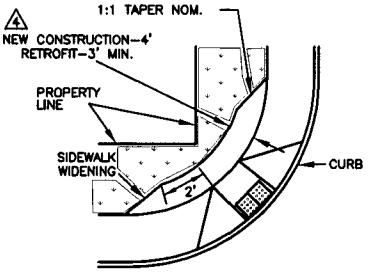
2 TRANSITION FINISH GRADE TO BACK OF RAMP AT 2:1 SLOPE. CONSTRUCT 6" WIDE CONCRETE CURB AT BACK OF RAMP IF UNABLE TO TRANSITION WITHIN 4 FEET OF BACK OF RAMP.



TRUNCATED DOME DETAIL



END RAMP
(PROPERTY LINE WALKS)



CENTER RAMP
(CURB LINE WALK)

4 NEW CONSTRUCTION IS DEFINED AS PROJECTS COMPLETELY WITHIN NEW R/W. IN RETROFITS, CONFORM TO NEW CONSTRUCTION REQUIREMENTS TO THE MAXIMUM EXTENT POSSIBLE.

LEGEND & NOTES

LANDSCAPE AREA

CONSTRUCT TRANSITION SLOPE TO SIDEWALK (AT 1:12 MAX. LONGITUDINAL SLOPE, BUT NOT EXCEEDING 12 FOOT TOTAL LENGTH).

DETECTABLE WARNING SURFACE.
- 2'x4' MIN. DETECTABLE WARNING SURFACE. LOCATE IN THE LOWER 24" OF RAMP THROAT. ARRANGE DOMES USING IN-LINE PATTERN ONLY, AS SHOWN IN TRUNCATED DOME DETAIL. USE 2' x 2' TACTILE CONCRETE PANELS CENTERED IN RAMP. COLOR OF DETECTABLE SURFACE AREA TO BE YELLOW. STANDARD BROOM FINISH ALL OTHER SIDEWALK AREAS.

1. TYPE A CURB AND GUTTER REQUIRED IN RETROFIT SITUATIONS WHERE CURB GRADE IS 2% OR LESS IN EITHER DIRECTION.

CITY OF HUBBARD

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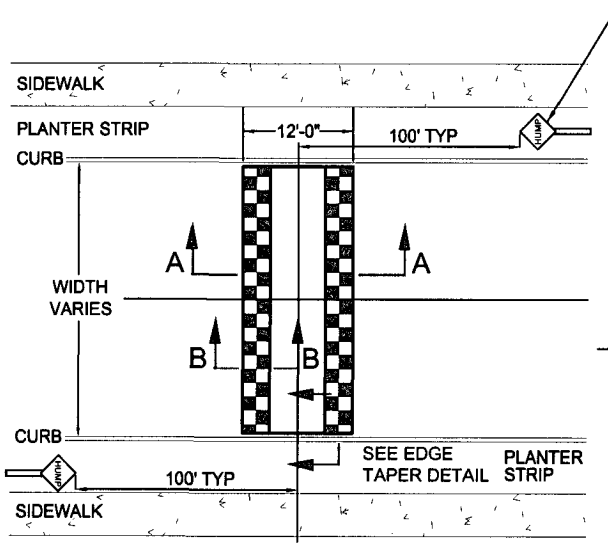
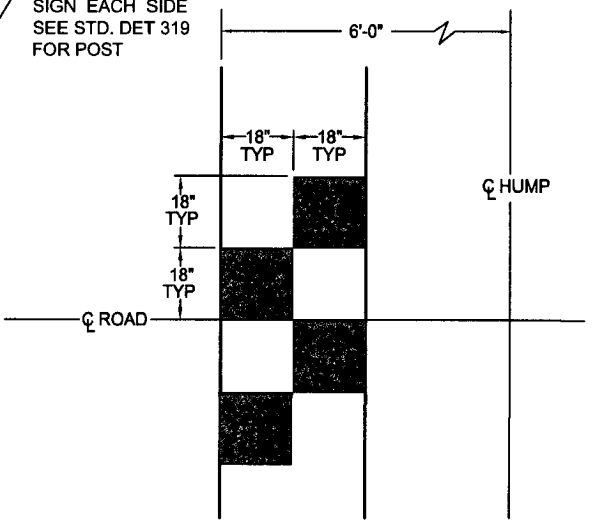
STANDARD DETAIL DRAWING

SIDEWALK RAMP

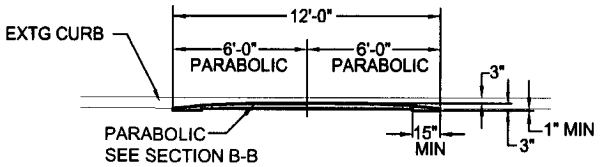
DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 307



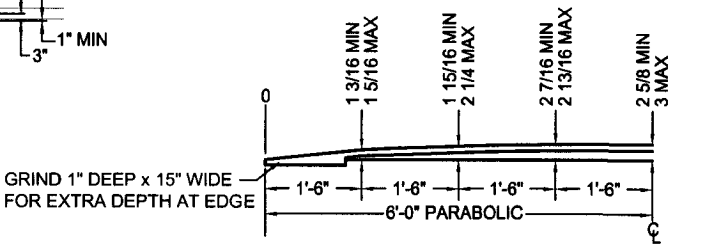
PLAN VIEW



PAVEMENT MARKING DETAIL

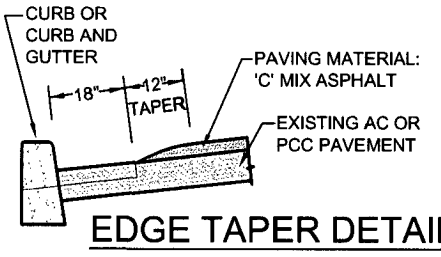


SECTION A-A



SECTION B-B

PARABOLIC CROWN



EDGE TAPER DETAIL

CONSTRUCTION NOTES:

1. Grind for extra depth at edges as shown.
2. Apply bitumal tack coat over air-blown cleaned and swept asphalt concrete.
3. Asphalt shall be rolled for compaction per specifications.
4. Finish edges by applying tack coat and sand sweeping. Tack coat shall conform to *ODOT'S Sandard* Specifications.

APPLICATION NOTES:

[Approved for use when the conditions below exist.]

1. Locations per approved plan.
2. Neighborhood Routes and Local Streets only.
3. Posted speed 25 mph.
4. Tangent sections or curves with 300 ft. radius or larger.
5. Grade less than 8%.
6. No more than 2 travel lanes.
7. Not an existing or planned Transit Route.
8. Not a Primary Emergency Vehicle Route.

CITY OF HUBBARD

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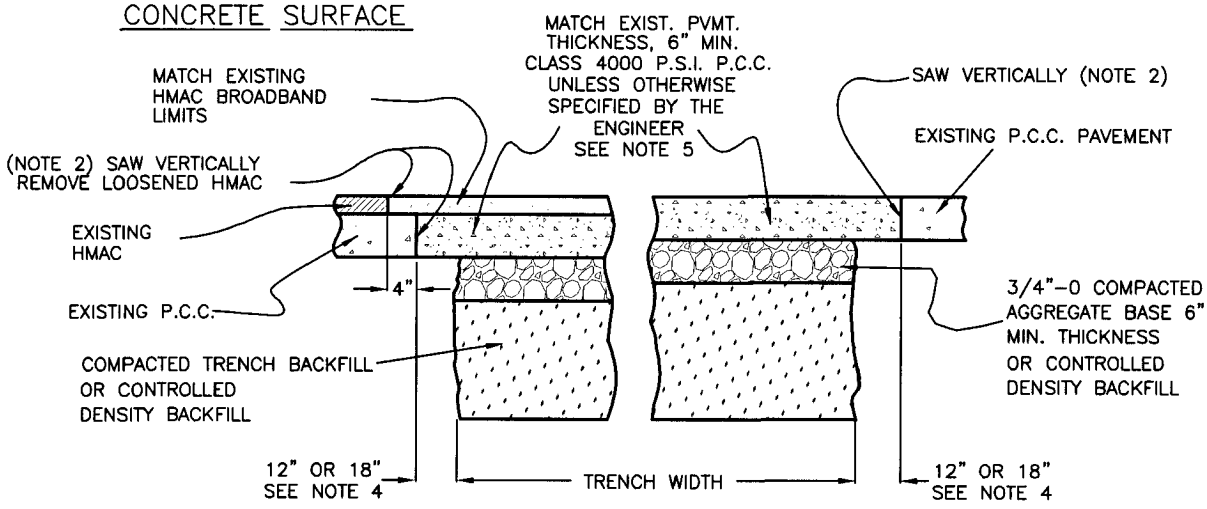
STANDARD DETAIL DRAWING

HMAC SPEED HUMP

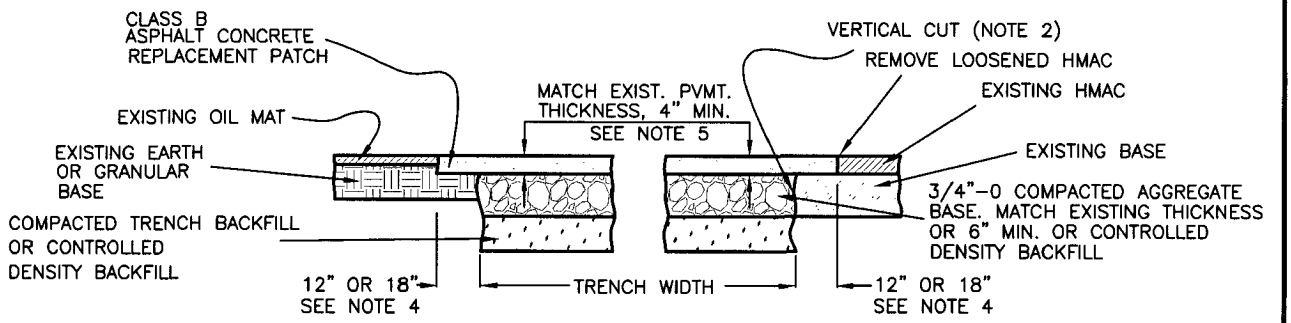
DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 308

HALF SECTION
RIGID PAVEMENT
WITH ASPHALT
CONCRETE SURFACE

HALF SECTION
P.C.C. PAVEMENT



TYPICAL PATCH FOR RIGID PAVEMENT



TYPICAL PATCH FOR FLEXIBLE PAVEMENT

NOTES

1. FINAL CUTS IN HMAC PAVEMENT SHALL BE MADE WITH A CONCRETE SAW, MORE THAN ONE CUT MAY BE REQUIRED IN AC PAVEMENTS.
2. CUTS IN P.C.C. PAVEMENT SHALL BE MADE WITH A CONCRETE SAW.
3. 1"-0 BASE AGGREGATE MAY BE SUBSTITUTED FOR 3/4"-0.
4. PAVEMENT REPLACEMENT WIDTH SHALL BE: TRENCH WIDTH PLUS 12 INCHES ON EACH SIDE FOR CONTROLLED DENSITY BACKFILL, AND TRENCH WIDTH PLUS 18 INCHES ON EACH SIDE FOR AGGREGATE BASE BACKFILL.
5. PAVEMENT REPLACEMENT THICKNESS SHALL BE AS SHOWN ABOVE FOR ROCK TRENCH BACKFILL. FOR CONTROLLED DENSITY TRENCH BACKFILL, PAVEMENT REPLACEMENT THICKNESS SHALL BE AS FOLLOWS:

STREET CLASSIFICATION	ARTERIAL	COLLECTOR	LOCAL
PORTLAND CEMENT CONCRETE	8"P.C.C.	7"P.C.C.	6"P.C.C.
A.C. OVER P.C.C.	4"A.C.	4"A.C.	4"A.C.
HMAC	4"A.C.	4"A.C.	4"A.C.

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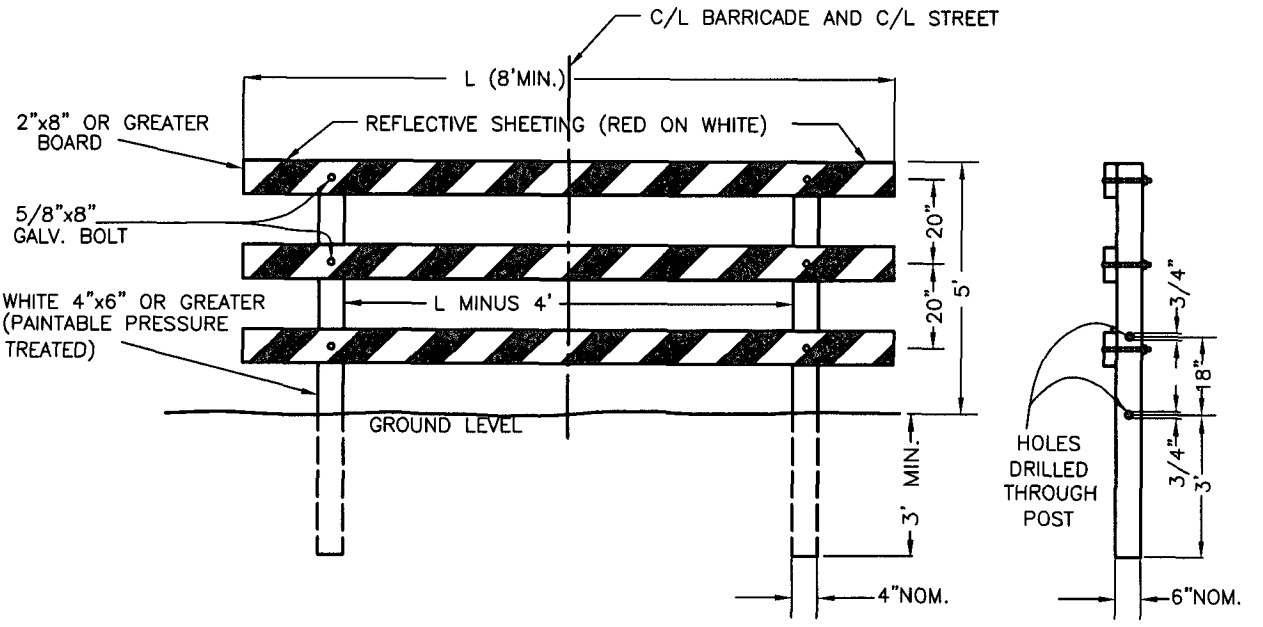
STANDARD DETAIL DRAWING

PAVEMENT PATCHING

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 309



ELEVATION

SIDE VIEW

NOTES:

1. REFLECTIVE SHEETING SHALL CONFORM TO THE LATEST EDITION OF ODOT'S STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION. SECTION 02910.
2. THE LENGTH OF THE BARRICADE UNIT "L" AND NUMBER AND POSITIONING OF UNITS SHALL BE SHOWN ON PROJECT PLANS.

CITY OF HUBBARD

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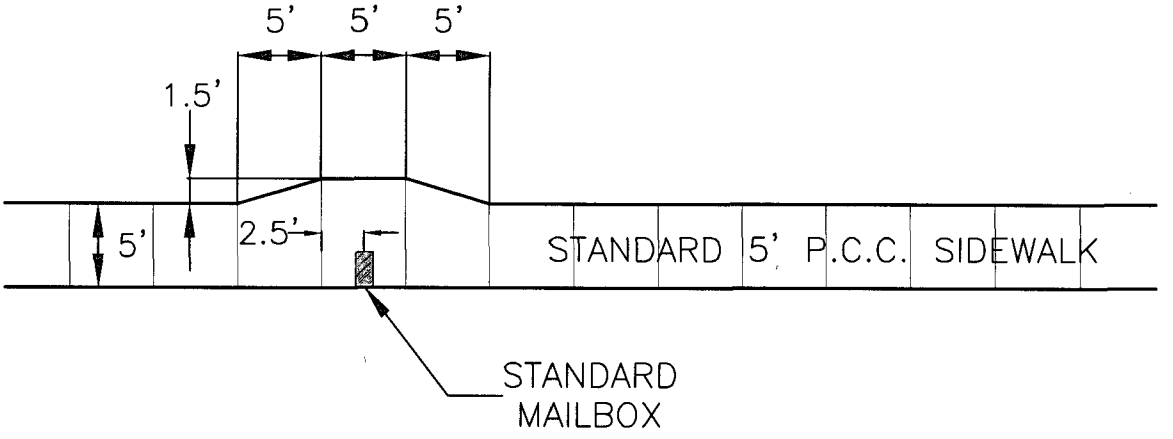
STANDARD DETAIL DRAWING

PERMANENT BARRICADE

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 310



NOTE

1. SEE STD. DETAIL 306 FOR STANDARD SIDEWALK DETAILS.
2. CONSTRUCT WIDENED SIDEWALK AT ALL MAILBOX LOCATIONS.
3. MAILBOX PLACEMENT SPECIFICATIONS:
   - FRONT FACE OF MAILBOX TO BE SET BACK 6" FROM FACE OF CURB.
   - BASE OF MAILBOX TO BE BETWEEN 38" AND 40" ABOVE CURB, GUTTER OR PAVEMENT GRADE.

CITY OF HUBBARD

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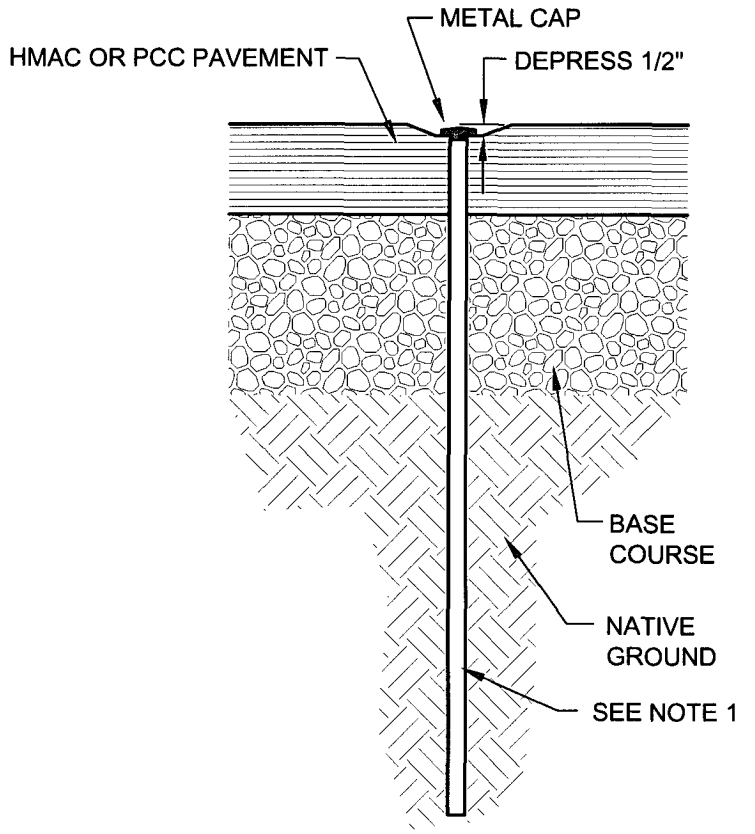
STANDARD DETAIL DRAWING

WIDEN SIDEWALKS AT MAILBOX LOCATIONS

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 311



NOTES:

1. ALL MONUMENTS SHALL USE EITHER $\frac{5}{8}$ INCH Ø X 30 INCHES LONG IRON ROD OR $\frac{3}{4}$ INCH Ø X 30 INCHES LONG IRON PIPE.
2. ALL MONUMENTS SHALL BE IN ACCORDANCE WITH THE *OREGON REVISED STATUTES* CHAPTERS 92 AND 209.

CITY OF HUBBARD

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STANDARD DETAIL DRAWING	
HMAC/PCC CENTERLINE MONUMENT	
DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 312

NOTE:
BLACK LEGEND ON REFLECTIVE WHITE BACKGROUND ON ALUMINUM SHEETING (80 GAUGE). SIGN SHALL BE MOUNTED FLUSH WITH TOP RAIL OF TYPE III BARRICADE AT THE TERMINUS OF STUBBED STREETS.

CITY OF HUBBARD

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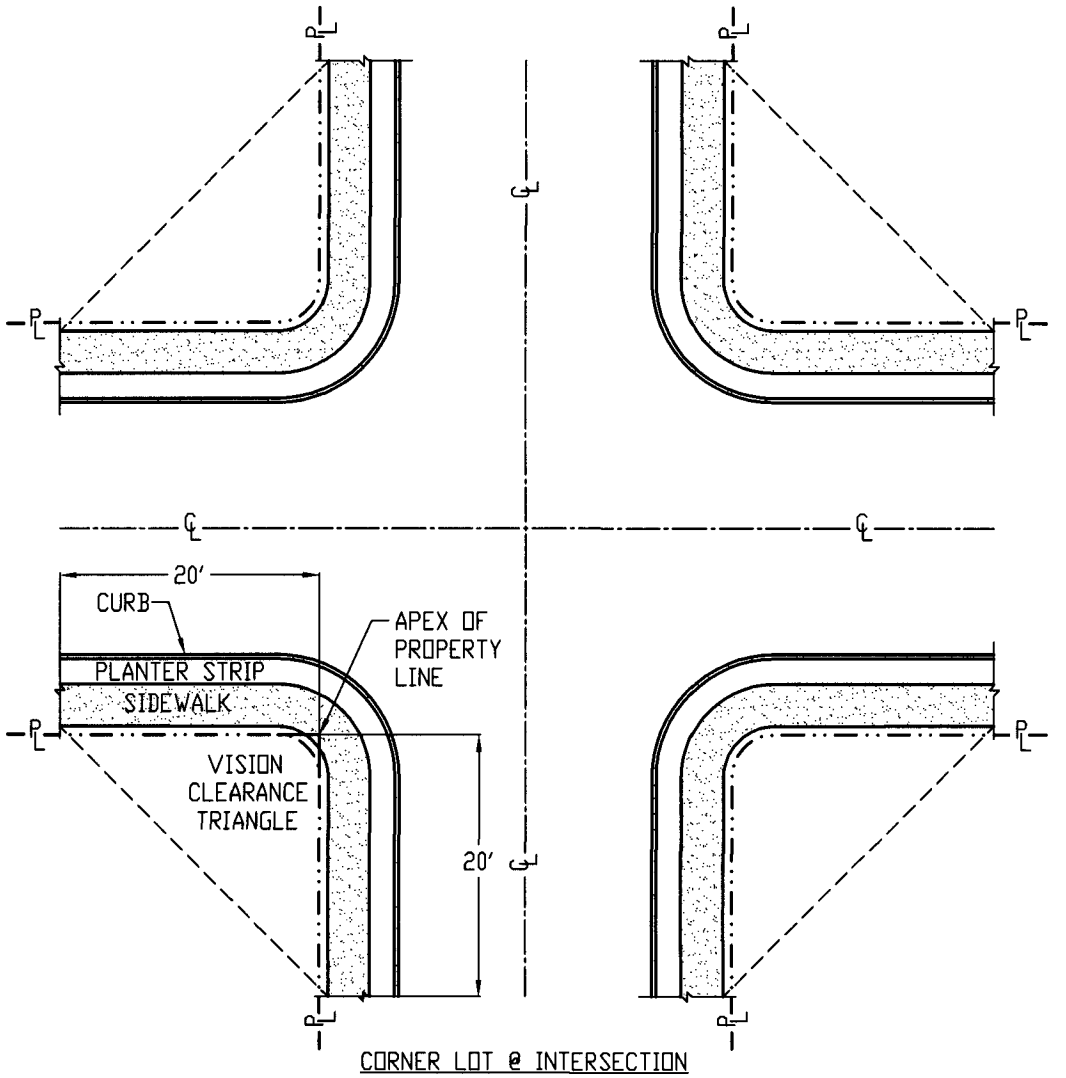
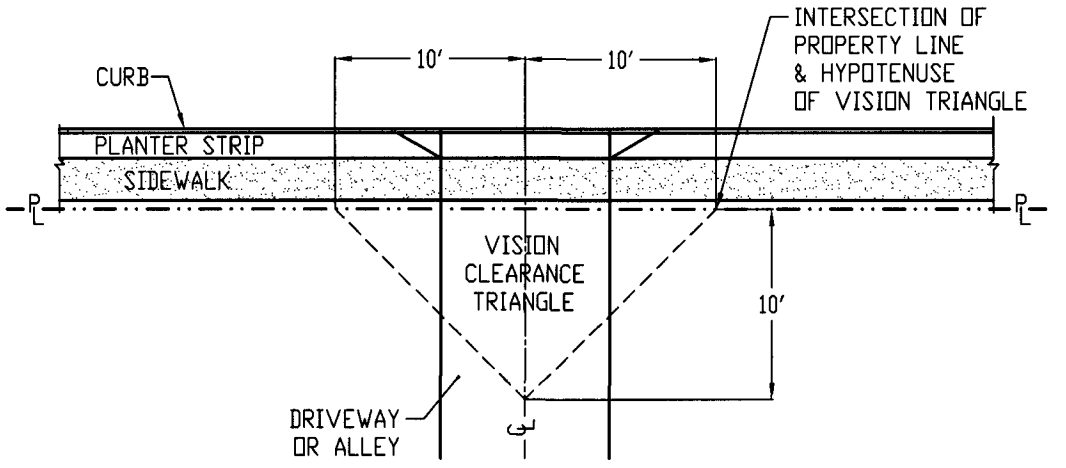
STANDARD DETAIL DRAWING	
FUTURE ST. EXTENTION SIGN	
DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 313



CORNER LOT @ INTERSECTION



STREET/ ALLEY OR STREET/ DRIVEWAY

CITY OF HUBBARD

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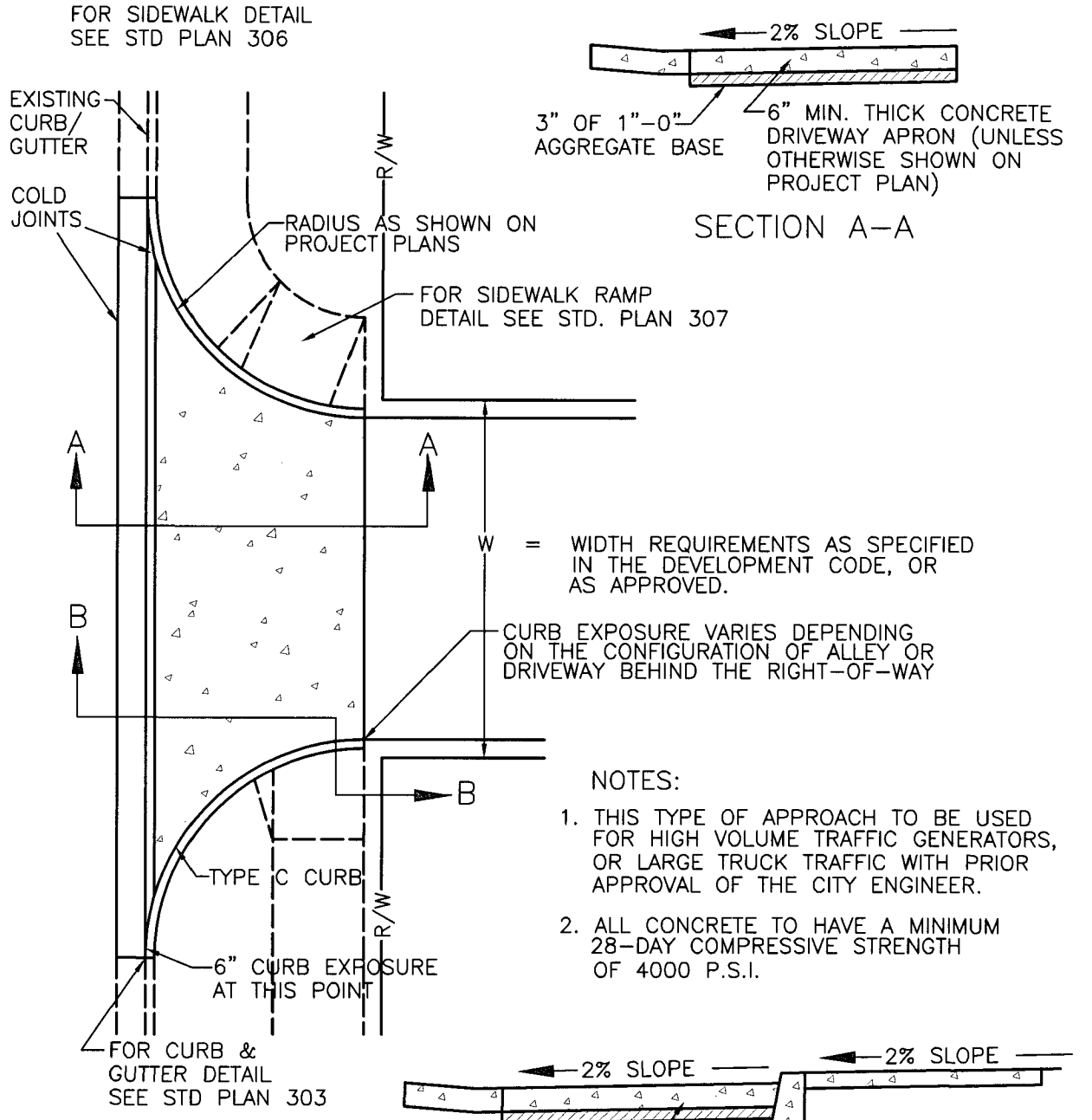
STANDARD DETAIL DRAWING

VISION CLEARANCES

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 314



CITY OF HUBBARD

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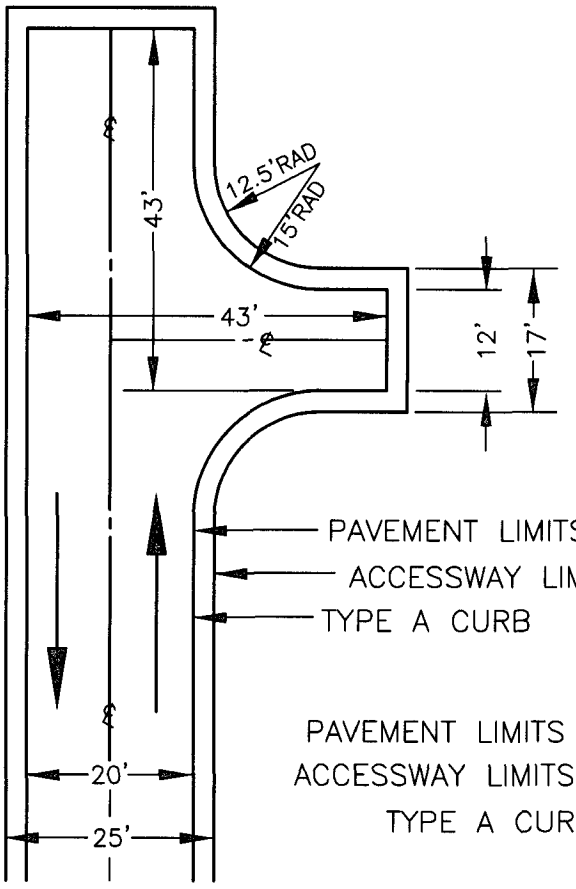
STANDARD DETAIL DRAWING

COMMERCIAL CURB RETURNS FOR DRIVEWAY AND ALLEY APPROACH

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 315

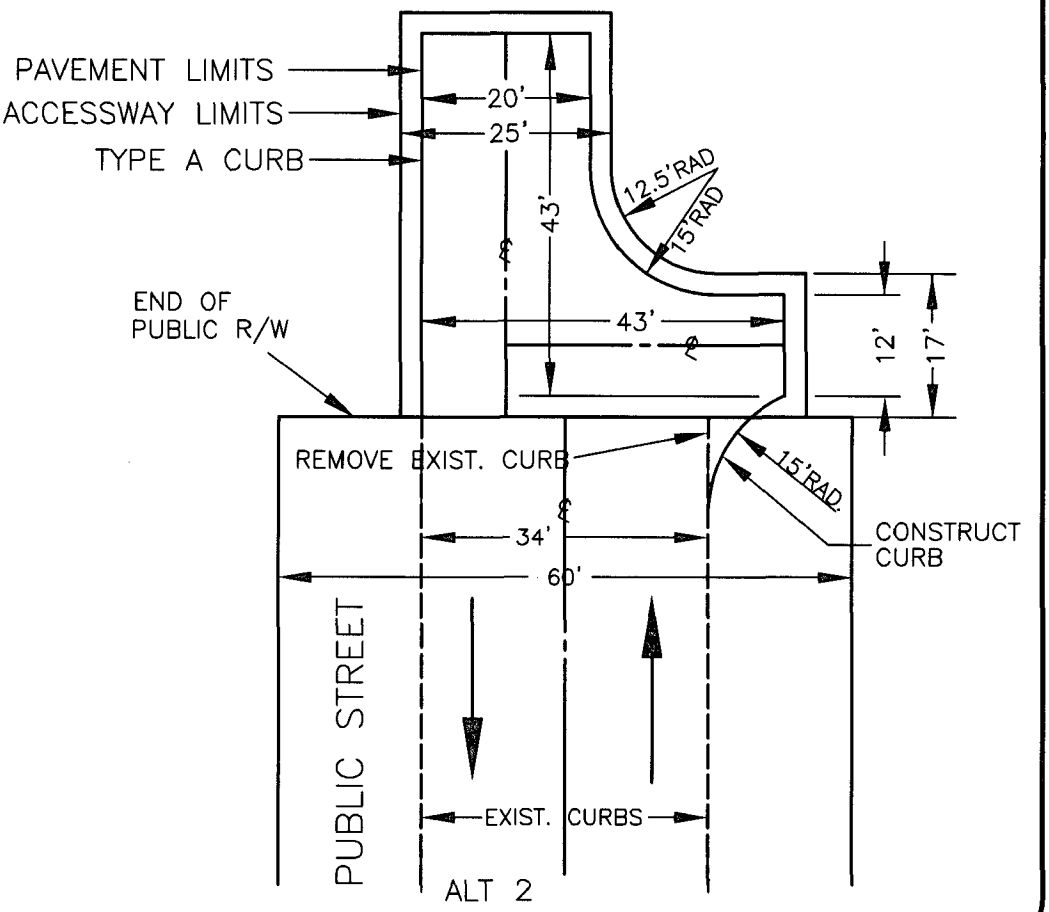


ALT 1

NOTES

1. "NO PARKING SIGNS REQUIRED WITHIN LIMITS OF ACCESSWAY AND TURNAROUND

2. THIS IS A TYPICAL DESIGN. DIMENSIONS SHALL STAY THE SAME BUT THE CONFIGURATION CAN VARY.



ALT 2

CITY OF HUBBARD

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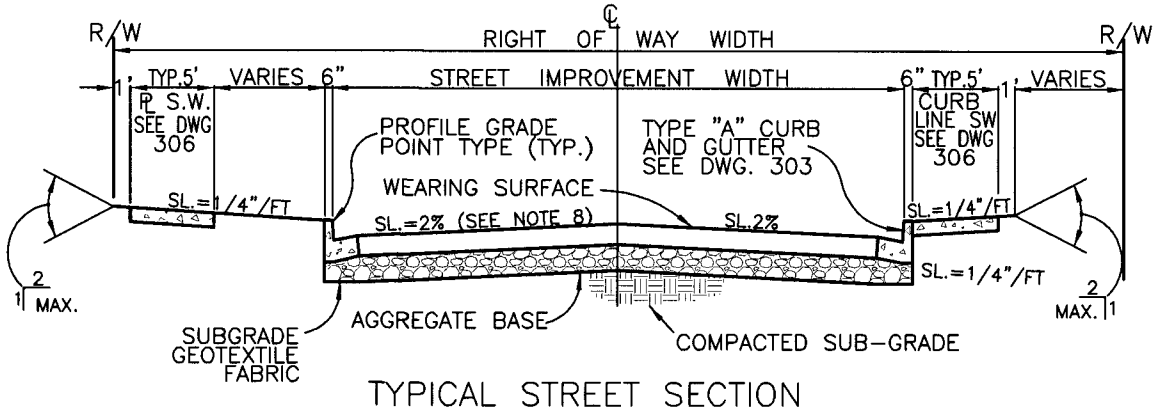
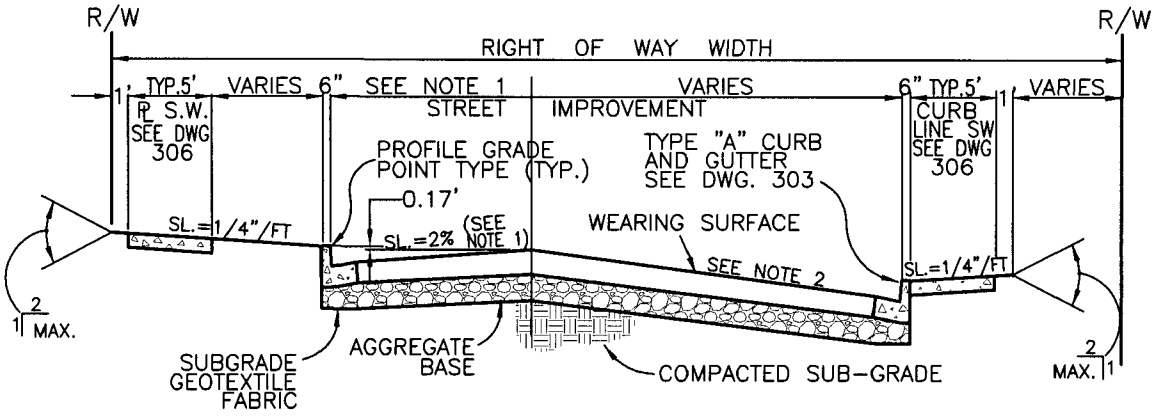
STANDARD DETAIL DRAWING

HAMMER–HEAD TURNAROUND

DRAWN: K.L.C.	DATE: 9–16–08
APPROVED: W.I.P.	NO. 316



TYPICAL STREET SECTION
℄ SECTION



TYPICAL STREET SECTION
TILT SECTION

NOTES:

1. 0 TO 0.3' TILT HAS A ℄ CROWN. 0.3' TO 1' TILT, AS DRAWN, HAS A CROWN THAT IS 0.17 BELOW AND 12' FROM HIGH CURB.
2. MAXIMUM SLOPE: LOCAL STREET = 12% COLLECTOR = 8% ARTERIAL = 6%.
3. ALTERNATE DESIGNS TO BE APPROVED BY HUBBARD PUBLIC WORKS.
4. FOR STANDARD DRIVEWAY DETAILS SEE STD. DETAIL NO.S 301 AND 302.
5. SIDEWALK LOCATION SHALL BE AS APPROVED BY HUBBARD PUBLIC WORKS.
6. FOR CLASSIFICATION (LOCAL, COLLECTOR, ARTERIAL) SEE HUBBARD TRANSPORTATION SYSTEM PLAN OR ADOPTED SECTOR PLANS.
7. FOR STREET WIDTH IN EXCESS OF 34', CROSS SLOPE SHALL BE A MINIMUM OF 3%.
8. REFER TO TABLE 21 OF THE CITY OF HUBBARD TRANSPORTAION PLAN FOR ROW WIDTH, PAVED WIDTH, TRAVEL LANE WIDTH, ETC.

CITY OF HUBBARD

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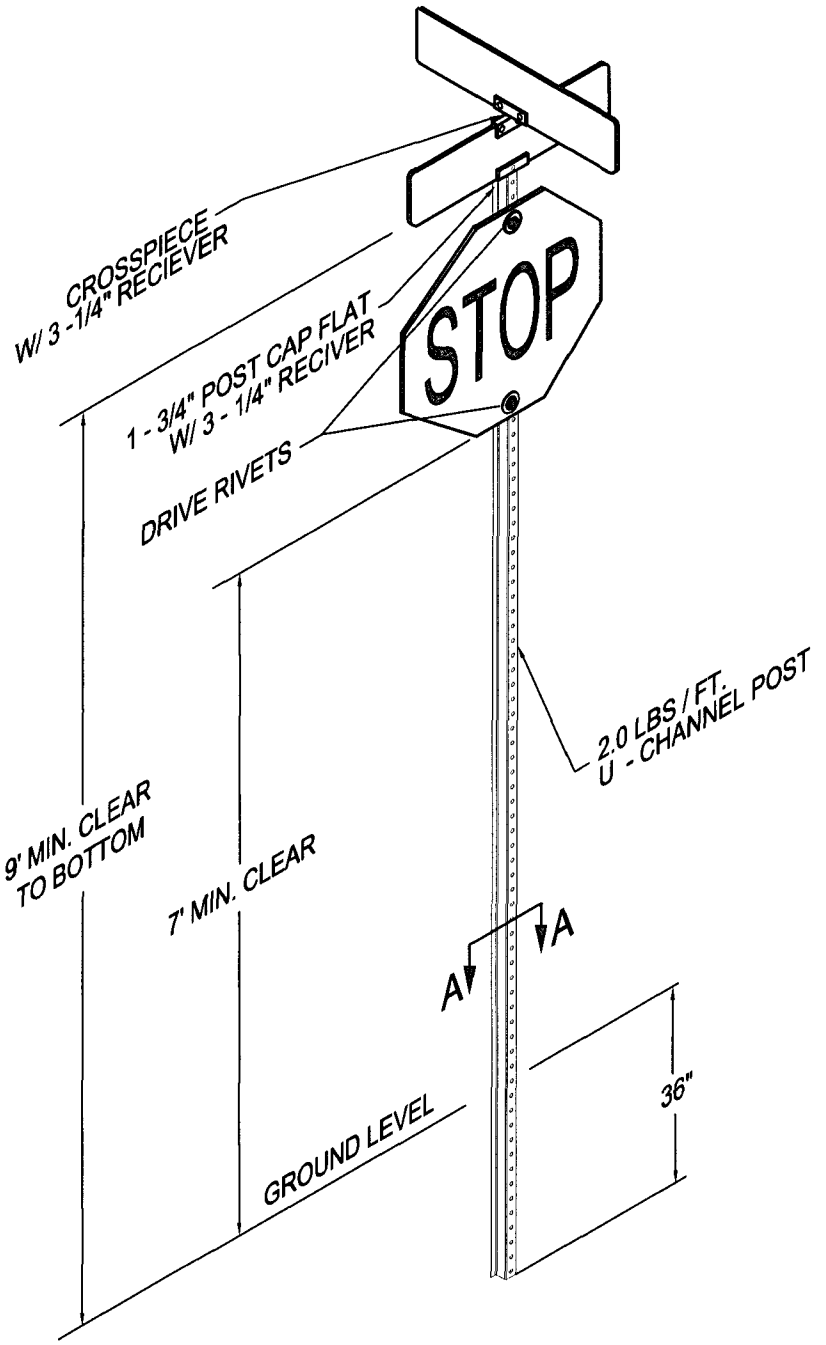
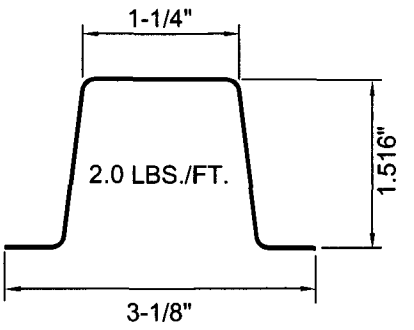
STANDARD DETAIL DRAWING

TYPICAL STREET SECTION

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 318





SECTION A - A
NTS

NOTES:

1. U - CHANNEL POST, CROSSPIECE, POST CAP, AND HARDWARE SHALL BE GALVANIZED PER ASTM A 653 DES G90.
2. CAP AND CROSSPIECE TO BE OF THE SAME STYLE.
3. PRODUCTS SHOWN AVAILABLE FROM TRAFFIC SAFETY SUPPLY CO. PORTLAND, OR. OR APPROVED EQUAL.

CITY OF HUBBARD

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STANDARD DETAIL DRAWING

TYPICAL SIGN ASSEMBLY

DRAWN: K.L.C.	DATE: 9-16-08
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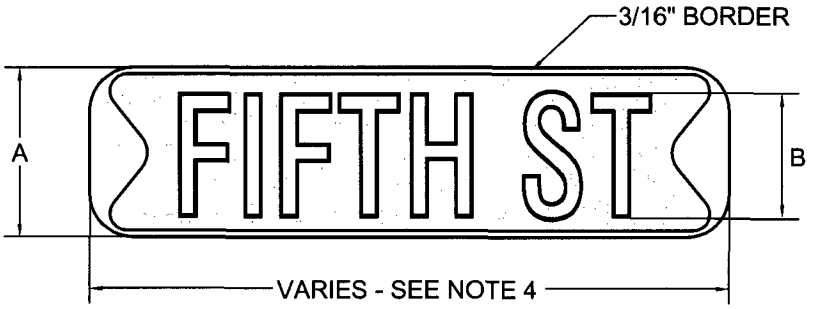

CRITICAL DIMENSIONS	
A	B
6"	4"

NOTES:

1. ON ALL STREETS WITH POSTED SPEEDS OF 25 MPH OR LESS, NEW STREET NAME LETTERS SHALL BE 4 INCHES TALL.
2. LETTER STYLES FROM THE *STANDARD ALPHABETS FOR HIGHWAY SIGNS MANUAL* SHALL BE AS FOLLOWS:
   A. FOR THE NAME OF STREET USE 4 INCH SERIES 'C'. SERIES 'B' IS ALLOWABLE FOR LONG NAMES.
3. 2 - SIDED FLAT ALLUMINUM BLADE W/ ENGINEERING GRADE REFLECTIVE SHEETING - WHITE LETTERS ON GREEN W/ SPECIAL WHITE BORDER.
4. THE MINIMUM LENGTH SHALL BE 24 INCHES AND THE MAXIMUM LENGTH SHALL BE 36 INCHES, IN 6 INCH INCREMENTS, W/ 1/2 INCH RADIUS CORNERS.
5. BOTH SIDES OF STREET NAME SIGNS SHALL BE GREEN *3M SCOTCHLITE* BRAND HIGH INTENSITY REFLECTIVE SHEETING.
6. ALL LETTERS, NUMBERS AND BORDERS SHALL BE WHITE *3M SCOTCHLITE* BRAND HIGH INTENSITY REFLECTIVE SHEETING.
7. PRODUCTS SHOWN AVAILABLE FROM TRAFFIC SAFETY SUPPLY CO. PORTLAND, OR. OR APPROVED EQUAL.

CITY OF HUBBARD

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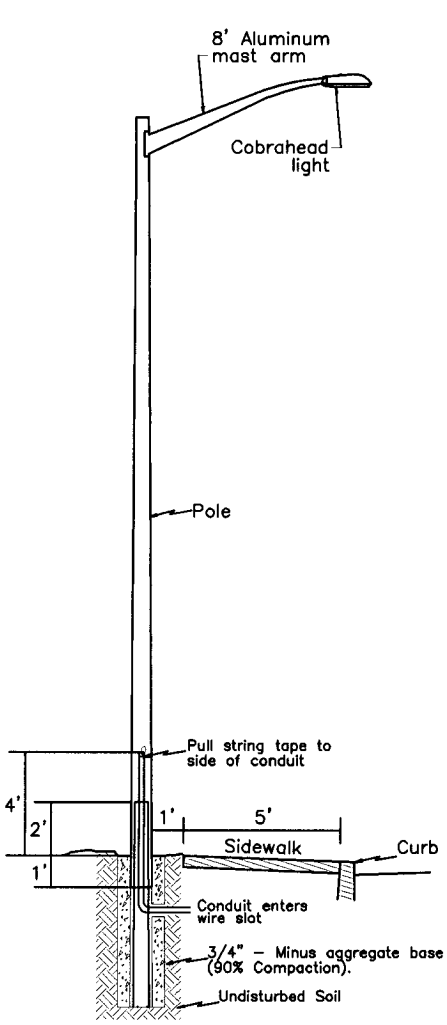
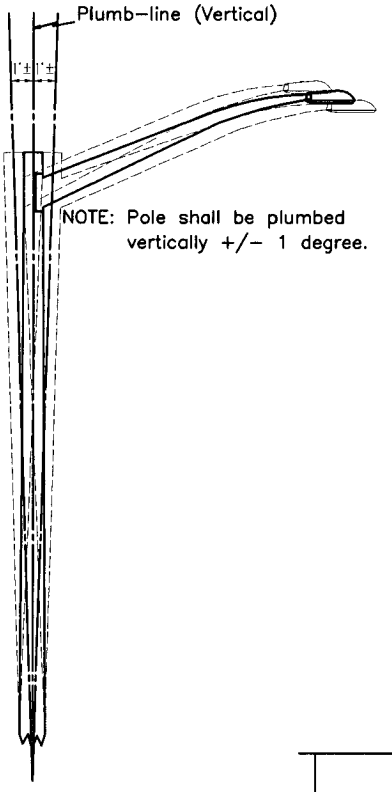
STANDARD DETAIL DRAWING

STREET NAME SIGN – 4 INCH

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 320



Typical Street Light
Curb Line Sidewalk



Typical Street Light
Property Line Sidewalk

NOTES:
1. STREET LIGHT SHALL CONFORM TO PGE INSTALLATION STANDARDS. PGE OPTION A: CONVENIENCE PLAN FOR INFILL DEVELOPMENTS WITHIN DEVELOPED AREAS. PGE OPTION B: FOR NEW DEVELOPMENTS OUTSIDE DEVELOPED AREAS, I.E. NEW SUBDIVISIONS.
2. POLE SHALL BE GRAY FIBERGLASS DIRECT BURY PER PGE SPECIFICATIONS.
3. MAST ARM SHALL BE PER PGE SPECIFICATONS.
4. LIGHT SHALL BE GRAY COBRAHEAD FLAT LENSE, 30' HIGH FOR WIDE ARTERIALS, 25' HIGH FOR COLLECTORS AND LOCALS. WATTAGE AS DETERMINED BY POLE SPACING AND IN ACCORDANCE WITH ILLUMINATION ENGINEERING SOCIETY (IES) STANDARDS. DEVELOPER SHALL CONSULT W/PGE AND PAY FOR COST OF PGE'S COST TO RUN LIGHTING LEVEL CALCULATIONS REQUIRED TO DETERMINE POLE SPACING AND LIGHT WATTAGE.
5. CONFORM TO PGE'S INSTALLATION STANDARDS FOR CONDUIT, JUNCTION BOXES, TRENCHING, ETC.

CITY OF HUBBARD

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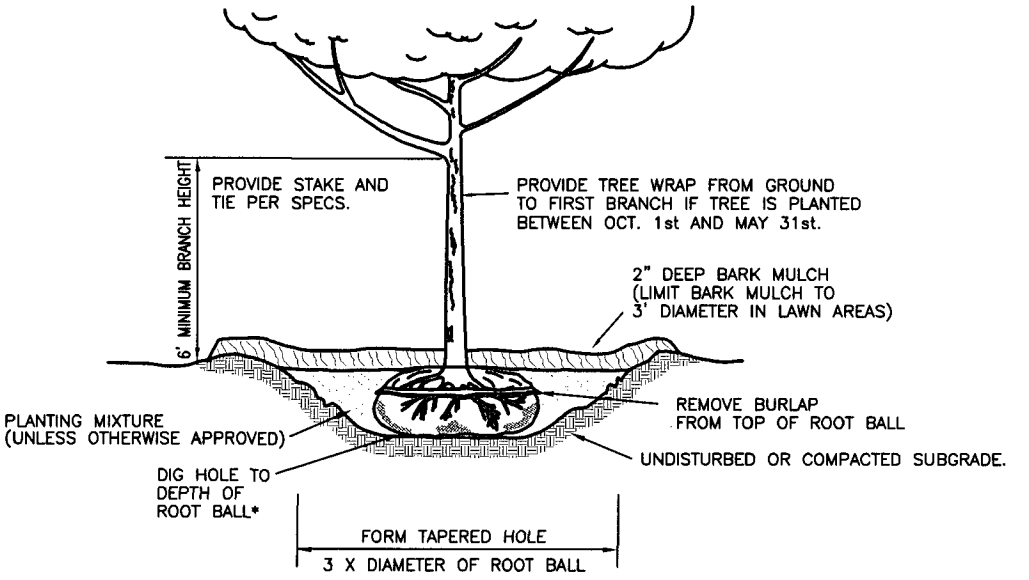
STANDARD DETAIL DRAWING

STREET LIGHT INSTALLATION

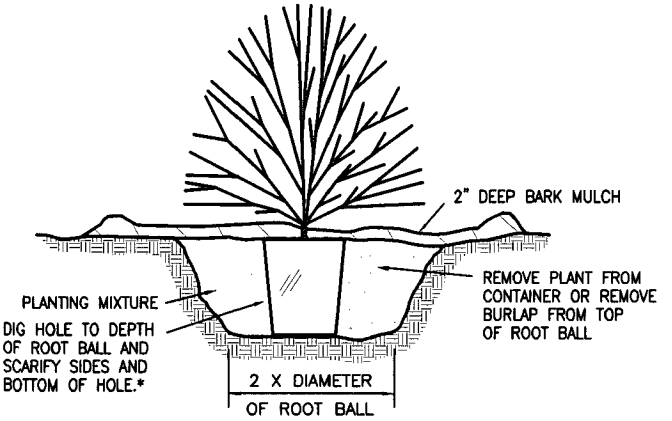
DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 321



TREE PLANTING DETAIL

NO SCALE

*NOTE:
IF DRAINAGE IS POOR, ELEVATE ROOT BALL 2" ABOVE GRADE AND SLOPE PLANTING MIXTURE AWAY FROM TRUNK. FORM A 3' DIAMETER SAUCER AROUND TRUNK. UNDER NO CONDITIONS SHOULD FILL BE PLACED IN CONTACT WITH TRUNK OR TOP OF BALL BE EXPOSED.



SHRUB AND GROUND COVER PLANTING DETAIL

NO SCALE

*NOTE:
IF DRAINAGE IS POOR, ELEVATE ROOT BALL 2" ABOVE GRADE AND SLOPE PLANTING MIXTURE AWAY FROM TRUNK. FORM A 3' DIAMETER SAUCER AROUND TRUNK. UNDER NO CONDITIONS SHOULD FILL BE PLACED IN CONTACT WITH TRUNK OR TOP OF BALL BE EXPOSED.
PLANT GROUND COVER AND SHRUBS IN ALTERNATING STAGGERED ROWS.

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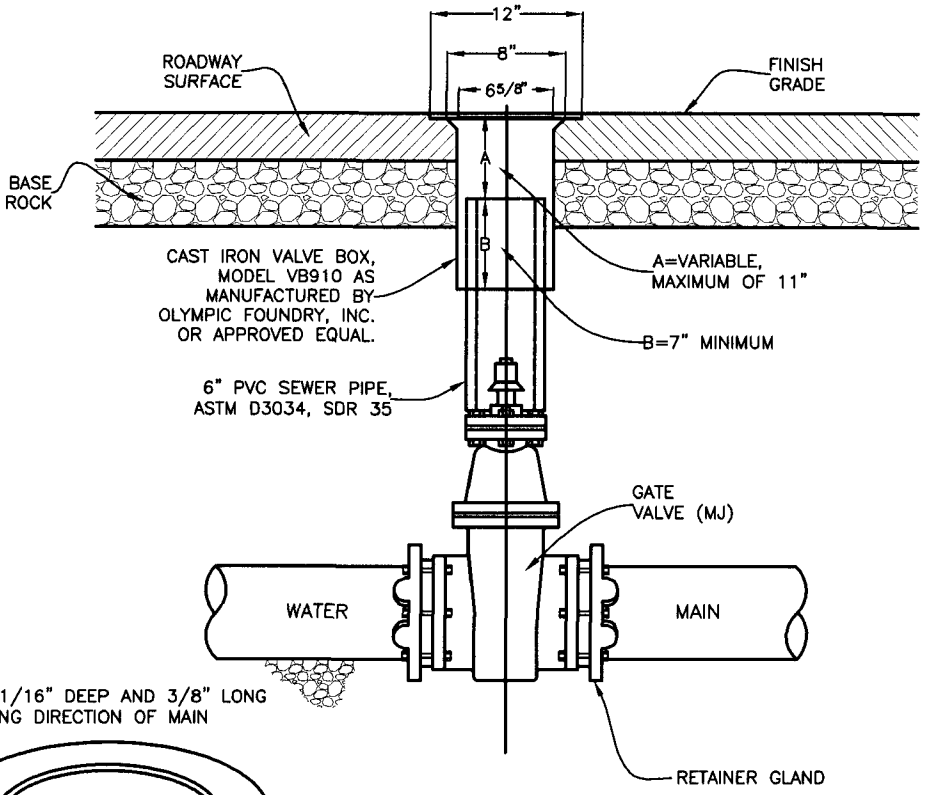
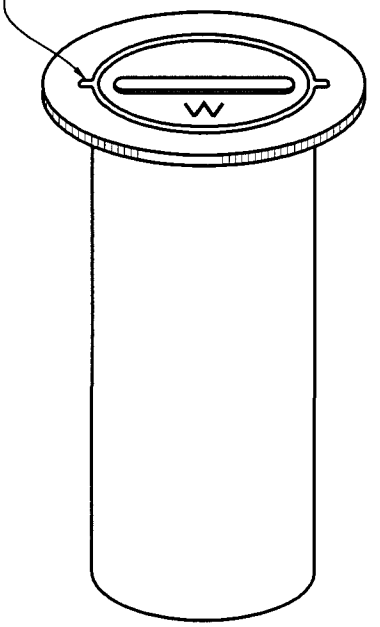
STANDARD DETAIL DRAWING

TREE–SHRUB PLANTING DETAIL

DRAWN: K.L.C.	DATE: 9–16–08
APPROVED: W.I.P.	NO. 322





"VANCOUVER"
18" TALL VALVE BOX

NOTES:

1. VALVE BOXES SHALL BE CENTERED DIRECTLY OVER THE VALVE NUT IN A VERTICAL POSITION.
2. VALVE BOX TOP SHALL BE ADJUSTED TO MEET FINISHED GRADE.
3. PVC SHALL BE ONE CONTINUOUS PIECE – NO BELLS OR COUPLERS.

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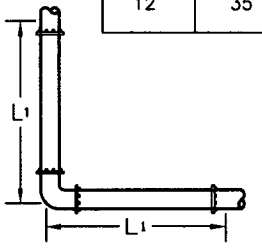
STANDARD DETAIL DRAWING

WATER VALVE BOX

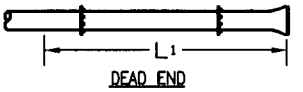
DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 400

LENGTH (L_1) OF PIPE REQUIRED FOR RESTRAINT (FEET)

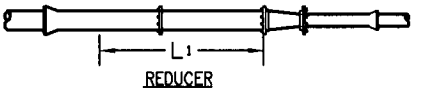
	Horizontal Bend				Dead End	Reducer (Restrained Length for Large Diameter Side)				
Diameter	90°	45°	22 1/2°	11 1/4°		4"	6"	8"	10"	12"
4"	14	6	3	2	42	--	30	55	74	93
6"	19	8	4	2	58	--	--	32	56	78
8"	25	11	5	3	76	--	--	--	31	57
10"	30	13	6	3	91	--	--	--	--	32
12"	35	15	7	4	108	--	--	--	--	--



BEND
90°, 45°, 22 1/2°, 11 1/4°



DEAD END

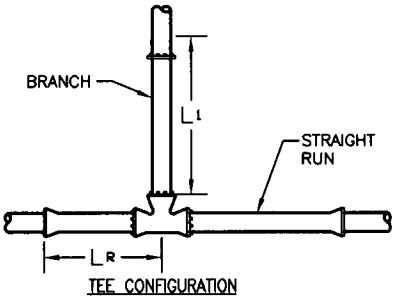


REDUCER

LENGTH (L_1) OF PIPE REQUIRED FOR RESTRAINT WHEN USING TEES (FEET)

Tee Configurations (Restraint Length for Branch) (Regardless of Straight Run Diameter)										
Branch Pipe Diameter	L_R=0	L_R=2	L_R=4	L_R=6	L_R=8	L_R=10	L_R=12	L_R=14	L_R=16	L_R=18
4"	40	28	17	5	1	1	1	1	1	1
6"	56	44	32	21	9	1	1	1	1	1
8"	73	61	49	37	26	14	2	1	1	1
10"	87	75	63	51	39	27	15	3	1	1
12"	103	91	79	66	54	42	30	18	6	1

L_R is the minimum length in either direction from tee to nearest adjacent joint



TEE CONFIGURATION

NOTES:

1. ALL JOINTS WITHIN THE LENGTH "L1" FROM THE ABOVE TABLE, SHALL BE RESTRAINED.
2. THE JOINT RESTRAINT LENGTHS CALCULATED ARE FOR FITTINGS USED TO CHANGE PIPE HORIZONTAL ALIGNMENT ONLY. FOR APPLICATIONS WHERE FITTINGS ARE USED TO CHANGE THE SLOPE OF THE PIPE, THE DESIGN ENGINEER SHALL INCLUDE THE JOINT RESTRAINT REQUIREMENTS ON THE PROJECT DRAWINGS.
3. IF AN UNANTICIPATED NEED FOR JOINT RESTRAINT ARISES TO CHANGE THE SLOPE OF THE PIPE, THE CONTRACTOR SHALL CONTACT THE DESIGN ENGINEER OR UTILIZE ANCHORS IN ACCORDANCE WITH STANDARD DRAWING NO. 402.
4. JOINT TYPES NOT COVERED ON ABOVE TABLE MUST BE DESIGNED INDIVIDUALLY IN ORDER TO DETERMINE APPROPRIATE RESTRAINED LENGTH. THIS LENGTH SHALL BE SHOWN ON THE PROJECT DRAWINGS.
5. THE SMALL DIAMETER SIDE OF A REDUCER DOES NOT REQUIRE RESTRAINT IF THE LARGE DIAMETER SIDE IS PROPERLY RESTRAINED.
6. ABOVE RESTRAINED LENGTHS ARE BASED ON:
   - TEST PRESSURE OF 150 POUNDS PER SQUARE INCH AND AWWA C900 PIPE
   - MINIMUM OF 3 FEET COVER
   - CLASS B PIPE ZONE CONDITIONS – SEE STD. DETAIL 605
   - WHEN ORGANIC OR CLAY TYPE SOILS ARE BEING USED FOR BACKFILL, GRANULAR BACKFILL MUST BE USED FOR BEDDING AND BACKFILL TO A HEIGHT OF 6 INCHES OVER THE TOP OF THE PIPE BEFORE OTHER SOILS ARE PLACED.
   - UNCOATED PIPE, THIS TABLE IS NOT APPLICABLE FOR PIPE ENCASED IN POLYETHYLENE

   ANY REDUCTION OF THESE VALUES AS A RESULT OF OTHER CONDITIONS ENCOUNTERED SHALL BE BASED ON THE APPROPRIATE EVALUATION AND RECOMMENDATION BY A QUALIFIED, REGISTERED ENGINEER AND WITH APPROVAL BY THE CITY.

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STANDARD DETAIL DRAWING

JOINT RESTRAINT

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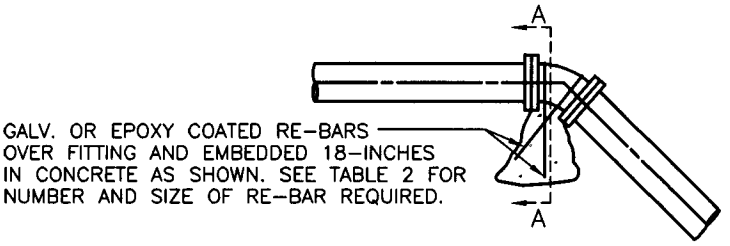
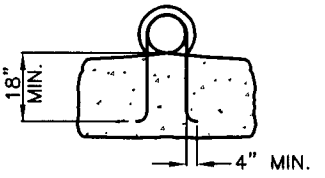
APPROVED: W.I.P.	NO. 401





SECTION A-A

N.T.S.

1. KEEP CONCRETE CLEAR OF JOINT AND JOINT ACCESSORIES.
2. THE REQUIRED ANCHOR BLOCK VOLUMES FOR SPECIAL CONNECTIONS ARE SHOWN ENCIRCLED ON THE PLAN E.G. ③ INDICATES 3 CUBIC YARDS OF CONCRETE ARE REQUIRED.
3. IF NOT SHOWN ON PLANS, REQUIRED VOLUMES AT FITTINGS SHALL BE AS INDICATED BELOW, ADJUST IF NECESSARY, TO CONFORM TO THE TEST PRESSURE(S) STATED IN THE THE SPECIAL PROVISIONS.
4. VOLUMES AND SPECIAL BLOCKING DETAILS SHOWN ON PLANS TAKE PRECEDENCE OVER VOLUMES AND BLOCKING DETAIL SHOWN ON THIS STANDARD PLAN.
5. THRUST BLOCKS FOR VERTICAL UP BENDS SHALL BE THE SAME AS FOR HORIZONTAL BENDS.

TABLE 1

FITTING SIZE	VOLUME OF CONCRETE ANCHOR BLOCK IN CU. YD.			
	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND
4	1.0	0.5	0.3	N.R
6	2.0	1.1	0.5	0.3
8	3.4	1.8	0.9	0.5
10	5.1	2.7	1.4	0.7
12	7.2	3.9	2.0	1.0
14	9.6	5.2	2.7	1.3
16	12.5	6.7	3.4	1.7
18	15.6	8.5	4.3	2.2
20	19.2	10.4	5.3	2.7
24	27.4	14.8	7.6	3.8

TABLE 2

FITTING SIZE	NUMBER & SIZE OF STEEL RE-BAR REQUIRED			
	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND
4	2-#5	2-#5	2-#5	2-#5
6	2-#5	2-#5	2-#5	2-#5
8	2-#5	2-#5	2-#5	2-#5
10	3-#5	2-#5	2-#5	2-#5
12	4-#5	2-#5	2-#5	2-#5
14	4-#6	3-#5	2-#5	2-#5
16	4-#7	4-#5	2-#5	2-#5
18	4-#7	3-#6	3-#5	2-#5
20	4-#8	4-#6	3-#5	2-#5
24	6-#8	4-#7	2-#7	2-#5

NOTE:

1. THE VOLUMES SHOWN IN TABLE 1 ARE BASED ON TEST PRESSURES OF 150 PSI AND THE WEIGHT OF CONCRETE = 4050 LBS/CU.YD.. TO COMPUTE VOLUME FOR DIFFERENT TEST PRESSURES, USE THE FOLLOWING EQUATION: VOLUME = (TEST PRESSURE/150) X (TABLE VALUE).
2. THE NUMBER AND SIZE OF RE-BAR REQUIRED SHOWN IN TABLE 2 ARE BASED UPON GRADE 40 RE-BAR WITH A TENSILE STRENGTH OF 20,000 PSI AND A FS=1.5.
3. ALTERNATE JOINT RESTRAINT METHODS SUCH AS MEGA-LUG, ETC., WILL BE ACCEPTED BY WRITTEN APPROVAL OF THE ENGINEER.

CITY OF HUBBARD

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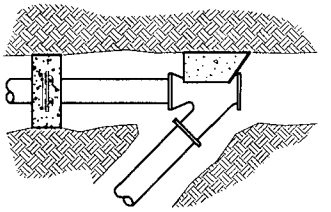
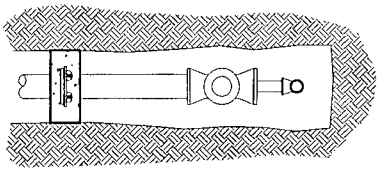
STANDARD DETAIL DRAWING

VERTICAL BEND ANCHOR BLOCK DETAIL

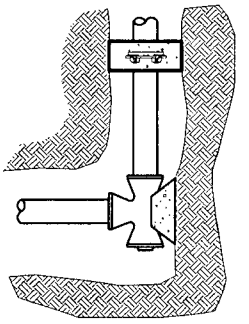
DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 402



WYE W/STD THRUST BLOCK



BLOW-OFF OR DEAD END



TEE W/STD THRUST BLOCK

REQUIRED BEARING AREA OF THRUST BLOCKS								
PIPE SIZE	I.D	AREA	TEST PRESURE	THRUST	SOIL BEARING	REQUIRED AREA	AREA INCL'G PIPE	SIZE
(INCHES	(INCHES)	(SQ. IN)	(PSI)	(POUNDS)	(PSF)	(SQ. FT.)	(SQ. FT.)	(FT. x FT.)
4	4.39	15.13	150	2,269.29	2000	1.1	1.24	1.11
6	6.30	31.16	150	4,673.50	2000	2.3	2.55	1.60
8	8.28	53.82	150	8,072.75	2000	4.0	4.41	2.10
10	10.16	81.03	150	12,154.81	2000	6.1	6.64	2.58
12	12.08	114.55	150	17,182.83	2000	8.6	9.39	3.06
14	13.50	143.07	150	21,459.94	2000	10.7	11.72	3.42
16	15.35	184.96	150	27,744.55	2000	13.9	15.16	3.89

NOTES:

1. THE AREAS SHOWN IN TABLE ARE BASED ON TEST PRESSURES OF 150 PSI AND AN ALLOWABLE SOIL BEARING STRESS OF 2,000 POUNDS PER SQUARE FOOT.

2. CONSTRUCT THRUST BLOCK AS PER STANDARD DETAIL NO. 404.

CITY OF HUBBARD

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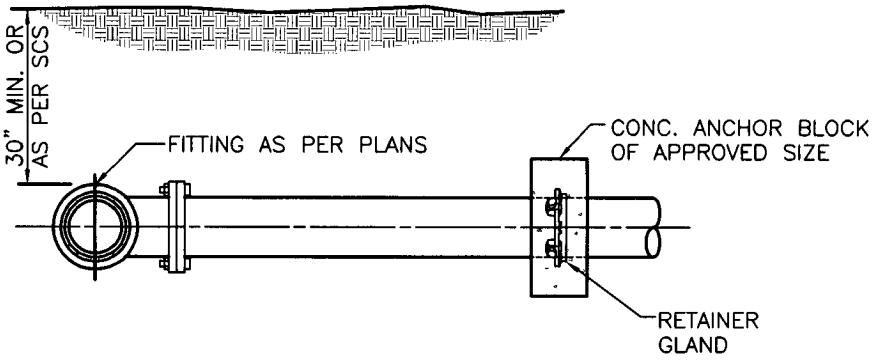
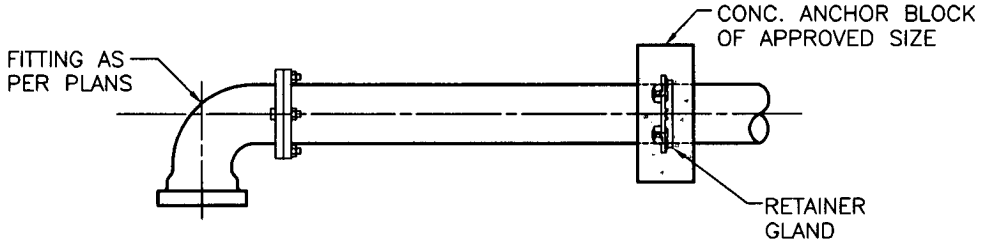
STANDARD DETAIL DRAWING

4" TO 16" THRUST BLOCK SCHEMATIC AND DIMENSIONS

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 403





NOTES:

1. CONCRETE THRUST BLOCK TO BE POURED AGAINST UNDISTURBED EARTH.
2. KEEP CONCRETE CLEAR OF JOINT AND ACCESSORIES.
3. THE REQUIRED THRUST BLOCK BEARING AREAS FOR SPECIAL CONNECTIONS ARE SHOWN ENCIRCLED ON THE PLANS: E.G. (15) INDICATES 15 SQUARE FEET BEARING AREA REQUIRED.
4. IF NOT SHOWN ON PLANS REQUIRED BEARING AREAS SHALL BE AS INDICATED ON STD DETAIL NO. 403, ADJUSTED IF NECESSARY, TO CONFORM TO THE TEST PRESSURE(S) AND ALLOWABLE SOIL BEARING STRESS(ES) STATED IN THE SPECIAL PROVISIONS.
5. BEARING AREAS AND SPECIAL BLOCKING DETAILS SHOWN ON PLANS TAKE PRECEDENCE OVER BEARING AREAS AND BLOCKING DETAILS SHOWN ON THIS PLAN AND STD. DETAIL NO. 403.
6. CONSTRUCT STANDARD (STD.) THRUST BLOCKS AS PER STD. DETAIL NO. 403.
7. TIE RODS, NUTS & WASHERS USED FOR THRUST RESTRAINT SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM A307.

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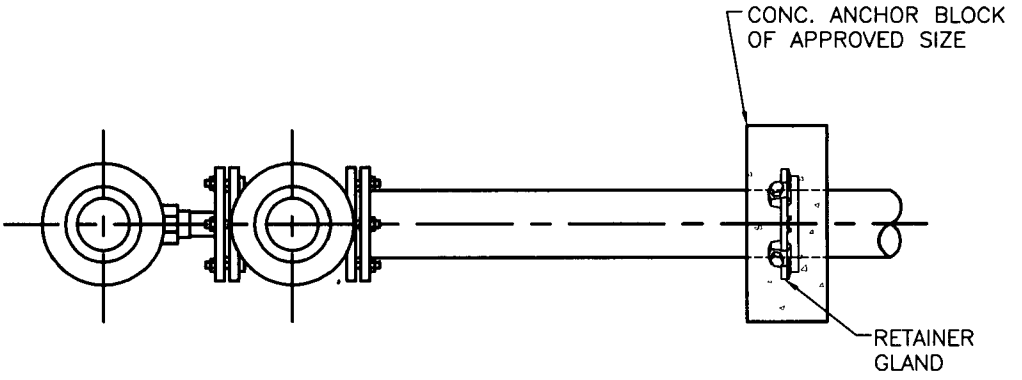
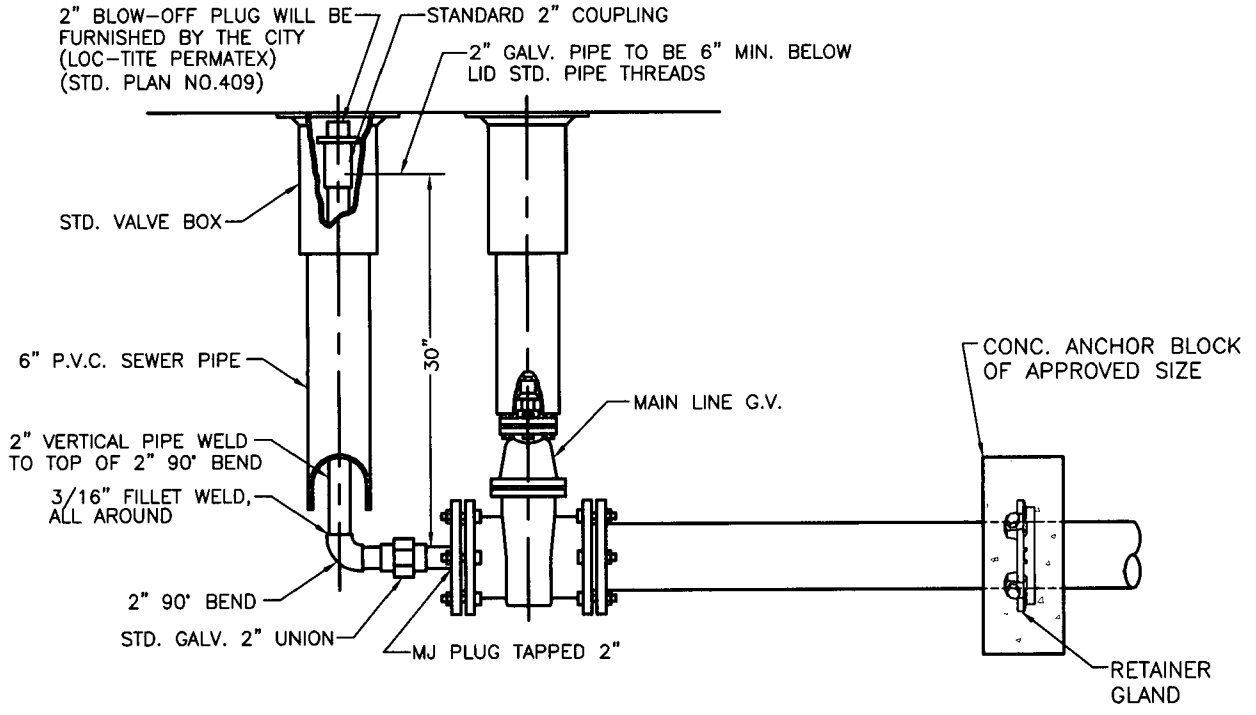
STANDARD DETAIL DRAWING

4" TO 16" IN LINE THRUST BLOCK CONSTRUCTION DETAIL

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 404





NOTES:

1. 8" MAXIMUM PIPE SIZE ALLOWED FOR 2" BLOW-OFF.

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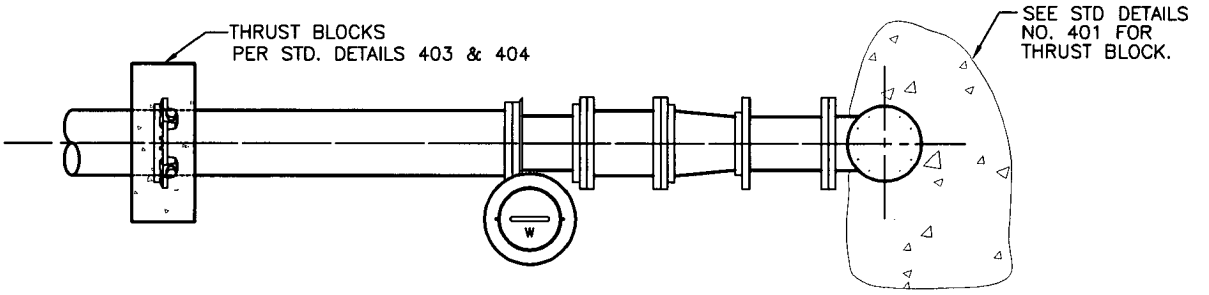
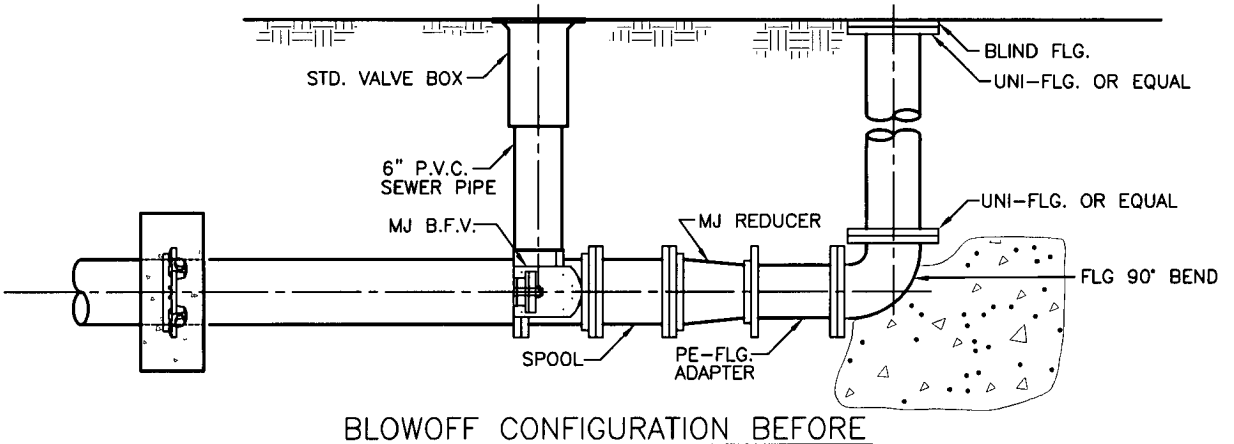
STANDARD DETAIL DRAWING

BLOWOFF WITH IN-LINE VALVE

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 405

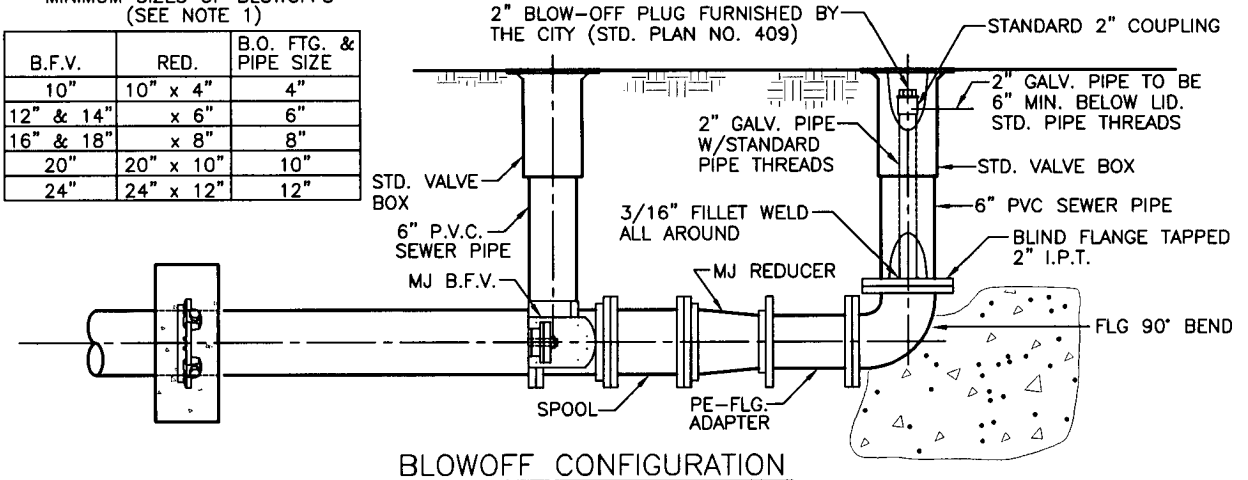




BLOWOFF CONFIGURATION BEFORE
FIRST FLUSHING OF MAIN LINE

MINIMUM SIZES OF BLOWOFFS
(SEE NOTE 1)

B.F.V.	RED.	B.O. FTG. & PIPE SIZE
10"	10" x 4"	4"
12" & 14"	x 6"	6"
16" & 18"	x 8"	8"
20"	20" x 10"	10"
24"	24" x 12"	12"



BLOWOFF CONFIGURATION
BEFORE CHLORINATION

NOTES:

1. SIZE OF B.O. & VALVE SHALL BE USED IN ABSENCE OF MORE SPECIFIC INFORMATION SHOWN ON PLANS.
2. FITTINGS MAY BE SUBSTITUTED AS APPROVED BY ENGINEER.

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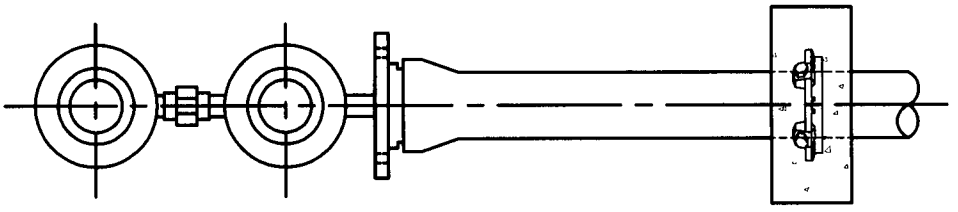
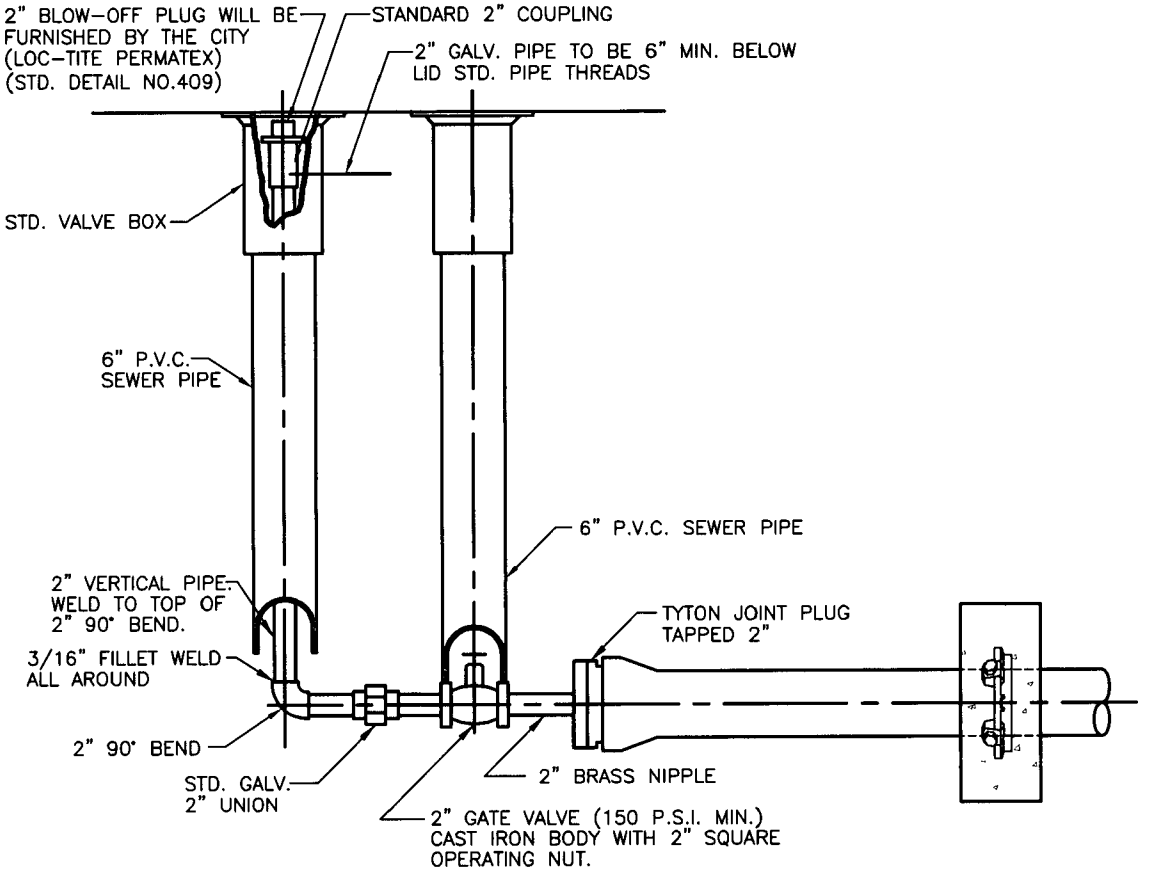
STANDARD DETAIL DRAWING

BLOWOFF WITH IN LINE VALVE FOR 10" DIA. PIPE & LARGER

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 406





NOTES:

1. 8" MAXIMUM PIPE SIZE FOR 2" BLOW-OFF.

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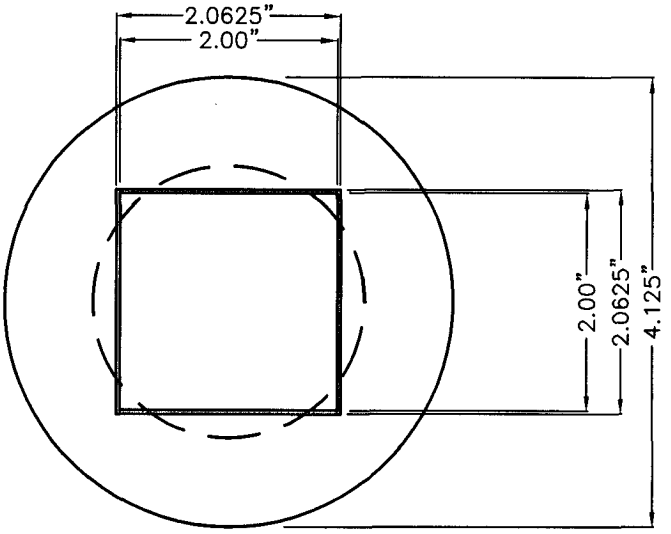
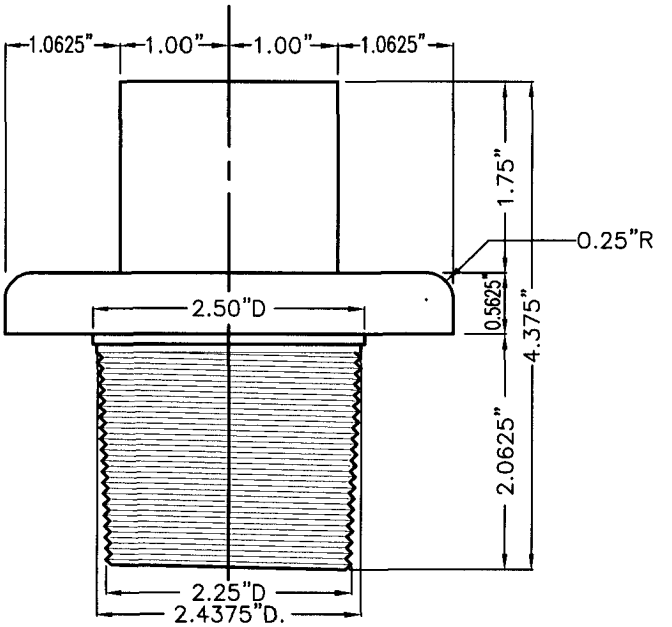
STANDARD DETAIL DRAWING

BLOWOFF WITH PLUGGED END

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 407





NOTES:

1. MATERIAL SHALL BE A.S.T.M. A-48 GRAY CAST IRON, CLASS 30.
2. APPROX. WEIGHT 5 LBS 15 OZ.
3. THREADS SHALL BE STANDARD PIPE THREAD TO MATCH 2" I.D. COUPLING.
4. REFER TO STD. DETAIL NOS. 405 AND 407 FOR LOCATION OF PLUG IN BLOW-OFF.

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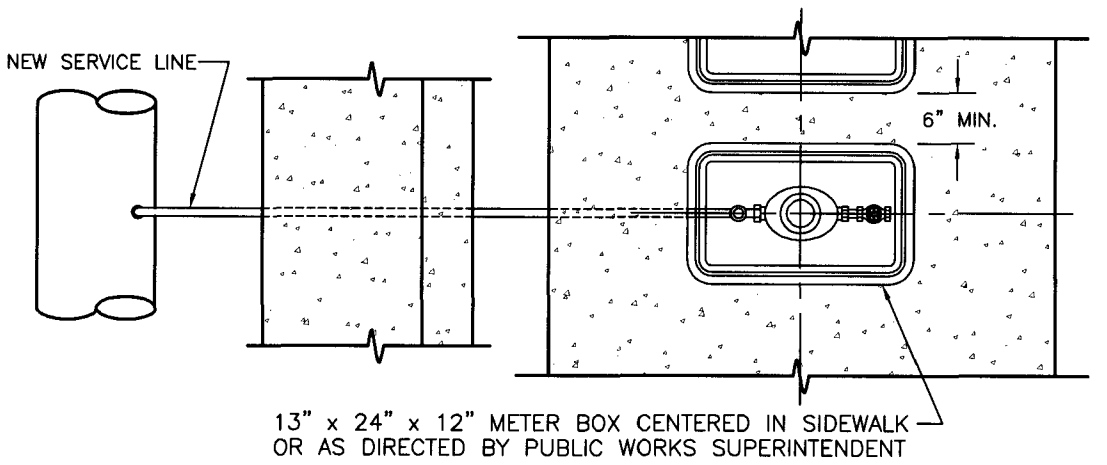
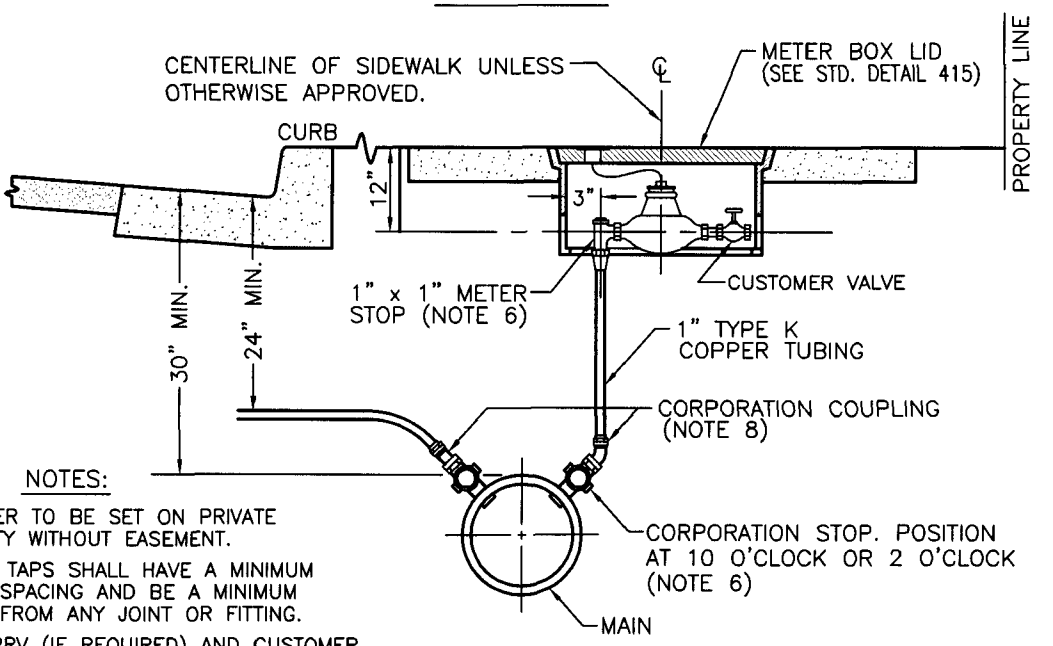
STANDARD DETAIL DRAWING

2" BLOW-OFF PLUG

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 409



PLAN



PROFILE

NOTES:

1. NO METER TO BE SET ON PRIVATE PROPERTY WITHOUT EASEMENT.
2. SERVICE TAPS SHALL HAVE A MINIMUM OF 18" SPACING AND BE A MINIMUM OF 18" FROM ANY JOINT OR FITTING.
3. METER PRV (IF REQUIRED) AND CUSTOMER VALVE TO BE INSTALLED BY CITY FORCES.
4. MAINTAIN MINIMUM 6" SPACING BETWEEN ANY TWO METER BOXES.
5. ALL NEW SERVICE TAPS ON EXISTING MAINS MUST BE DONE BY CITY FORCES.
6. CORPORATION COUPLING IS A REQUIRED FITTING. USE 0°–90° BEND AS SITUATION REQUIRES. SEE SPECIFICATIONS.

CITY OF HUBBARD

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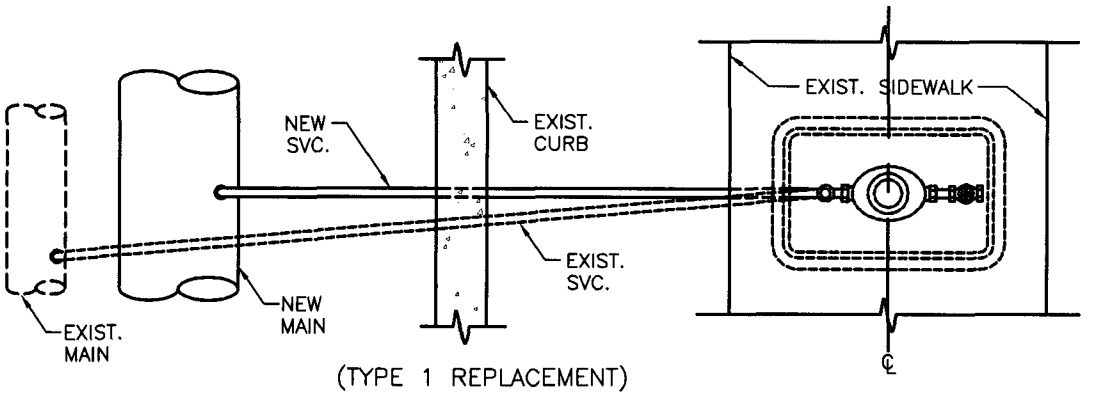
STANDARD DETAIL DRAWING

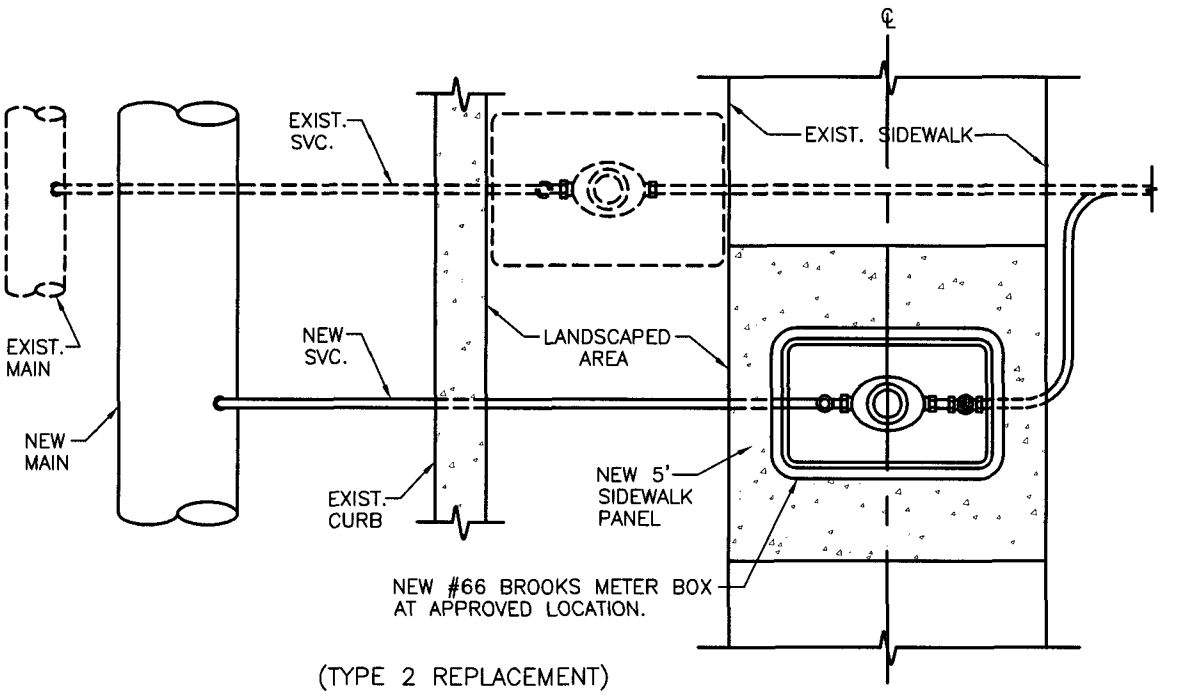
3/4" 5/8" & 1"
WATER SERVICE INSTALLATION

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 410



(TYPE 1 REPLACEMENT)

NOTES: 1. USE TYPE 1 WHEN EXISTING METER IS LOCATED WITHIN EXISTING SIDEWALK AND WATER METER/METER BOX IS NOT DESIGNATED TO BE REPLACED.
2. NEW LOCK-WING ANGLE METER STOP SHALL BE SIZED TO MATCH EXIST. METER.
3. NEW SERVICE LINE CONNECTION AT EXISTING METER SHALL BE MADE ONLY BY A LICENSED PLUMBER.
4. SEE STD. DETAIL 410 FOR ADDITIONAL INFORMATION AND NOTES.



(TYPE 2 REPLACEMENT)

NOTES: 1. USE TYPE 2 WHEN EXISTING METER IS NOT LOCATED IN AN EXISTING SIDEWALK WITHIN RIGHT-OF-WAY.
2. NEW METER AND CUSTOMER VALVE TO BE INSTALLED BY CITY FORCES.
3. CONTRACTOR TO REMOVE AND REPLACE SIDEWALK PANEL.
4. REPLUMBING OF SERVICE ON CUSTOMER SIDE OF METER SHALL BE DONE IN ACCORDANCE WITH UNIFORM PLUMBING CODE.
5. SEE STD. DETAIL 410 FOR ADDITIONAL INFORMATION AND NOTES.

CITY OF HUBBARD

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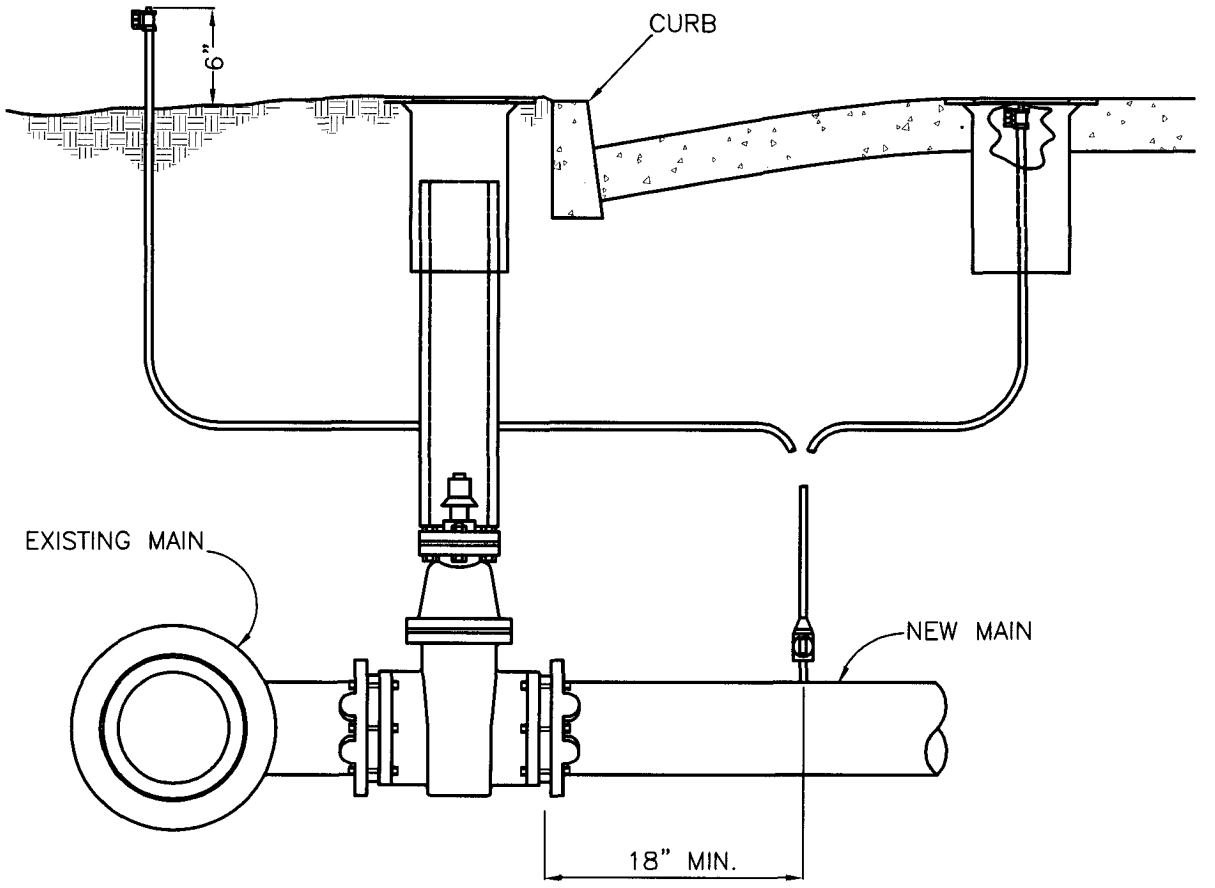
STANDARD DETAIL DRAWING

3/4" 5/8" & 1"
WATER SERVICE REPLACEMENT

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 411



NOTES:

1. VALVE BOX OVER 1" CHLORINE LINE DOES NOT NEED TO BE INSTALLED IF CHLORINE LINE IS BEHIND THE CURB. VALVE BOX IS TO BE INSTALLED ONLY WHEN CHLORINE LINE IS IN AREA COVERED BY TRAFFIC.
2. CHLORINE LINE PLACED IN AN AREA NOT COVERED BY TRAFFIC WILL BE 6" ABOVE NATURAL GROUND LEVEL, WITH ANGLE CURB STOP WITH METER COUPLING FOR 5/8" METER.
3. DISTANCE FROM GATE VALVE TO CHLORINE TAP WILL NOT BE LESS THAN 18".
4. REMOVE CHLORINE LINE AND VALVE BOX AFTER RECEIVING NOTICE OF NEGATIVE BACTERIOLOGICAL TEST AND PRIOR TO PAVING. CONTRACTOR TO PROVIDE EXCAVATION, BACKFILL, AND SURFACE RESTORATION.
5. CHLORINATION PROCESS WILL BE CONDUCTED IN ACCORDANCE WITH APPROVED SPECIFICATIONS.

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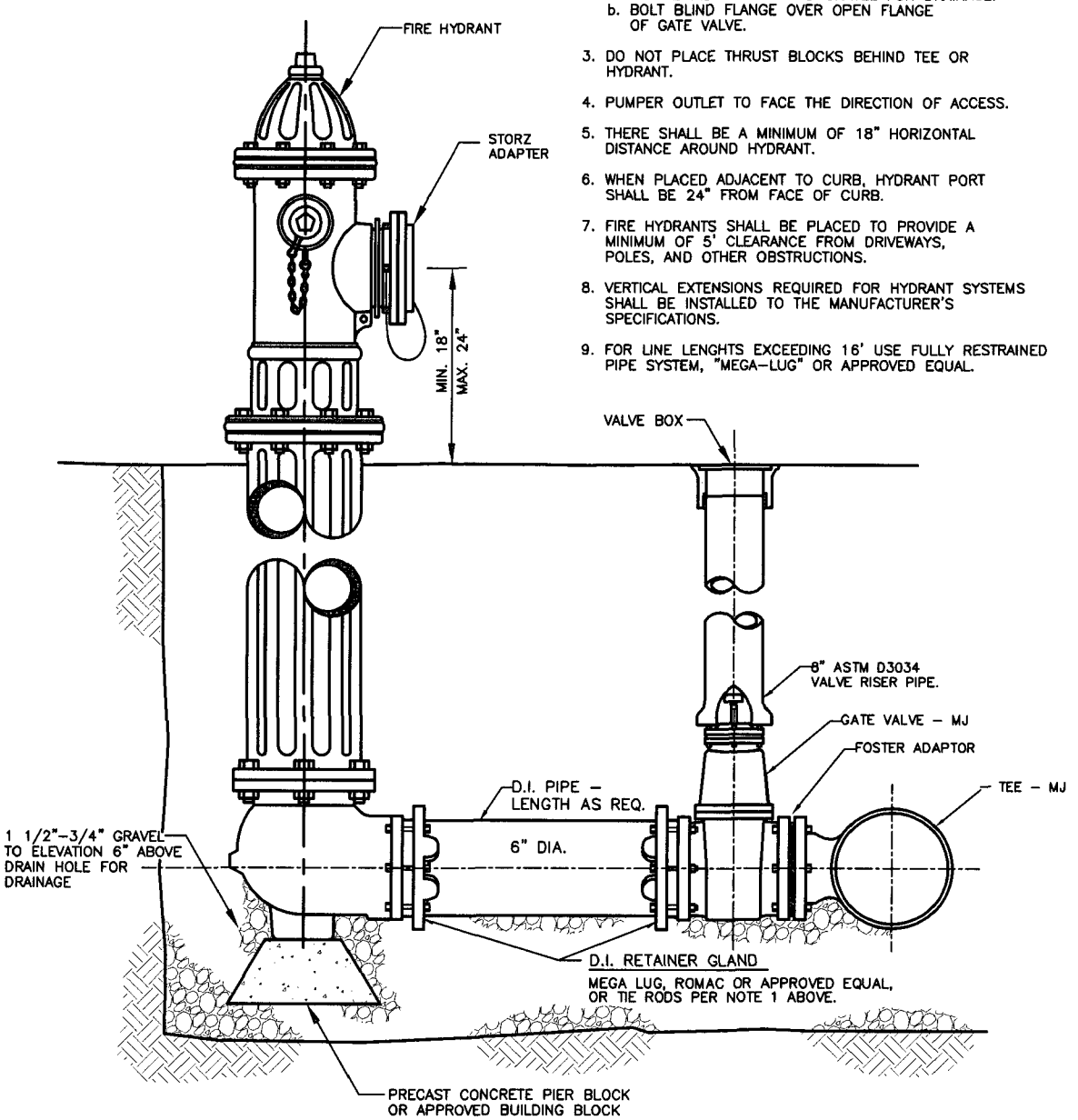
STANDARD DETAIL DRAWING

MAIN CLORINATION ASSEMBLY

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 412

NOTES

1. TIE RODS TO BE 5/8" A307 STEEL BOLT STOCK WITH 14,000 PSI TENSILE STRENGTH OR APPROVED EQUAL. ONE TIE ROD PER SIDE.
2. IF HYDRANT IS NOT INSTALLED ON STUB.
   a. DELETE PIER BLOCK AND GRAVEL FOR DRAINAGE.
   b. BOLT BLIND FLANGE OVER OPEN FLANGE OF GATE VALVE.
3. DO NOT PLACE THRUST BLOCKS BEHIND TEE OR HYDRANT.
4. PUMPER OUTLET TO FACE THE DIRECTION OF ACCESS.
5. THERE SHALL BE A MINIMUM OF 18" HORIZONTAL DISTANCE AROUND HYDRANT.
6. WHEN PLACED ADJACENT TO CURB, HYDRANT PORT SHALL BE 24" FROM FACE OF CURB.
7. FIRE HYDRANTS SHALL BE PLACED TO PROVIDE A MINIMUM OF 5' CLEARANCE FROM DRIVEWAYS, POLES, AND OTHER OBSTRUCTIONS.
8. VERTICAL EXTENSIONS REQUIRED FOR HYDRANT SYSTEMS SHALL BE INSTALLED TO THE MANUFACTURER'S SPECIFICATIONS.
9. FOR LINE LENGHTS EXCEEDING 16' USE FULLY RESTRAINED PIPE SYSTEM, "MEGA-LUG" OR APPROVED EQUAL.



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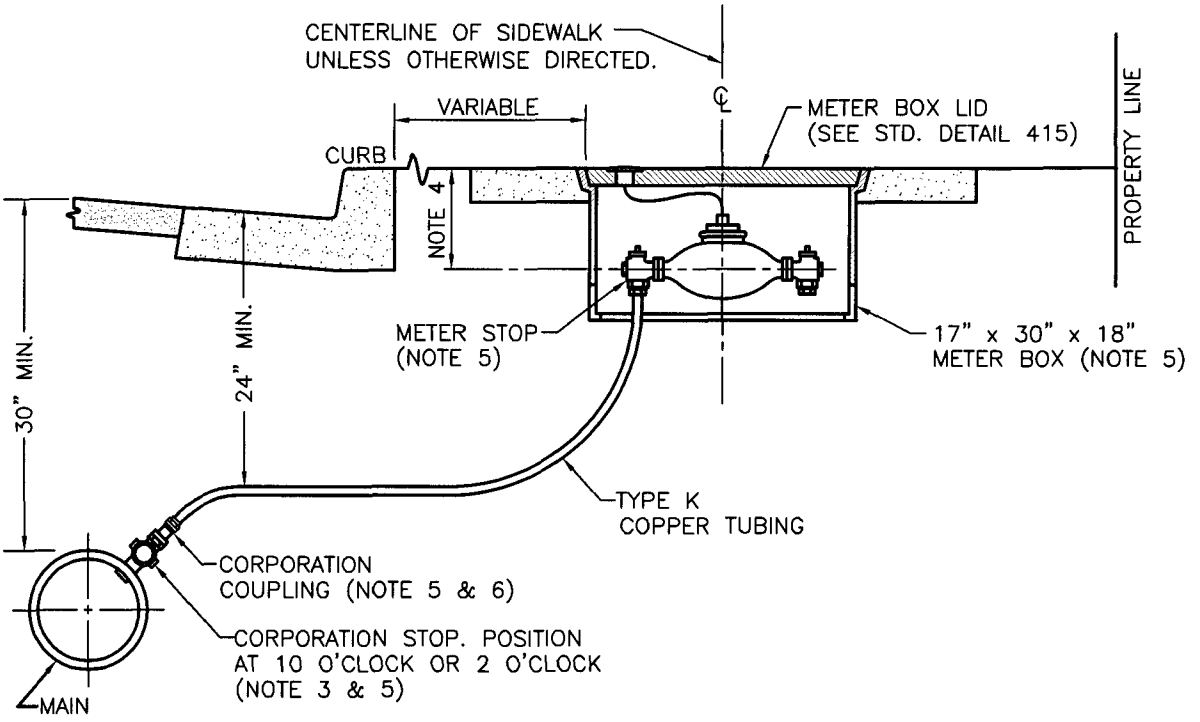
STANDARD DETAIL DRAWING

FIRE HYDRANT INSTALLATION

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 413



NOTES

1. NO METER ON PRIVATE PROPERTY WITHOUT EASEMENT
2. METER TO BE INSTALLED BY CITY FORCES.
3. SERVICE TAPS TO HAVE A MINIMUM OF 18" SPACING AND BE A MINIMUM OF 18" FROM ANY JOINT OR FITTING.
4. DIMENSION EQUALS 10" FOR 1 1/2" SERVICE, OR 15" FOR 2" SERVICE.
5. SEE SPECIFICATION AS FOUND IN COH DESIGN & CONSTRUCTION STANDARDS.
6. CORPORATION COUPLING IS A REQUIRED FITTING. USE 0°–90° BEND AS FIELD CONDITIONS REQUIRE.

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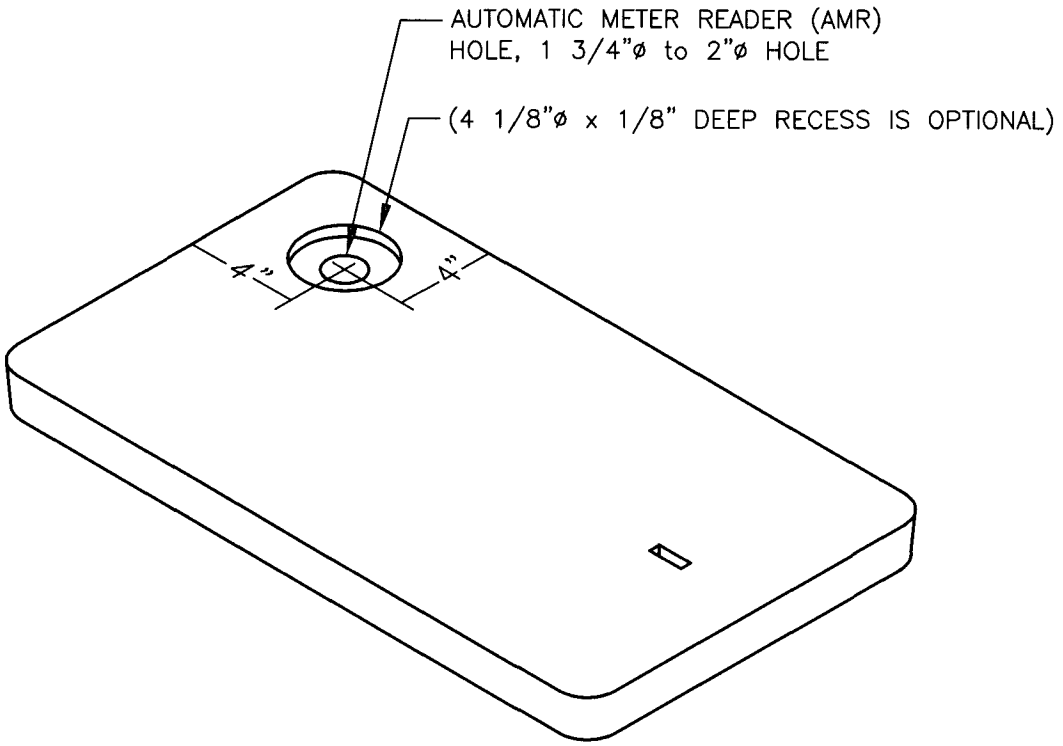
STANDARD DETAIL DRAWING

1 1/2" & 2" DOMESTIC & IRRIGATION WATER SERVICE INSTALLATION

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 414



NOTE:

1. SEE SPECIFICATION AS FOUND IN COH DESIGN & CONSTRUCTION STANDARDS.

CITY OF HUBBARD

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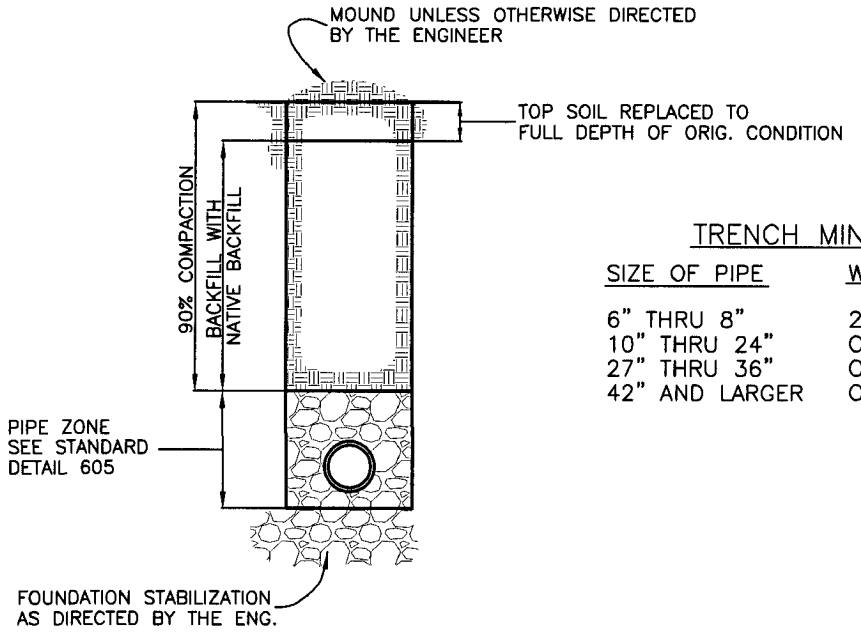
STANDARD DETAIL DRAWING

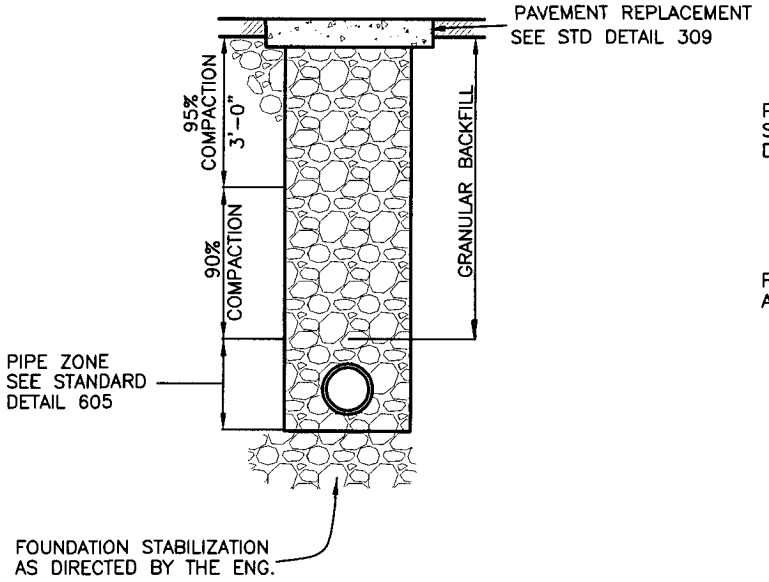
AUTOMATIC METER READER LID

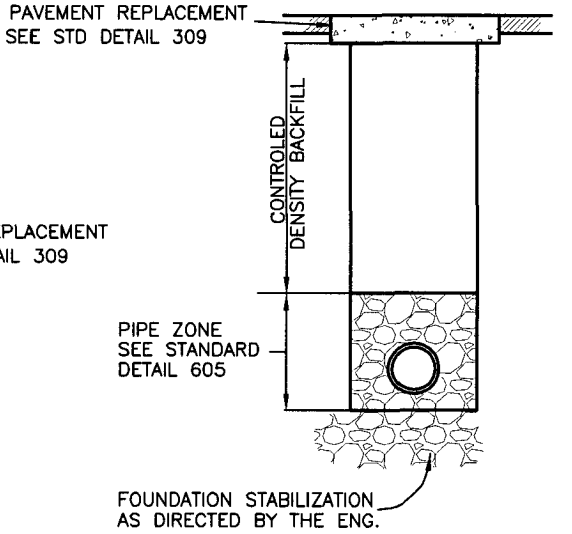
DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 415



TRENCH MINIMUM WIDTHS

SIZE OF PIPE	WIDTH OF TRENCH
6" THRU 8"	2.5 FT.
10" THRU 24"	OUTSIDE DIAMETER PLUS 18"
27" THRU 36"	OUTSIDE DIAMETER PLUS 24"
42" AND LARGER	OUTSIDE DIAMETER PLUS 30"





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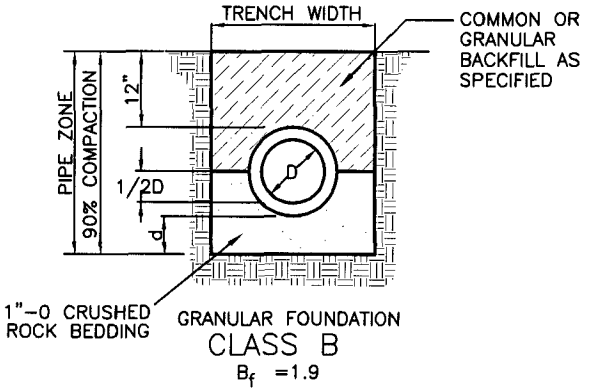
STANDARD DETAIL DRAWING

PIPE TRENCH

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 601



LEGEND:

D = OUTSIDE DIAMETER
d = DEPTH OF BEDDING MATERIAL BELOW PIPE

DEPTH OF BEDDING MATERIAL BELOW PIPE	
D	d(min).
12" & SMALLER	6"
15" to 36"	8"
42" & LARGER	10"

NOTES:

1. WHERE DIRECTED BY THE ENGINEER GRANULAR TRENCH STABILIZATION SHALL BE PLACED PRIOR TO PLACEMENT OF THE BEDDING. SIZE AND DEPTH ARE DEPENDENT ON SOIL CONDITIONS.
2. FOR ROCK OR OTHER INCOMPRESSIBLE MATERIALS, THE TRENCH SHALL BE OVEREXCAVATED A MINIMUM OF 6" AND REFILLED WITH GRANULAR MATERIAL AS DIRECTED BY THE ENGINEER.
3. BEDDING AND BACKFILL MATERIALS IN THE PIPE ZONE SHALL BE COMPACTED AS SPECIFIED PRIOR TO BACKFILLING THE REMAINDER OF THE TRENCH.

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STANDARD DETAIL DRAWING

PIPE ZONE

DRAWN: K.L.C.	DATE: 9-16-08
APPROVED: W.I.P.	NO. 605