

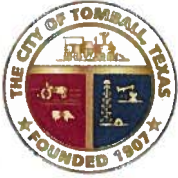
CITY OF TOMBALL

SUBMITTAL INFORMATION PACKET

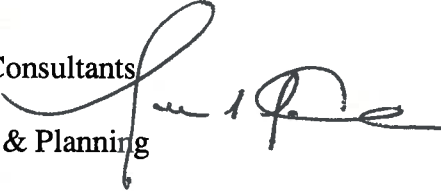
LUE Memorandum
Storm Water Construction Requirements
Traffic Impact Analysis Guidelines
Construction Notes
Parking Requirements
Landscape Requirements
Construction Details

January 2009

LUE MEMORANDUM



CITY OF TOMBALL
MEMORANDUM

Date: June 16, 2009
To: Owners / Developers / Consultants
From: Mark A. McClure, P.E. 
Director of Engineering & Planning
City of Tomball
Re: **Living Unit Equivalent (LUE) Calculations for Development**

Water service demand is expressed in living-unit-equivalents (LUE), which forms the basis for establishing equivalency among and within various customer classes. Each single-family home is served by a three-quarters-inch meter, which serves as the basis of connection and establishes the LUE. Presently, the City is operating under a 370 gallons per day (gpd) demand for each LUE (reference Infrastructure Master Plan and Impact Fee Determination 2007-2017). The Master Plan reviewed total capital costs, equating cost per LUE for water and wastewater. City of Tomball, Ordinance No. 2009-12, amending section 156 Schedule of Maximum Capital Recovery fees of Chapter 82, establishes said fees per LUE.

The Engineering & Planning (E&P) Department has adopted the attached “discharge criteria sheet” to be utilized for a determination of LUE associated with all development, except residential. Note that the “discharge criteria sheet” provides for a service unit equivalent (SUE), which equates to 315 gpd. The designer will be required to convert to the 370 gpd LUE basis. For example, a Hotel, Motel type of development has a SUE of 0.251000 per room. Assuming the Hotel, Motel has a proposed design of 100 rooms, the development will have an impact of 25.1000 SUEs. The designer shall convert the SUEs to LUEs, as shown in the following example:

Convert by ratio:

$$\frac{315}{370} = \frac{25.1000}{X}$$

Solve for X:

$$370 \times 25.1 = 315 \times (X)$$

Therefore X:

$$= \frac{370 \times 25.1}{315} = \underline{\underline{29.48 \text{ LUEs}}}$$

The LUE determination shall be included in table form and shown on the “utility plan”, included as part of the site plan submittal. The cost per LUE fee is posted at the Permits Office and will be calculated at the time of permit application. (Note that the Master Plan and the demand rate per LUE is subject to periodic required updates.)

- Cc: Jan Belcher, City Manager
Doris Speer, City Secretary
Monica Kohlenberg, Director of Finance
David Kauffman, Director of Public Works
Dave Allen, Building Official
Julie Stafford, Utility Billing Supervisor



CITY OF TOMBALL
DEPARTMENT OF ENGINEERING & PLANNING
DISCHARGE CRITERIA SHEET

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Type of Development	Service Unit Equivalency (SUE)
Bakery	0.000700 per Sq Ft
Barber Shop, General	0.480000 per Bowl
Barber Shop, Supercuts	0.240000 per Bowl
Beauty Shop	0.480000 per Bowl
Bowling Alley	0.635000 per Lane
Car Repair	0.000160 per Sq Ft
Carwash, Tunnel, Self Serve	6.350000 per Carwash
Carwash, Tunnel, w/ Attendant	31.430000 per Carwash
Carwash, Wand Type, Self Serve	1.220000 per Carwash Bay
Church	0.003200 per Seat
Club, Tavern or Lounge	0.031700 per Occupant
Convenience Store	0.000200 per Sq Ft
Country Club	0.320000 x Members, .08 x Guest
Day Care Center	0.031700 per Occupant
Dormitory	0.286000 per Bed
Fire Station	0.286000 per Capita
Funeral Home	2.140000 per Service
Gas Station w/ Carwash	9.350000 per Station
Gas Station w/out Carwash	1.750000 per Station
Grocery Store, 5,000-28,999 Sq Ft	0.000260 per Sq Ft
Grocery Store, 29,000+ Sq Ft	0.000700 per Sq Ft
Health Club	0.001210 per Sq Ft
Homeless Shelter	0.105000 per Bed
Hospital	0.635000 per Bed
Hotel, Motel w/ kitchenettes	0.430000 per Room
Hotel, Motel	0.251000 per Room
Manufacturing	0.000160 per Sq Ft
Mobile Home Park	0.880000 per Space
Modeling Studio	2.890000 per Studio
Nursing Home	0.286000 per Bed
Office	0.000335 per Sq Ft
Photo Store, One Hour Processing	3.175000 per Store
Post Office, Excluding Dock	0.000254 per Sq Ft



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CITY OF TOMBALL
DEPARTMENT OF ENGINEERING & PLANNING
DISCHARGE CRITERIA SHEET

Type of Development	Service Unit Equivalency (SUE)
Prison	0.290000 per Capita
Racquetball Club	0.510000 per Court
Recreational Vehicle Park	0.238100 per Vehicle
Residence, Apartment w/ Washer/Dryer	0.714000 per Unit
Residence, Apartment w/out Washer/Dryer	0.635000 per Unit
Residence, Condominium	0.714000 per Unit
Residence, Single Family	1.000000 per Unit
Duplex	2.000000 per Duplex
Triplex	3.000000 per Triplex
Residence, Townhouse	1.000000 per Unit
Restaurant, Fast Food (Burger, Chicken, Etc.)	0.002500 per Sq Ft
Restaurant, Full Service/Dining/Bar Area	0.006000 per Sq Ft
Retail	0.000223 per Sq Ft
School, High	0.047600 per Seat
School, Others, Non-Residential	0.031700 per Seat
School, Others, Residential	0.317000 per Capita
Service Center	0.000160 per Sq Ft
Shopping Center; Mixed Tenants (New >150,000 Sq Ft Centers Only)	0.000900 per Sq Ft
Skating Rink	0.015900 per Capita
Stadium	0.010000 per Seat
Swimming Pool	0.015900 per Swimmer
Theater, Drive Inn	0.015900 per Space
Theater, Indoor	0.015900 per Seat
Toilet	0.254000 per Toilet
Transportation Terminal	0.015900 per Passenger
Warehouse	0.000096 per Sq Ft
Washateria	0.914000 per Machine

Note 1: 1 Service Unit Equivalent (SUE) = 315 Gallons per Day/1 Living Unit Equivalent (LUE) = 370 Gallons per Day

Note 2: Should a type of development not appear on the above, the requestor shall propose an equivalent development for E&P review and acceptance.

Note 3: Calculations & assumptions shall be summarized and included on the utility plan submitted as part of permit / site plan submittal process.

BUILDING PERMIT FEES

CAPITAL RECOVERY FEES PER CITY OF TOMBALL ORDINANCE 2009-12

Effective June 1, 2009 – May 31, 2010*

<u>LUE'S</u>	<u>WATER METER SIZE</u>	<u>WATER</u>	<u>SEWER</u>	<u>TOTAL</u>
1.0	3/4"	\$ 1,162.98	\$ 1,446.57	\$ 2,609.55
2.5	1"	\$ 2,907.45	\$ 3,616.43	\$ 6,523.88
5.0	1 1/2"	\$ 5,814.90	\$ 7,232.85	\$ 13,047.75
8.0	2"	\$ 9,303.84	\$ 11,572.56	\$ 20,876.40
10.0	2" TURBINE	\$ 11,629.80	\$ 14,465.70	\$ 26,095.50
16.0	3"	\$ 18,607.68	\$ 23,145.12	\$ 41,752.80
24.0	3" TURBINE	\$ 27,911.52	\$ 34,717.68	\$ 62,629.20
25.0	4"	\$ 29,074.50	\$ 36,164.25	\$ 65,238.75
42.0	4" TURBINE	\$ 48,845.16	\$ 60,755.94	\$ 109,601.10
50.0	6"	\$ 58,149.00	\$ 72,328.50	\$ 130,477.50
92.0	6" TURBINE	\$ 106,994.16	\$ 133,084.44	\$ 240,078.60
80.0	8"	\$ 93,038.40	\$ 115,725.60	\$ 208,764.00
160.0	8" TURBINE	\$ 186,076.80	\$ 231,451.20	\$ 417,528.00
115.0	10"	\$ 133,742.70	\$ 166,355.55	\$ 300,098.25
250.0	10" TURBINE	\$ 290,745.00	\$ 361,642.50	\$ 652,387.50
330.0	12" TURBINE	\$ 383,783.40	\$ 477,368.10	\$ 861,151.50

NOTE: ALL NEW DEVELOPMENT OR CHANGE IN USE WILL BE REQUIRED TO CALCULATE THE LIVING UNIT EQUIVALENT (LUE) AND PAY THE GREATER VALUE BETWEEN THE MINIMUM METER SIZE IMPACT FEE OR THE CALCULATED LUES.

* REFER TO SCHEDULE OF MAXIMUM CAPITAL RECOVERY FEES FOR INCREASE IN FEES BASED ON EFFECTIVE DATE.

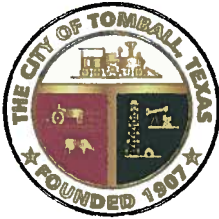
SCHEDULE OF MAXIMUM CAPITAL RECOVERY FEES

		Effective: June 1, 2009	Effective: June 1, 2010	Effective: June 1, 2011	Effective: June 1, 2012
Water:	Per LUE	\$1,162.98	\$1,218.36	\$1,273.74	\$1,329.12
Wastewater:	Per LUE	\$1,446.57	\$1,515.46	\$1,584.34	\$1,653.23

Drainage effective June 1, 2009:

M118 per acre	\$6,023.90
M121E per acre	\$6,828.71
M121W per acre	\$4,985.14
M125 per acre	\$ 574.40

STORM WATER CONSTRUCTION REQUIREMENTS



**City of Tomball
Memorandum**

Date: September 22, 2008
To: Developers and Contractors
From: Mark A. McClure, PE
Director of Engineering and Planning
City of Tomball
Re: Storm Water Construction Requirements

The Texas Commission on Environmental Quality (TCEQ) storm water regulations presents two (2) options for construction activity permit applications. The first option is to submit an individual permit application to TCEQ. The second option is to file a notice of intent (NOI) to seek coverage under a general permit in accordance with the requirements of the TPDES Construction General Permit TXR150000. One of the major requirements of the Construction General Permit is that operator(s) of the construction activity prepare and implement a Storm Water Pollution Prevention Plan (SWP3) to reduce the pollutants in storm water discharges from the construction site. Guidance to prepare the SWP3 can be found in the Storm Water Management Handbook for Construction Activities, by the City of Houston, Harris County, and Harris County Flood Control District. The handbook is based on the requirements of the TPDES Construction General Permit. A link is provided on the City's website under Engineering & Planning, http://cleanwaterways.org/downloads/professional/construction_handbook_full.pdf.

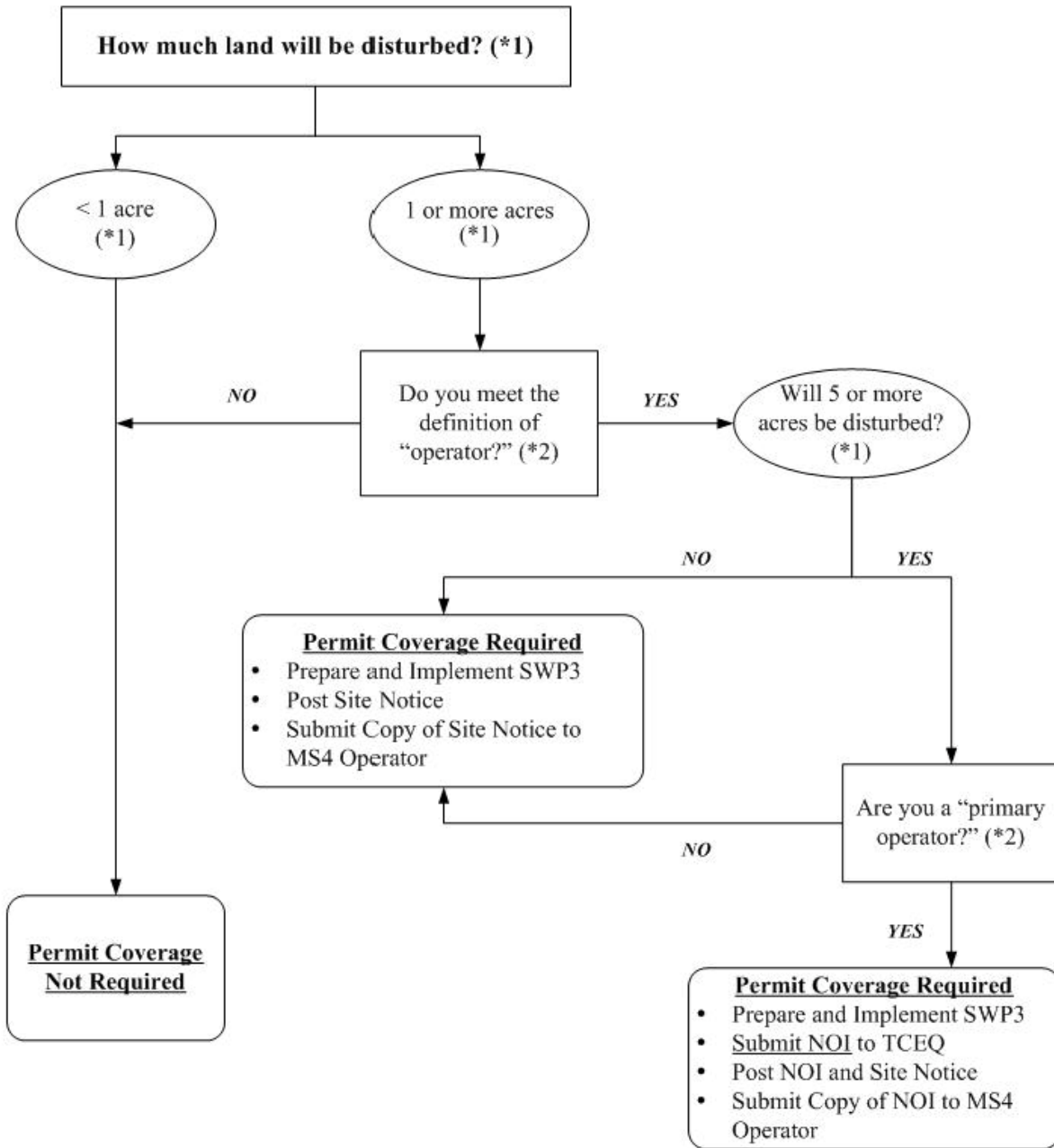
The TPDES Construction General Permit extends general permit coverage to small construction sites/activities disturbing from one acre to less than 5 acres. Small construction sites/activities are required to obtain permit coverage. Specific requirements for small construction sites/activities are provided in the TPDES Construction General Permit.

Attached is a flow chart on what the TDPEs Construction General Requirements are. In addition to TCEQ's requirements you must comply with all local and county requirements.

In addition, all new development and significant redevelopment must submit for a Storm Water Quality (SWQ) Permit from Harris County, if any portion of a project drains directly into a Municipal Separate Storm Sewer System owned by Harris County (i.e. roadside ditches) and/or the Harris County Flood Control District (HCFCD channels and ponds). Copies of the SWQ Permits, SWP3, Construction Site Notice, and Notice of Intent (NOI), if required, must be submitted to the City of Tomball as part of the permit process. All detention structures and features for storm water quality must also be included on the plans when submitted for review. The designer must verify facility ownership (i.e. channels, ditches, ponds, and roadways) prior to or during plan development.

Part I. Flow Chart and Definitions

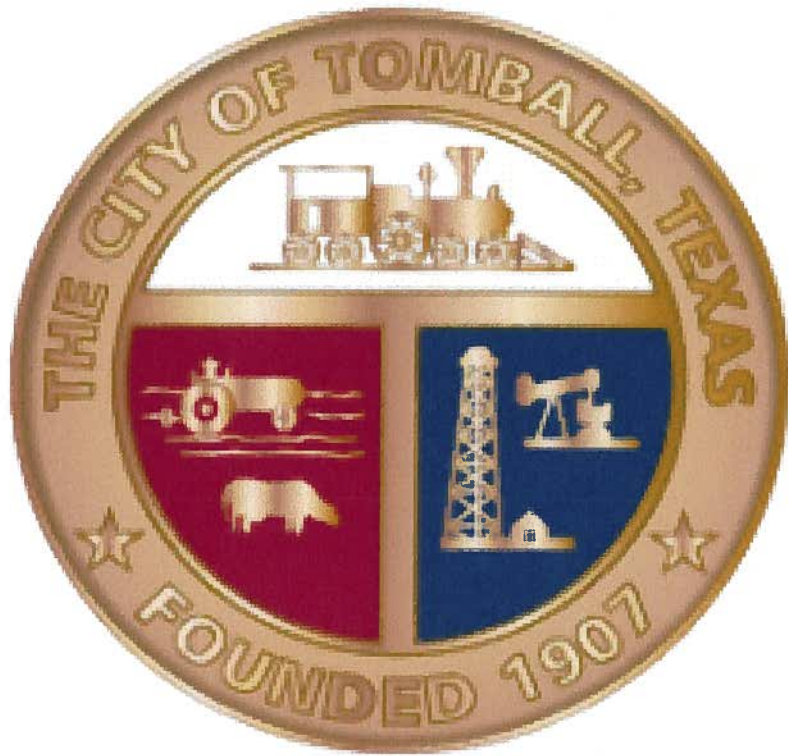
Section A. Flow Chart to Determine Whether Coverage is Required



(*1) To determine the size of the construction project, use the size of the entire area to be disturbed, and include the size of the larger common plan of development or sale, if the project is part of a larger project (refer to Part I.B., "Definitions," for an explanation of "larger common plan of development or sale").

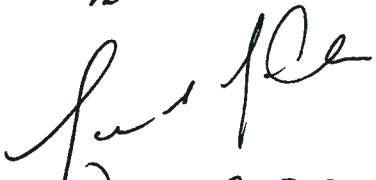
(*2) Refer to the definitions for "operator," "primary operator," and "secondary operator" in Part I., Section B. of this permit.

TRAFFIC IMPACT ANALYSIS GUIDELINES



TRAFFIC IMPACT ANALYSIS GUIDELINES

CITY OF TOMBALL, TEXAS
DECEMBER 2008

12-22-08

DIRECTOR OF EEP
CITY OF TOMBALL

PURPOSE OF THE GUIDELINES

The City may require a traffic impact analysis (TIA) if it is determined a development could have a significant impact on the street system in the vicinity of the development. The purpose of these guidelines is:

- To describe the purpose of the TIA
- To determine when a TIA is required, and
- To describe the minimum requirements of the TIA

PURPOSE OF THE TIA

A TIA is often necessary to define the magnitude of the projected impact of a proposed development on the traffic operations of the roadways and intersections in the vicinity of the development. If the impact of the development is significant, a TIA will also determine the improvements to the roadway system that are necessary to accommodate the traffic in the site vicinity.

WHEN A TIA IS REQUIRED

TIA Trip Generation Worksheet

A completed TIA Trip Generation Worksheet (included herein) shall be submitted with each plat and/or site plan that does not have an approved TIA on file with the City for the development. Upon review of this worksheet, the Engineering & Planning department will make the final determination regarding the need for a TIA. The Trip Generation Worksheet shall be completed using the latest edition of the ITE Trip Generation Manual.

If the type of development use is not known at the time of the submittal, the applicant should make assumptions based on the worst-case scenario for the site. If this is the case, the following items shall be evaluated at a minimum:

- The type of land use allowed by the city's zoning criteria for the site.
- The maximum amount of developable land based on setbacks and other restrictions (ie: detention, etc.)
- Logical assumptions by the developer
- Adjacent land uses

If the proposed development is not listed in the ITE Trip Generation Manual, a letter documenting the type of development and identifying the number of trips generated shall be submitted in lieu of the Trip Generation Worksheet. This letter shall be written, signed and sealed by a professional engineer with adequate experience in transportation/traffic engineering.

TIA Requirement Thresholds

The City may require a TIA for a proposed development under the following conditions:

- The development is projected to generate 1,000 or more vehicular trips in a 24-hour period.
- The development is projected to generate 100 or more vehicular trips in the peak hour.
- The development involves an area of 100 acres or more.
- The development is a proposed and/or modified school.
- The development is a shopping center of 100,000 square feet or more.
- Planned Development (PD) requests
- Rezoning requests
- If requested by the Director of Engineering & Planning, City Planner or the Planning and Zoning Commission.

If it is determined that a TIA must be performed, the Developer and their qualified consulting engineer shall schedule a meeting with the City's Engineering & Planning Department to determine the scope of the TIA and the requirements for the TIA content. Any work on the TIA completed prior to meeting with the City is at the applicant's risk and the City reserves the right to have the applicant revise the TIA without a formal review or comments.

MINIMUM REQUIREMENTS OF A TIA

As a minimum, a TIA prepared for the City should include the following:

- ***Existing Conditions:*** a description of the study area including roadways and development and an analysis of the traffic operations at significant intersections. The study area shall be based on the characteristics of the surrounding area. The traffic engineer preparing the study shall determine the limits of the study area (including the intersections to be analyzed). The Director of Engineering & Planning must approve the limits of the study area prior to proceeding with the study.
- ***Proposed Development:*** a description of the proposed development, calculation of the projected trips generated by the proposed development, and the projected distribution of the generated trips to the roadway network.

- **Capacity Analysis** – Capacity analysis must be performed at each of the major streets and project site access intersection locations (signalized and unsignalized) within the study area. Signalized intersections in coordinated systems must be analyzed as a system. In addition, analysis must be completed for roadway segments considered sensitive to site traffic within the study area. The operational analysis and methodology in the current version of the “Highway Capacity Manual, Special Report 209” (Transportation Research Board, National Research Council, Washington, D.C.) should be used for analyzing existing conditions, traffic impacts, access requirements, or other future conditions for which traffic, geometric and control parameters can be established.
 - No-Build Traffic Analysis: an analysis of the projected traffic conditions in the study area at the build-out year if the proposed development is not developed. The “build-out year” is the anticipated opening year of the development, assuming full build-out and occupancy.
 - Build Traffic Analysis: an analysis of the projected traffic conditions in the study area at the build-out year if the proposed development is developed.

The recommendations of the traffic impact shall provide safe and efficient movement of traffic to and from and within and past the proposed development, while minimizing the impact to non-site trips. The current levels of service (as defined by the Highway Capacity Manual) must:

1. Be maintained if they are “C” or less, and
 2. Not deteriorate to worse than “C” if they are currently “A” or “B”.
- **Proposed Improvements:** a description of the proposed improvements in the study area, as necessary, and an analysis of the projected traffic conditions in the site vicinity with the improvements.
 - **Conclusions:** a summary of the key findings and recommendations in the TIA.

If the proposed development includes multiple phases of development, the TIA may need to analyze the no-build traffic conditions, the build traffic conditions, and the proposed improvements for multiple phases.

TIA reports shall be completed, signed and sealed by a professional engineer registered in the State of Texas with adequate experience in transportation/ traffic engineering.

Development abutting Harris County and/or TxDOT-owned rights-of-way may be subject to additional TIA guidelines, and shall adhere to the more restrictive guidelines.

City of Tomball Trip Generation Worksheet

This form shall be completed as an aid to determine if the proposed development requires a traffic impact analysis (TIA).

Project Name:	
Location:	
Applicant / Contact:	
Contact Phone Number:	
Contact E-mail:	

Anticipated Land Use	ITE Code	Unit ¹	24-Hour		AM Peak Hour		PM Peak Hour	
			Rate ²	Trips ³	Rate ²	Trips ³	Rate ²	Trips ³
Total	-	-	-		-		-	

¹Unit is the variable (dwelling units, square feet, employees, etc.) for which the anticipated land use is to be evaluated.

²All rates shall be the trip generation rates published in the latest edition of the ITE trip generation manual.

³The product of the unit and the rate equals the trips for each anticipated land use.

The thresholds used to determine when a TIA is necessary are contained in the City of Tomball Traffic Impact Analysis Guidelines which is available at:

http://www.ci.tomball.tx.us/engineering-planning/development_docs/tiaguidelines.

Applicant's Signature: _____

Date: _____

For signalized and unsignalized intersections, LOS can be calculated using the methodology from the Highway Capacity Manual, Transportation Research Board, 2000. Each LOS corresponds to a range of delay. LOS worsens as delay increases. Corresponding LOS and ranges of delay for unsignalized and signalized intersections is listed in **Table 2** and **Table 3**, respectively.

Table 2: *Level of Service Criteria for Unsignalized Intersections.*

Level of Service	Control Delay Range (seconds)
A	≤ 10
B	>10 and ≤ 15
C	>15 and ≤ 25
D	>25 and ≤ 35
E	>35 and ≤ 50
F	> 50

Table 3 *Level of Service Criteria for Signalized Intersections.*

Level of Service	Control Delay Range (seconds)
A	≤ 10
B	>10 and ≤ 20
C	>20 and ≤ 35
D	>35 and ≤ 55
E	>55 and ≤ 80
F	> 80

CONSTRUCTION NOTES

GENERAL CONSTRUCTION NOTES

(ISSUE DATE: 7/25/08)

1. Contractor shall contact the City of Tomball a minimum of 48 hours prior to beginning any work.
2. Contractor shall adequately protect existing structures, utilities, trees, shrubs and other permanent objects.
3. Trees within the street right-of-way shall not be removed or disturbed, except where called out to be removed. Where tree roots must be cut, follow the repair methods described in the Specifications.
4. The Contractor shall conduct his operations in a manner such that trucks and other vehicles do not create a dirt nuisance or safety hazard in any streets, public or private. Clean up of streets shall be done daily.
5. Any area of grass, which is disturbed or dug up during the construction, shall be replaced with St. Augustine sod or grass that matches the grass removed. See Specifications.
6. No excavations shall be left open overnight. All excavations which cannot be backfilled overnight for the installation of manholes, sanitary sewer lines, and other utilities shall be covered with steel sheeting, when in paved areas, 3/4" plywood, wood planking or some other material approved by the City in other areas. The excavation area must be well protected with traffic barricades equipped with flashing yellow lights.
7. All excavation areas must be completely cordoned off with a minimum of two strands of yellow plastic construction tape, acceptable to the City, the tape shall be supported with enough intermediate supports to avoid excessive sagging. The tape may be tied to traffic barricades with flashing yellow lights and wooden lath for support. Where excavations extend beyond the existing back of curb or edge of pavement, adequate barricades with flashing yellow lights shall be installed to protect pedestrian traffic.
8. Existing pavements, curbs, sidewalks, driveways and landscaping damaged or removed during construction by the Contractor shall be replaced by the Contractor at his expense.
9. When any street or any section of a street is closed, the Contractor shall furnish and maintain adequate barricades, warning and directing signs, red flags and lights at the end of each street and at all intersections along the street within the limit of the work area. All expense incurred for the above requirements shall be borne by the Contractor. All warning signs and barricades shall conform to the Texas Manual of Uniform Traffic Control Devices. Contractor to notify proper authorities prior to any street or partial street closing
10. Contractor shall maintain at least one lane of traffic in each direction during working hours.

11. Off-duty uniformed police officer(s) are required to direct traffic where traffic lanes are blocked.
12. Contractor shall provide the City of Tomball one set of (record) drawings as per specifications.
13. All existing underground utilities are not guaranteed to be completed or definite, but were obtained from the best information available. Contractor has sole responsibility for field verification of all existing facilities shown on drawings. Contractor shall coordinate all conflicts with the appropriate governing agency.
14. The location of Southwestern Bell Telephone, City of Tomball Gas, Centerpoint Energy, and other utilities are shown in an approximate way only. The Contractor shall request the exact location of these facilities by calling the utility Coordinating Committee at phone number 800-669-8344 or 800-344-8377, at least 48 hours before commencing work. The Contractor is fully responsible for any and all damages which occur due to his failure to request the location and preservation of these underground facilities. For natural gas call City of Tomball (281) 351-5484 or 800-344-8377.
15. Contractor shall comply with OSHA regulations and State of Texas law concerning excavation, trenching and shoring as specified.
16. Adequate drainage shall be maintained at all times during construction and any drainage ditch or structure disturbed during construction shall be restored to the satisfaction of the owning authority. All construction storm runoff shall comply with the final draft of Stormwater Management Handbook for Construction Activities as prepared by Harris County/HCFCD, and in compliance with the National Pollutant Discharge Elimination System (NPDES) requirements.
17. Existing pavements, curbs, sidewalks and driveways damaged or removed during construction shall be replaced to the original or better conditions.
18. Condition of the facilities, upon completion of job, shall be as good or better than the condition prior to starting work. The Contractor shall restore all grades and landscaping to preconstruction conditions and re-establish turf areas damaged by the construction activities.
19. All dimensions shown are approximate and need to be field verified by the Contractor, Horizontal and vertical alignment changes are to be approved by the City.
20. Contractor shall maintain access to all properties affected by this construction by means of anchored steel plates, by backfilling immediately after construction, and/or by placing shell or limestone surfaces for temporary driveway purposes. Contractor's attention is directed to HS-20 load rated access requirements for all such area.

21. All excess dirt from excavation shall be disposed of offsite by Contractor at no extra pay.
22. Contractor to be responsible to obtain all required construction permits including Harris County, TxDOT and City of Tomball.
23. Contractor shall remove all trash, excess material, debris, etc. from the site upon completion of the project prior to inspection and approval by the approving agencies.
24. Texas Law Article 1436c, prohibits all activities in which persons or equipment may come within 6 feet of energized overhead power lines, and Federal regulation, Title 29, Part 1910.190(l) and Part 1926.440(a)(15) require a minimum clearance of 10 feet from these facilities. The above laws carry both criminal and civil liabilities, with Contractors and Owners being legally responsible for the safety of workers under these laws. If you or your company must work near overhead power lines, call 713-207-7777 for the lines to be de-energized and/or moved at your expense.
25. Contractor shall notify the Utility Coordinating Committee at phone numbers 800-669-8344 or 800-344-8377 and the City of Tomball at 281-351-5484 at least 48 hours prior to excavating.
26. Contractor shall verify horizontal and vertical locations of all utilities prior to construction to determine potential conflicts and verify that the boring operation and pipe installation can be accomplished without conflicting with existing utilities.
27. Contractor is responsible for his own horizontal and vertical control. Reference points and construction staking is incidental to the project.
28. Public easements denoted on this plan are hereby dedicated to the public forever. Any public utility, including the City of Tomball, shall have the right at all times, of ingress and egress to and from and upon said easements for the purpose of construction, reconstruction, inspection, patrolling, maintaining and adding to or removing all or part of its respective systems without the necessity of any time of procuring the permission of the property owner. Any public utility, including the City of Tomball, shall have the right to move and keep moved all or part of any building, fences, trees, shrubs, other growths or improvements that in any way endanger or interfere with the construction, maintenance or efficiency of it's respective systems on any of the easements shown on this plat. Neither the City of Tomball or any public utility shall be responsible for the replacing or reimbursing the property owner due to removal or relocation of any obstruction on the public easements.

WATERLINE CONSTRUCTION NOTES

(ISSUE DATE: 7/25/08)

1. ALIGNMENT, CENTERLINE CURVE DATA, AND STATIONING TO BE DETERMINED FROM APPROVED AND/OR RECORDED SUBDIVISION OR ROAD RIGHT-OF-WAY PLAT.
2. ALL WATERLINE CONSTRUCTION TO BE ACCOMPLISHED IN ACCORDANCE WITH THE LATEST EDITION OF THE TEXAS NATURAL RESOURCE CONSERVATION COMMISSION RULES AND REGULATIONS FOR PUBLIC WATER SYSTEMS.
3. ALL WATERLINES TO BE LOCATED INSIDE PUBLIC ROAD RIGHT-OF-WAYS AND PUBLIC EASEMENTS. CITY REPRESENTATIVE TO INSPECT & APPROVE PRIOR TO BACKFILL.
4. ALL WATER MAINS TO BE CLASS 150 (DR-18). PVC (AWWA C-900).
5. TWELVE (12) INCH OR SMALLER WATERMAINS TO HAVE A MINIMUM COVER OF FOUR (4) FEET. VARY FLOW LINE UNIFORMLY FROM DEPTH AND LOCATION SHOWN IN PLANS.
6. WATERLINE FITTINGS TO BE CAST OR DUCTILE IRON WITH POLYETHYLENE WRAP AS SPECIFIED UNLESS OTHERWISE NOTED.
7. MAINTAIN 12-INCH MINIMUM CLEARANCE AT CROSSINGS BETWEEN ALL WATERLINES AND ALL UTILITIES INCLUDING STORM SEWERS AND CULVERTS UNLESS OTHERWISE NOTED.
8. WATERLINES SHALL BE SAND-BEDDED AS SHOWN IN THE CITY OF TOMBALL DETAILS. (COT-37) ALL WATER LINES TO BE INSPECTED BY CITY OF TOMBALL PRIOR TO BACKFILL.
9. WATERLINE TRENCHES UNDER OR WITHIN ONE (1) FOOT OF PROPOSED OR FUTURE PAVEMENT SHALL BE BACKFILLED PER THE CITY OF TOMBALL DETAILS (COT-37).
10. ALL 2 " THRU 12" GATE VALVES FOR THIS PROJECT SHALL BE IN ACCORDANCE WITH AWWA C509 AND BE MANUFACTURED BY MUELLER, AMERICAN-DARLING, OR APPROVED EQUAL RESILIENT SEAT GATE VALVES AND SHALL OPEN IN A COUNTER CLOCKWISE DIRECTION ONLY. VALVES ON ALL TAPPING SLEEVES ARE TO BE OF THE SAME TYPE.
11. VALVES TO BE LOCATED OPPOSITE PROPERTY CORNER WHERE APPROPRIATE.
12. ALL VALVE BOXES SHALL BE ADJUSTED TO FINISHED GRADE AFTER PAVNG IS COMPLETE.
13. ALL FIRE HYDRANTS SHALL BE MANUFACTURED BY MUELLER OR AMERICAN-DARLING. EQUIP EACH FIRE HYDRANT WITH TWO (2) TWO AND ONE-HALF (2 ½) INCH NOMINAL INSIDE DIAMETER HOSE NOZZLES AND ONE (1) FOUR AND ONE-HALF (4 ½) INCH NOMINAL INSIDE DIAMETER PUMPER NOZZLE WITH NATIONAL STANDARD THREADS ON EACH NOZZLE. SUPPLY STORTZ CONNECTOR & PRESSURE CAP FOR PUMPER NOZZLE.
14. CONTRACTOR SHALL PROVIDE ADEQUATE THRUST BLOCKING TO WITHSTAND TEST PRESSURES SPECIFIED BY THE TEXAS NATURAL RESOURCE CONSERVATION COMMISSION AND THE CITY OF TOMBALL.
15. ALL WATERLINE TESTING SHALL BE WITNESSED AND APPROVED BY THE CITY OF TOMBALL.
16. 14 GAUGE LOCATOR WIRE TO BE INSTALLED ON ALL WATER AND GAS LINES & FORCE MAINS. TO BE ACCESSIBLE AT VALVE STACKS.
17. ALL TS&V SHALL BE FULL BODY – CAST IRON OR DUCTILE IRON.

18. 1 WATER SAMPLE PER 1000 FEET SHALL BE SUBMITTED TO A TEXAS DEPARTMENT OF HEALTH APPROVED LABORATORY AND SHALL BE FREE OF ANY CONTAMINATES, PRIOR TO BEING PUT IN SERVICE.
19. DISINFECTION OF NEW AND REPAIRED WATER MAINS SHALL BE IN CONFORMANCE WITH AWWA C651. ALL NEW WATER MAINS SHALL BE DISINFECTED BEFORE THEY ARE PLACED IN SERVICE. ALL WATER MAINS TAKEN OUT OF SERVICE FOR INSPECTING, REPAIRING OR OTHER ACTIVITY, WHICH MIGHT LEAD TO CONTAMINATION OF WATER, SHALL BE DISINFECTED BEFORE THEY ARE RETURNED TO SERVICE. (NO SEP. PAY)
20. CONTRACTOR TO INSTALL 4" X 4" BLUE RELECTORIZED PAVEMENT MARKERS 6" OFF CENTER OF ROADWAY ON FIRE HYDRANT SIDE OF STREET. RAY-O-LITE OR EQUAL.
21. WATERLINE 8" OR GREATER SHALL BE CONSTRUCTED SUCH THAT ALL CROSSINGS WITH SANITARY SEWER OR SANITARY SEWER LEADS SHALL CENTER ONE FULL SECTION OF WATERLINE AT THE SANITARY SEWER CROSSING. WATERLINE SHALL BE AT LEAST 2 FEET ABOVE SANTIARY LINE. WHERE WATERLINE CORSSSES UNDER SANITARY SEWER LINES. WATERLINE SEGMENT SHALL BE ENCASED IN PIPE AT LEAST TWO NOMINAL PIPE DIAMETERS LATFER THAN WATERLINE AND MAINTAIN 1 FOOT VERTICAL CLEARANCE FROM SANITARY LINE.
22. WHERE WATERLINE CROSSES UNDER SANITARY SEWER LINE, BOTH SEGMENTS MUST PASS A PRESSURE AND LEAKAGE TEST AS SPECIFIED IN AWWA C600 STANDARDS.
23. ALL VALVE BOXES SHALL BE ERECTED PLUMBED & BE FREE OF DEBRIS.

SANITARY SEWER CONSTRUCTION NOTES

(ISSUE DATE: 7/25/08)

1. ALIGNMENT, CENTERLINE CURVE DATA, AND STATIONING TO BE DETERMINED FROM APPROVED, RECORDED SUBDIVISION PLAT OR ROAD RIGHT-OF-WAY.
2. SEWER MAINS, MANHOLES AND LIFT STATIONS ARE TO BE DESIGNED, TO BE CONSTRUCTED AND TESTED IN ACCORDANCE WITH CITY OF TOMBALL STANDARDS AND TNRCC TITLE 30 CHAPTER 317 OF THE TEXAS ADMINISTRATIVE CODE. TAC 317.2 REQUIRES LOW-PRESSURE AIR TESTS TO CONFORM TO THE PROCEDURE DESCRIBED IN ASTM C828, C924, F-1417 OR OTHER APPROPRIATE PROCEDURES. FOR SAFETY REASONS, AIR TESTING OF SECTIONS OF PIPE SHALL BE LIMITED TO LINES LESS THAN 36-INCH AVERAGE INSIDE DIAMETER. LINES 36-INCH IN DIAMETER OR LARGER MAY BE AIR TESTED AT EACH JOINT. DEFLECTION TESTING OF ALL FLEXIBLE AND SEMI-RIGID PIPE SHALL BE CONDUCTED AFTER THE FINAL BACKFILL HAS BEEN IN PLACE FOR AT LEAST 30 DAYS. NO PIPE SHALL EXCEED A DEFLECTION OF 5%. THE DEFLECTION TEST IS TO BE RUN USING A RIGID MANDREL, AND SHALL HAVE A DIAMETER EQUAL TO 95% OF THE INSIDE DIAMETER OF THE PIPE. TEST SHALL BE PERFORMED WITHOUT MECHANICAL PULLING DEVICES. ALL TESTS TO BE WITNESSED & APPROVED BY CITY OF TOMBALL.
3. MAINTAIN 12 INCH MINIMUM CLEARANCE AT CROSSINGS BETWEEN ALL OTHER UTILITY LINES, STORM SEWERS, AND CULVERTS UNLESS OTHERWISE NOTED.
4. SEWER TRENCHES UNDER OR WITHIN ONE (1) FOOT OF PROPOSED OR FUTURE PAVEMENT TO BE BACKFILLED WITH CEMENT SAND (1.5 SACKS PER TON) BACKFILL AS SPECIFIED, TO WITHIN ONE (1) FOOT OF SUBGRADE, BEDDING WILL BE CLASS AAA WHERE CEMENT-SAND BACKFILL IS USED FOR SANITARY SEWERS. INCLUDE COST OF BACKFILL IN UNIT PRICE BID PER LINEAR FOOT OF PIPE.
5. ALL PROPOSED GRAVITY SANITARY SEWER LINES WILL BE DUCTILE IRON, OR SDR 26 PVC PIPE & 8" MIN I.D. UNLESS APPROVED OTHERWISE.
6. BEDDING FOR ALL TYPES OF SANITARY SEWER PIPE SHALL BE CEMENT STABILIZED SAND (1.5 SACKS PER TON) CLASS AA AT ALL DEPTHS. ALL SEWER LINES TO BE INSPECTED BY CITY OF TOMBALL PRIOR TO BACKFILL.
7. FOR PVC PIPE, USE MANHOLE WATERSTOP GASKET AND CLAMP ASSEMBLY AT MANHOLE CONNECTIONS (NO SEPARATE PAY).
8. SANITARY SEWER MANHOLES SHALL BE PRECAST OR POURED IN PLACE MONOLITHIC CONCRETE, AND BACKFILLED WITH CEMENT- SAND AS SPECIFIED (NO SEPARATE PAY). MANHOLES WILL BE EXFILTRATION TESTED AS SPECIFIED BY THE CITY OF TOMBALL.
9. ALL FAR-SIDE LEADS SHALL BE FOUR (4) INCHES OR SIX (6) INCHES AT 1.0% MIN. SLOPE. SIX (6) INCH ABS WILL NOT BE ACCEPTABLE. ALL FAR SIDE LEADS (OPEN-CUT OR BORED AND JACKED) SHALL BE DUCTILE IRON, 150 PSI THICKNESS CLASS 50, OR PVC, DR-18.
10. ALL PRECAST CONCRETE AND POURED-IN-PLACE CONCRETE MANHOLES SHALL HAVE THE TOP 18 INCHES CONSTRUCTED OF PRECAST RINGS & TO EXTEND 3"-6" ABOVE NATURAL GRADE.
11. STUBS OR LEADS SERVING TWO LOTS SHALL HAVE A SERVICE AWYE AND CLEANOUT WITH PLUGS (NO SEPARATE PAY). THE AWYE SHALL BE LOCATED WITHIN THE STREET RIGHT-OF-WAY OR AN ADJOINING UTILITY EASEMENT.
12. STACKS SERVING NEAR-SIDE AND FAR-SIDE LOTS SHALL HAVE A SERVICE "WYE AND CLEANOUTS WITH PLUGS FOR THE NEAR-SIDE LOT (NO SEPARATE PAY).
13. ALL DUCTILE IRON PIPE & FITTINGS SHALL BE 150 PSI THICKNESS CLASS 50 WITH EIGHT (8) MIL BLACK VIRGIN POLYETHYLENE WRAP AS SPECIFIED. ALL PVC PIPE SHALL HAVE RUBBER GASKET JOINTS.

14. MANHOLE RIMS ARE TO BE SET AT THE ELEVATIONS SHOWN ON THE PLANS INITIALLY, AFTER PAVING AND GRADING IS COMPLETED, RIMS ARE TO BE ADJUSTED TO THREE (3) TO SIX (6) INCHES ABOVE FINAL GRADE AND BLACK DRESS DIRT TO PROVIDE DRAINAGE AWAY FROM MANHOLE.
15. ALL PVC PIPE SHALL HAVE RUBBER GASKET EQUIPPED BELL AND SPIGOT JOINTS. SOLVENT WELDED JOINTS WILL NOT BE APPROVED FOR THIS PROJECT.
16. ALL GRADE CHANGES AT MANHOLES IN EXCESS OF 2 FEET SHALL BE ACCOMPLISHED WITH DROP MANHOLE CONNECTIONS, CITY OF TOMBALL DRAWING No. 81.
17. CONTRACTOR TO FURNISH CITY WITH RECORD DRAWINGS UPON COMPLETION OF PROJECT.

SPECIAL NOTES: LOCATION OF SANITARY SEWER FACILITIES

THE UTILITY CONTRACTOR IS RESPONSIBLE FOR LOCATING AND MARKING -ALL STACKS AND FAR-SIDE LEADS AFTER THE PAVING IN THIS SECTION IS COMPLETE.

A ¼ -INCH DEEP NOTCH SHALL BE CUT IN THE CURB AND PAINTED WITH A RED LINE ADJACENT TO THE STACK OR LEAD.

IF STAKES ARE LEFT IN THE GROUND AT THE STACKS AND LEADS AFTER CONSTRUCTION OF UTILITIES, THEN AN EFFORT WILL BE MADE TO PRESERVE THEM DURING PAVING CONSTRUCTION. HOWEVER, IF THESE STAKES ARE KNOCKED OUT FOR ANY REASON, THE UTILITY CONTRACTOR REMAINS RESPONSIBLE FOR LOCATING AND MARKING THE FACILITIES AS DESCRIBED ABOVE.

STORM SEWER NOTES
(ISSUE DATE: 7/25/08)

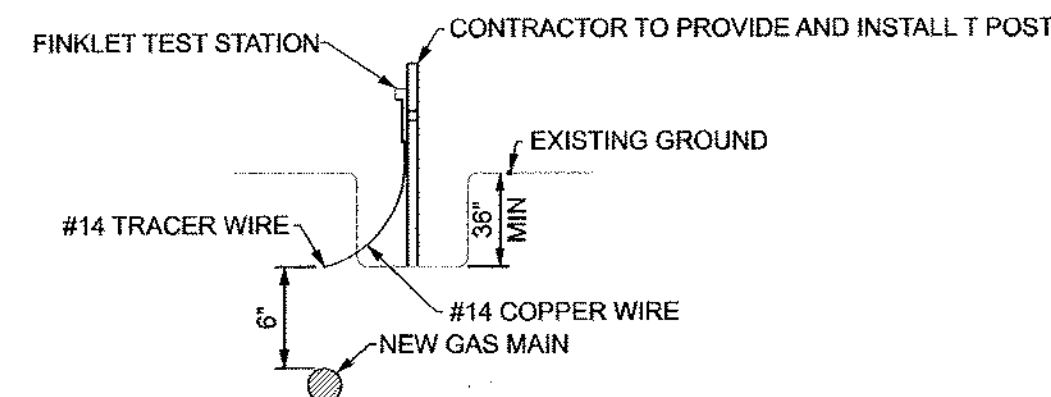
1. Storm sewer construction shall conform to the City of Tomball Specifications for Storm Sewer Construction.
2. All storm sewer to be ASTM C-76, Class III reinforced concrete pipe with rubber gasketed joints conforming to ASTM C443. Class IV RCP required under pavement with less than 2' of cover.
3. All storm sewer inlets shall be backfilled with cement stabilized sand (1.5 sacks per ton). All bedding shall be Class "AA". All storm sewers to be inspected by City prior to backfill.
4. All storm sewer trenches under proposed and future pavement or within one foot (1') from back of curb to be backfilled with cement stabilized sand (1.5 sacks per ton) to a point of one foot (1') below pavement subgrade. The remaining backfill to be made with compacted select material. Cost of backfill and bedding to be included in unit price per linear foot of pipe.
5. High density polyethylene pipe may be substituted on private property for reinforced concrete pipe subject to the following:
 - a. For pipes 36" and smaller – cement stabilized sand placed before pipe is laid, to 7" min. bedding depth. For sewers 42"-60" cement stabilized sand placed before pipe is laid, to 10" min. bedding depth. The sides shall be 12" min. from edge of trench to springline.
 - b. Cement stabilized sand shall be thoroughly rodded, placed and compacted to 95% standard proctor density 1'-0" above the top of pipe, after pipe is laid.
 - c. Pipe and fittings: The types of pipe will be indicated on the drawings by the following description conforming to AASHTO M 252, AASHTO M 294, and/or AASHTO MP6-95, latest edition. Pipe description: CPP (corrugated polyethylene pipe).
 - d. Type S (this pipe shall have a full circular cross-section, with an outer corrugated pipe wall and a smooth inner line).

NATURAL GAS SYSTEM REQUIREMENTS

- CONSTRUCTION OF NATURAL GAS PIPING SYSTEM MUST BE PERFORMED BY AN APPROVED CITY OF TOMBALL CONTRACTOR IN GOOD STANDING WITH THE CITY. ALL PERSONNEL CERTIFICATIONS MUST BE KEPT ON SITE WITH CONSTRUCTION CREW AT ALL TIMES.
- CONTRACTOR MUST BE IN COMPLIANCE WITH CITY OF TOMBALL ANTI-DRUG AND ALCOHOL MISUSE PLAN BY PARTICIPATING IN AN APPROVED DRUG TESTING PROGRAM. PROOF OF TESTING PROTOCOLS IS REQUIRED.
- CONTRACTOR IS RESPONSIBLE FOR INSTALLING ALL NATURAL GAS FACILITIES AS PROPOSED IN THIS PLAN SET. ANY DEVIATIONS MUST FIRST BE APPROVED BY THE ENGINEER OF RECORD AND THE CITY OF TOMBALL PUBLIC WORKS DIRECTOR OR DESIGNATED REPRESENTATIVE.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THE MEANS, METHODS, SEQUENCE, PROCEDURES, TECHNIQUES AND/OR SCHEDULING OF ALL PORTIONS OF THE GAS WORK ARE PERFORMED SAFELY AND IN ACCORDANCE WITH CITY OF TOMBALL REQUIREMENTS, OSHA REGULATIONS, AND ANY OTHER STANDARDS OR CODES REQUIRED BY ANY OTHER REGULATORY AGENCY.
- SHUT-INS AND/OR SYSTEM TIES ARE THE RESPONSIBILITY OF THE CITY OF TOMBALL. AT GAS REPRESENTATIVE'S DISCRETION, CONTRACTOR MAY BE ALLOWED TO TAP OR SHUT IN EXISTING MAINS, IF CONTRACTOR CAN PROVE COMPETENCY AND MAINTAINS OPERATOR QUALIFICATIONS FOR APPROPRIATE TASKS. THE CITY GAS REPRESENTATIVE MUST BE ON SITE DURING TIE-IN PROCEDURE.
- THE CITY OF TOMBALL GAS REPRESENTATIVE MUST BE CONTACTED AS FOLLOWS:
 - GAS CONSTRUCTION START. CONTRACTOR MUST NOTIFY GAS REPRESENTATIVE AT LEAST 48 HOURS PRIOR TO THE INITIAL START OF ANY NATURAL GAS CONSTRUCTION TO SCHEDULE AN ON SITE MEETING. DURING THIS MEETING, ALL CONTRACTOR PERSONNEL CERTIFICATIONS WILL BE REVIEWED TO CONFIRM ALL CONTRACTOR PERSONNEL MEET CITY OF TOMBALL REQUIREMENTS. DELAYS WILL NOT BE PAID FOR IN THE EVENT GAS CONSTRUCTION CANNOT START DUE TO LACKING CREDENTIALS.
 - BACKFILL. CONTRACTOR MUST NOTIFY GAS REPRESENTATIVE TO COORDINATE A TRENCH INSPECTION PRIOR TO BACKFILLING. SEE TRENCH & BACKFILL REQUIREMENTS FOR MORE INFORMATION.
 - ENCASEMENT. CONTRACTOR MUST ALLOW GAS REPRESENTATIVE TO OBSERVE THE INSTALLATION OF THE CARRIER PIPE AND TO INSPECT ALL CASING END POINTS. SEE MINIMUM ENCASEMENT REQUIREMENTS FOR MORE DETAIL.
 - PRESSURE TEST. CONTRACTOR MUST COORDINATE WITH GAS REPRESENTATIVE PRIOR TO PERFORMING ANY PRESSURE TESTS. PRESSURE CHARTS CAN BE FURNISHED BY EITHER THE CONTRACTOR OR THE CITY; HOWEVER, ALL CHARTS MUST BE INITIALED BY GAS REPRESENTATIVE BEFORE THE PRESSURE TEST BEGINS.
- DRIVEWAYS WILL BE BORED, UNLESS OTHERWISE SPECIFIED IN PLANS OR AS DIRECTED BY GAS REPRESENTATIVE.
- TREES IN OR ADJACENT TO PUBLIC RIGHTS OF WAY WHICH HAVE DRIP LINES EXTENDING INTO PUBLIC RIGHTS OF WAY AND A TRUNK CALIPER OF SIX (6) INCHES OR MORE DETERMINED BY THE CITY OF TOMBALL TO HAVE ENVIRONMENTAL OR AESTHETIC VALUE MUST BE BORED FROM DRIP LINE TO DRIP LINE.
- EXISTING UTILITIES EXPOSED DURING TRENCHING OPERATIONS MUST BE SUPPORTED; CONTRACTOR IS RESPONSIBLE FOR PROTECTING EXISTING UTILITIES.
- CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION AND DEPTH OF ALL UTILITIES SHOWN IN THE PLANS. ADDITIONALLY, CONTRACTOR IS RESPONSIBLE FOR PROTECTING EXISTING UTILITIES.
- CONTRACTOR MUST VISUALLY INSPECT ALL MATERIAL FOR DAMAGE BEFORE CONSTRUCTION AND PRIOR TO BACKFILLING.
- ALL POLYFUSION MUST BE PERFORMED BY A CERTIFIED OPERATOR. POLYFUSION CERTIFICATION WILL BE CHECKED AT THE CONSTRUCTION KICKOFF MEETING.
- CONTRACTOR IS REQUIRED TO RECORD ALL POLYETHYLENE MATERIAL SPECIFICATIONS ON POLYETHYLENE PIPE LINE DATA CHART (AS SHOWN BELOW).
- CONTRACTOR MUST COMPLETE THE POLYETHYLENE PIPE LINE DATA CHART FOR ALL POLYETHYLENE PIPE INSTALLED IN EACH APPLICABLE SHEET (SEE THE FOLLOWING EXAMPLE):

Point Span	Line Data	Contractor	Fused By	Date Installed
1 TO 2	2" IPS SDR 11 DRISCOPIPE 8100 GAS PE2406/PE100 CEE ASTM D2513 WT015 R NR 0356 A1-043 072706 COIL 0152	COMPANY X	JOHN DOE	04/04/2008
- CONTRACTOR IS RESPONSIBLE FOR TESTING ALL NEW FACILITIES IN ACCORDANCE WITH CITY OF TOMBALL STANDARDS. ALL TESTS MUST BE DOCUMENTED BY PRESSURE CHART AND
- MAGNETIC WARNING TAPE AND #14 TRACER WIRE MUST BE INSTALLED ABOVE PIPE INSTALLATIONS ALONG THE TRENCH IN ACCORDANCE WITH CITY OF TOMBALL REQUIREMENTS. TRACER WIRE SHALL BE 6" ABOVE THE PIPE, AND MAGNETIC WARNING TAPE SHALL BE 6" ABOVE THE TRACER WIRE. ALL TRACER WIRE CONNECTIONS MUST BE WATER TIGHT. IN THE EVENT MAGNETIC WARNING TAPE IS ALREADY PRESENT IN THE TRENCH, CONTRACTOR MUST STRIP BACK A PORTION OF THE EXISTING TAPE AND TIE THE NEW TAPE INTO THE EXISTING. AT VALVE LOCATIONS, TRACER WIRE MUST BE INSTALLED AROUND VALVE STACKS, NOT THROUGH THEM. FOR DETAILED PLACEMENT INFORMATION, SEE TRENCH & BACKFILL REQUIREMENTS AND/OR VALVE STACK REQUIREMENTS.
- ALL VALVES ARE TO BE INSTALLED WITH VALVE BOXES IN ACCORDANCE WITH CITY OF TOMBALL REQUIREMENTS. A SUPPORT MUST BE PLACED IN ACCORDANCE WITH THE VALVE MANUFACTURER SPECIFICATIONS.
- PIPELINE MARKERS ARE TO BE INSTALLED IN ACCORDANCE WITH CITY OF TOMBALL REQUIREMENTS. CONTRACTOR IS REQUIRED TO PLACE MARKERS AT OR NEAR TAPS, TEES, CAPS AND AT 500' INTERVALS ALONG NATURAL GAS MAINS. FINAL PLACEMENT OF PIPELINE MARKERS IS SUBJECT TO FIELD CONDITIONS; CONTRACTOR MUST USE DISCRETION TO ENSURE APPROPRIATE LINE OF SIGHT IS ESTABLISHED WITH PIPELINE MARKERS. GAS REPRESENTATIVE MAY DETERMINE THE NEED FOR ADDITIONAL PIPELINE MARKER INSTALLATIONS.
- TEST STATIONS ARE TO BE INSTALLED AT 1000' INTERVALS OR AS OTHERWISE DIRECTED BY THE PLANS OR THE GAS REPRESENTATIVE.

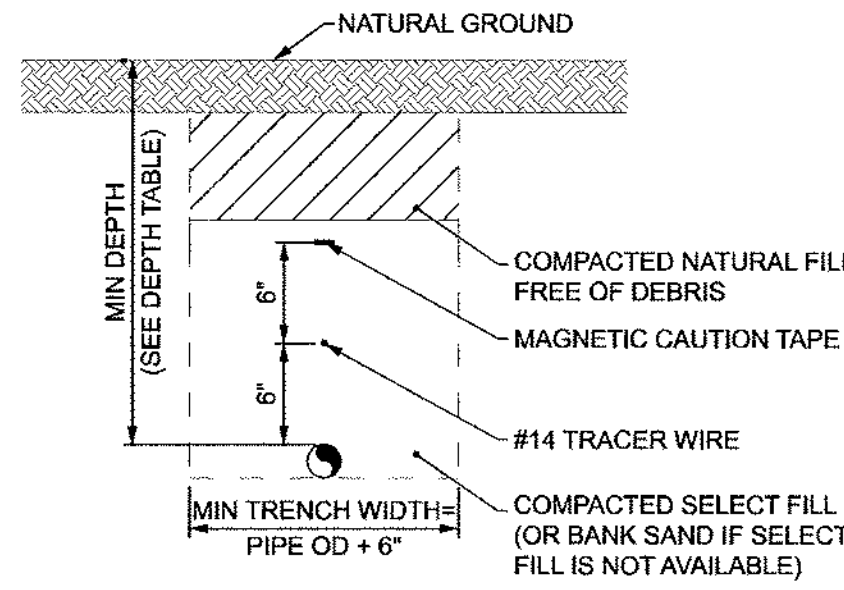
TEST STATION REQUIREMENTS



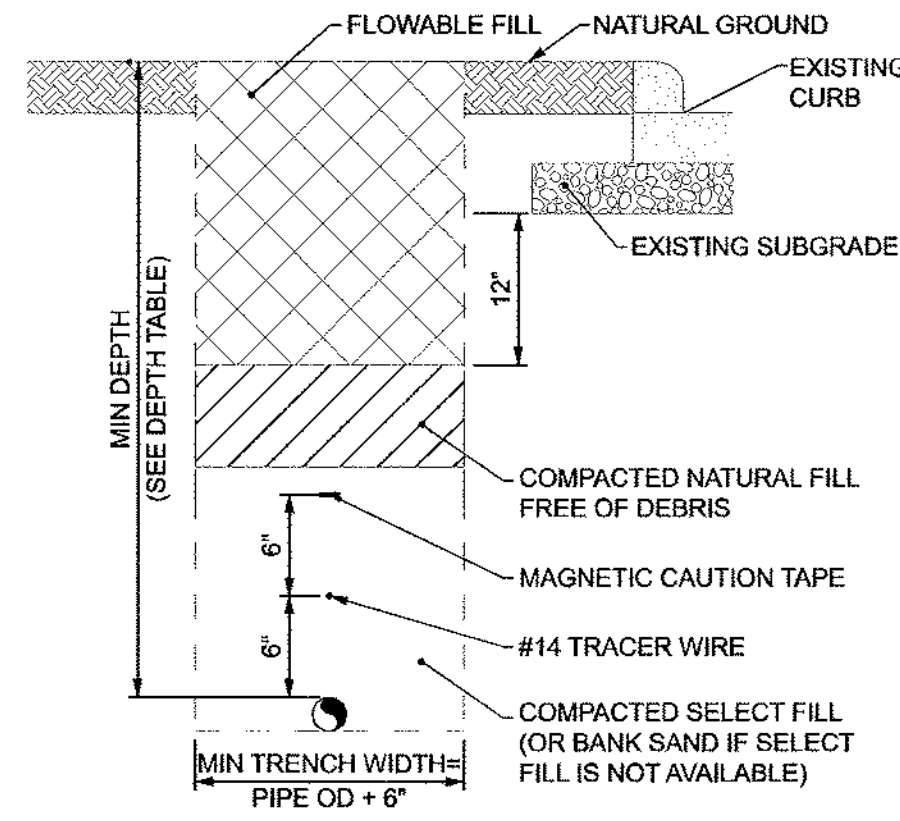
- NOTES:
- #1 ZINC ANODES ARE TO BE PLACED AT 500' INTERVALS WITH A 14 GAUGE (#14) COPPER WIRE CONNECTING THE ANODE TO THE TRACER WIRE. EVERY OTHER ANODE MUST BE CONNECTED TO A TEST STATION.

TRENCH & BACKFILL REQUIREMENTS

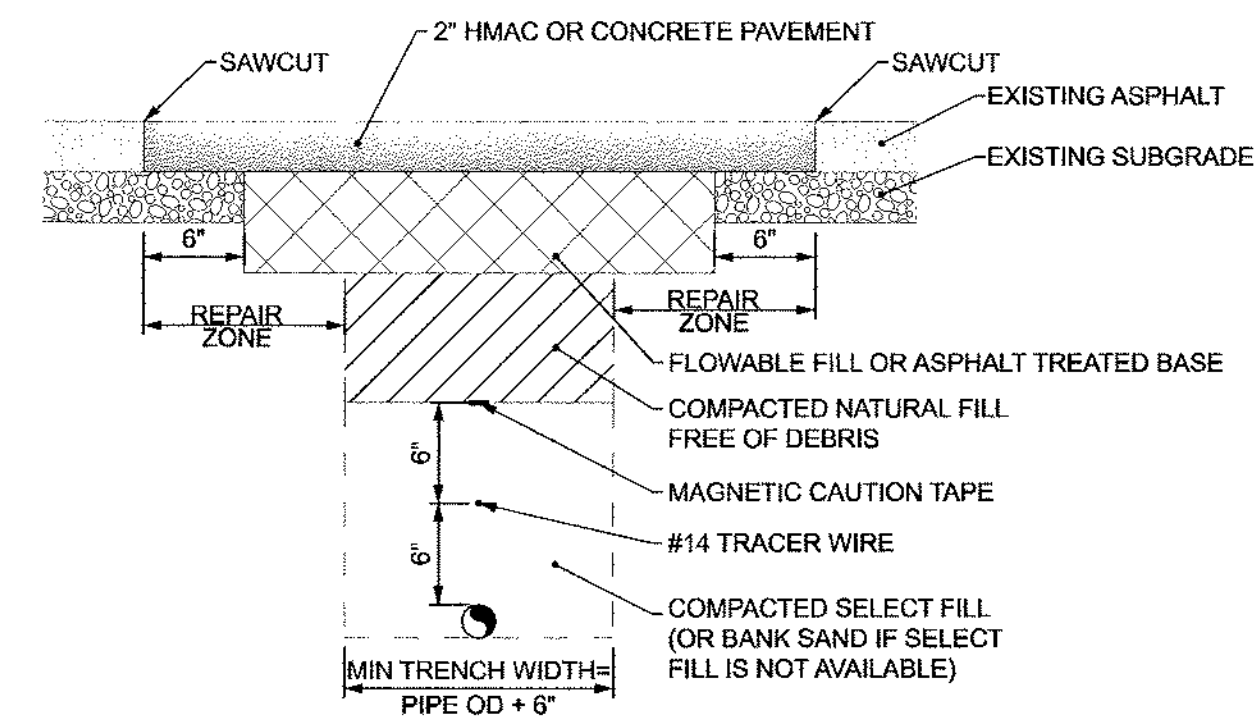
BASIC TRENCH REQUIREMENTS



WITHIN 10' FROM EDGE OF PAVEMENT



UNDER PAVEMENT



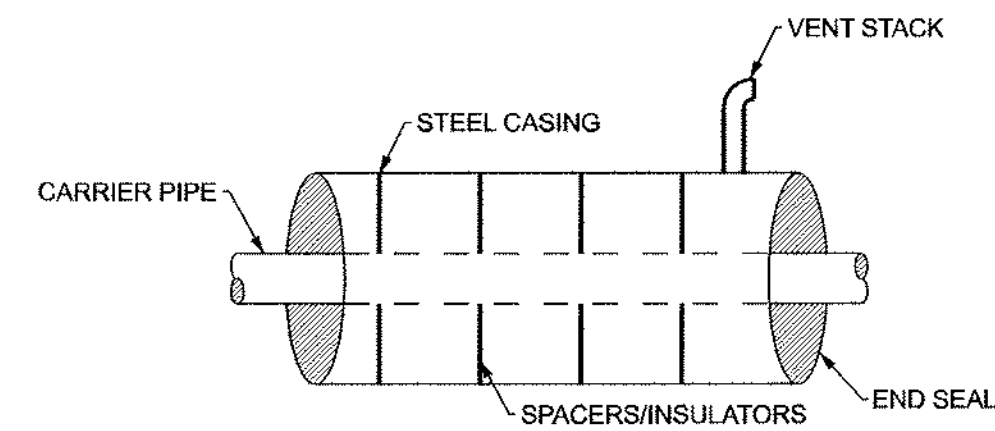
DEPTH TABLE

LOCATION CONDITION	MINIMUM DEPTH FROM EXISTING GROUND TO TOP OF PIPE
EASEMENT	30"
BELOW DITCH	24"
IP IN TXDOT ROW	48"
HP IN TXDOT ROW	60"

NOTES:

- CONTRACTOR MUST COMPLY WITH OSHA SPECIFICATIONS ON TRENCHING, BACKFILLING, EXCAVATION AND SHORING REQUIREMENTS.
- THE BOTTOM OF THE TRENCH MUST BE VOID OF ANY ROCKS GREATER THAN 0.5" DIAMETER AND OTHER DEBRIS CAPABLE OF DAMAGING THE SURFACE OF THE PIPE.
- A MINIMUM TWELVE INCHES (12") BANK SAND (OR OTHER APPROVED SELECT FILL) BEDDING MUST BE PLACED OVER THE NEW MAIN PRIOR TO THE COMPACTED BACKFILL.
- CONTRACTOR IS RESPONSIBLE FOR INSTALLING A CONTINUOUS LENGTH FOURTEEN GAUGE (#14) TRACER WIRE AT A MINIMUM SIX INCHES (6") ABOVE ALL NEW POLYETHYLENE MAINS. FOR CONNECTIONS TO EXISTING MAINS WHERE AN EXISTING TRACER WIRE IS ALREADY IN PLACE, CONTRACTOR IS RESPONSIBLE FOR STRIPING BACK AN APPROPRIATE LENGTH OF THE EXISTING TRACER WIRE AND MAKING A WATERPROOF CONNECTION TO WITH THE NEW TRACER WIRE. ANY JOINTS MUST BE TAPED.
- CONTRACTOR MUST INSTALL A MAGNETIC WARNING TAPE 6" ABOVE THE TRACER WIRE. CONTRACTOR MUST TIE THE NEW WARNING TAPE TO ANY EXISTING WARNING TAPE.
- BACKFILL PLACED OVER BEDDING MUST BE FREE OF ROCKS GREATER THAN 0.5" DIAMETER.
- ALL PIPE INSTALLED IN A TRENCH MUST UTILIZE A SNAKING METHOD.
- CONTRACTOR IS RESPONSIBLE FOR COORDINATING THE PRESENCE OF THE GAS REPRESENTATIVE WHEN ITEMS 2-8 ABOVE ARE ADDRESSED DURING CONSTRUCTION.
- DEPTH TABLE PROVIDES MINIMUM DEPTH REQUIREMENTS FOR FINAL TOP OF PIPE DEPTH OF COVER. CONTRACTOR MUST REFER TO THIS TABLE FOR ALL INSTALLATIONS WHERE ELEVATIONS AND/OR PROFILES HAVE NOT BEEN PROVIDED.
- SERVICES ARE TO BE INSTALLED WITH A MINIMUM DEPTH OF 12" INSIDE PRIVATE PROPERTY AND 18" IN PUBLIC RIGHTS OF WAY.
- ALL DEVIATIONS TO ANY OF THE ABOVE REQUIREMENTS AND/OR ILLUSTRATIONS MUST BE APPROVED BY THE GAS REPRESENTATIVE.
- REPAIR ZONE = 12" MINIMUM OR 6" BEYOND UNDISTURBED CONDITION (WHICHEVER IS GREATER)
- FOR CONDITIONS UNDER CONCRETE PAVEMENT, CONTRACTOR MUST REPAIR TO NEAREST JOINT UNLESS OTHERWISE SPECIFIED IN PLANS OR AS DIRECTED BY GAS REPRESENTATIVE.

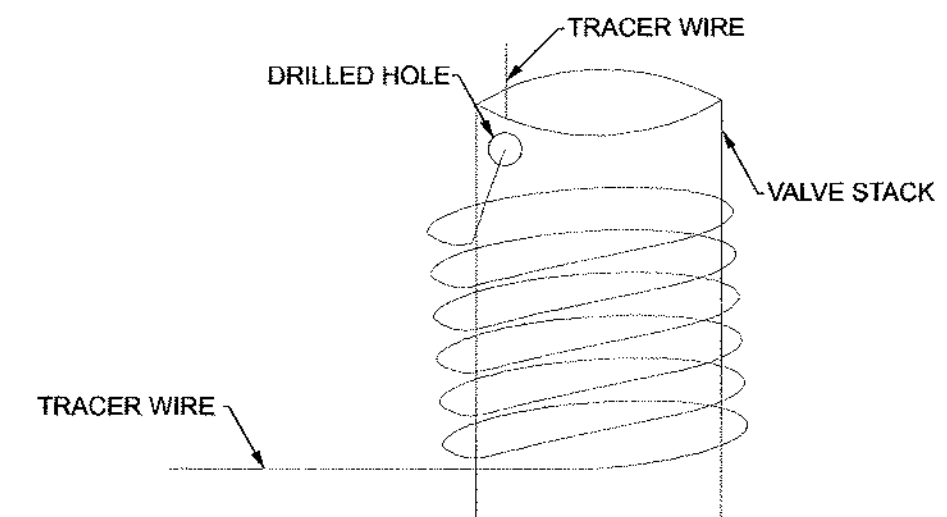
ENCASEMENT REQUIREMENTS



NOTES:

- UNLESS OTHERWISE DIRECTED IN PLANS OR BY GAS REPRESENTATIVE, MINIMUM CASING SIZE = 2" + CARRIER PIPE SIZE
- CASING PIPE MUST BE CAPPED PRIOR TO INSTALLING CARRIER PIPE TO ENSURE THE ABSENCE OF ANY DEBRIS.
- CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE GAS REPRESENTATIVE TO INSPECT THE REMOVAL OF THE CAPS PRIOR TO INSTALLING THE CARRIER PIPE.
- CONTRACTOR MUST INSTALL CASING SPACERS/INSULATORS TO ENSURE CARRIER PIPE IS ISOLATED FROM CASING PIPE AND SECURELY ANCHOR LONG SECTIONS OF CARRIER POLYETHYLENE PIPE PRIOR TO PULLING INTO CASING PIPE TO ENSURE EACH JOINT WILL SUSTAIN LONGITUDINAL PULLOUT.
- CASING ENDS ARE TO BE SECURED WITH WATER TIGHT CASING END SEALS.
- UNLESS OTHERWISE SPECIFIED IN PLANS OR BY GAS REPRESENTATIVE, PIPE LINE MARKERS AND VENT STACKS ARE TO BE INSTALLED AT ALL CASING END POINTS IN ACCORDANCE WITH CITY OF TOMBALL REQUIREMENTS AND AS SPECIFIED BY THE MANUFACTURER SPECIFICATIONS.

VALVE STACK REQUIREMENTS



NOTES:

- ALL VALVES ARE TO BE INSTALLED WITH VALVE BOXES IN ACCORDANCE WITH CITY OF TOMBALL REQUIREMENTS.
- CONTRACTOR MUST INSTALL A SUPPORT IN ACCORDANCE WITH VALVE MANUFACTURER SPECIFICATIONS.
- TRACER WIRE MUST BE INSTALLED AROUND VALVE STACK AS SHOWN IN ABOVE ILLUSTRATION. WIRE MUST BE WRAPPED ALONG OUTSIDE OF VALVE STACK AND INSERTED THROUGH DRILLED HOLE NEAR TOP OF VALVE STACK.

Janet R. ...
Maureen A. McInnes, P.E.
 DIRECTOR, ENGINEERING AND PLANNING
 APPROVAL ONLY FOR NATURAL GAS FACILITY INSTALLATIONS
 THE GENERAL NOTES ARE ISSUED FOR THE CONSTRUCTION
 OF NATURAL GAS FACILITIES UNDER THE DIRECTION
 OF MONICA F. SILVER, PE AND THE CITY OF TOMBALL.
 CHANGES AND/OR DEVIATIONS FROM THE GENERAL NOTES
 REQUIRE WRITTEN APPROVAL FROM THE CITY OF TOMBALL.

Cobb Fendley & ASSOCIATES
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CITY OF TOMBALL
 TOMBALL, TEXAS

PROJECT TITLE
SUBTITLE
PROJECT NO. 200X-XXXX

NATURAL GAS
GENERAL NOTES

SUBMITTED BY: <i>Bob Fenwick</i>	DESIGNED BY: <i>CF</i>
SCALE: <i>NA</i>	DRAWN BY:
DATE: <i>09/22/08</i>	SHEET No.: <i>1</i> OF <i>1</i>
SURVEY BY: <i>NA</i>	DWG. NO.: <i>1 of 1</i>
F B NO.: <i>NA</i>	

Private Drainage and Detention Pond Operation and Maintenance Requirements City of Tomball (Minimum Requirements)
AS-BUILT REQUIREMENTS
1. Prior to facility occupancy, the Engineer of Record (EOR) will provide as-built drawings certifying the pond system design and the volume provided is in accordance to the approved plans. The Owner or their designated representative will be responsible for providing signage identifying the responsible contact and phone number for continued operation and maintenance of the pond in accordance to the approved plans.
SITE INSPECTIONS AND REPORTING REQUIREMENTS
1. The Owner or their designated representative will be responsible for inspecting the site to ensure that all systems are maintained and are in good working condition. The City will be notified and kept informed in writing of the site representative, including phone number and address. A standard reporting form will be developed by the Owner for City review and approval. Inspection reports will be provided to the City on a minimum of a quarterly basis.
ROUTINE INSPECTIONS
1. Routine inspections will dictate maintenance requirements for general items at the site including (if applicable to site), locks, fencing, signage, and road/access conditions.
2. Defective or missing locks will be replaced and will be keyed to match all other site locks.
3. Missing or damage chain link fence will be repaired or replaced as needed. Fencing repair or replacement will be accordance with specifications from the original design plans.
4. Damage or missing signs will be replaced with a similar type signs.
5. Roadway surfaces which are damage will be repaired in accordance to the original plan specifications.
6. Surface water ditches and detention ponds will be observed for erosion or sediment build-up, which could result in overtopping and severe erosion down-slope.
SPECIAL INSPECTIONS AFTER MAJOR HURRICANE OR TORNADO EVENTS
1. Special unscheduled inspections will be conducted as necessary at the site after major hurricane or tornado events. Every attempt will be made to have these inspections conducted within several days after the storm event to ensure fencing is still in place and major damage to the facilities has not occurred. Any repair will be conducted as soon as possible.
MONTHLY MAINTENANCE
1. The majority of the site was planted with a type of (define native grass seeding). Typically, these areas will require mowing twice a month from April through October, and monthly mowing from November through March.
ANNUAL MAINTENANCE
1. Annual maintenance of the site may include fertilizing and reseeding the site, as necessary.
SURFACE MAINTENANCE
1. Inspections performed, as part of the scheduled routine inspections at the site will dictate maintenance requirements for the site. The items to be routinely inspected include surface water runoff control, ponded water, presence of erosion or gully, and whether or not the topsoil and vegetation are intact.
2. The site will be inspected to determine whether it drains without ponding and erosion.
3. Topsoil will be inspected for erosion, settlement, and cracking. Topsoil will be added as necessary to maintain drainage characteristics in accordance with the original specifications. Areas affected by the addition of topsoil will be seeded and fertilized in accordance with the original seeding specifications.
4. Topographic surveying of the detention pond and storm drainage system may need to be periodically performed to verify functionality of the system.
SURFACE WATER MANAGEMENT SYSTEM MAINTENANCE
1. Inspections performed, as part of the scheduled routine inspections at the site will dictate maintenance requirements for the surface water management system at the site. The items to be routinely inspected include inlets, culverts, drainage pipes, sediment controls, erosion of drainage ditches or berms, and the condition of the detention ponds.
2. Inlets culverts, and pipes will be visually inspected to ensure that no obstructions are hindering the performance of the

surface water drainage system.
3. Any significant obstructions found will be removed.
4. Inlets also will be visually inspected to ensure that grates are in place.
5. Any missing or damaged grates will be replaced.
6. Inlets, culverts, and pipes will be visually inspected for leaks or structural damage.
7. Any damaged items will be repaired or replaced in accordance to with the original specifications.
8. Areas are to be visually inspected for sediment build-up includes drainage pipes, drainage ditches and the area within the pond site.
9. If sediment buildup occurs in the surface water piping system, the sediment will be cleaned from the pipes to maintain their original hydraulic capacity.
10. If sediment buildup is obstructing the normal flow pattern in the drainage ditches, the sediments will be removed.
11. Surface water ditches and detention pond side slopes will be visually inspected for erosion and gulying.
12. If erosion occurs in surface water ditches, topsoil will be added as necessary to maintain drainage characteristics in accordance to the original plans.
13. If erosion occurs on the detention pond side slopes, a fill material will be added as necessary to maintain the original grade of the slope.
14. The detention pond will be visually inspected for the presence of litter. Any litter will be removed on a continual basis.
EQUIPMENT REQUIREMENTS (when applicable)
1. The equipment maintenance requirements will be determined based upon the manufacturers recommendations and will be included on the design plans. At a minimum, lift stations will require duplex systems. The Engineer of Record will provide for City review equipment operation and maintenance requirements.

Detention Pond Engineer's of Record As-Built Certification

I hereby certify that the information presented on this sheet represents the true as-built information for the detention pond for this site, and that the volume provided in the pond is equal to, or exceeds, the volume required and called for in the approved permitted construction drawings, as summarized in the below table.

(With Pumps) I hereby certify that the pumps were inspected and were operational, in accordance to the design, at the time of inspection.

(Without Pumps) I hereby certify that the detention pond was operational, in accordance to the design, at the time of inspection.

Total Detention Volume Required (Acre Feet):

--

Total Detention Volume Provided (Acre Feet):

--

--

(Engineer's seal, signature & date)

PARKING REQUIREMENTS

<i>Provide summary on site plan.</i>		
Parking Summary		
Applicable Ordinance Numbers:*	Sect. 39, Zoning Ord.	
Land Use Type:		
Written Description of Parking Requirement: (i.e., X spaces per Y sf)		
Quantity of applicable parking space-controlling element: (building SF, # of employees, # of beds, etc.)		
	Required	Provided
Total Parking Spaces:		
ADA Accessible Spaces:		
ADA Van Accessible Spaces:		

**If the site includes mixed occupancy types, a separate column shall be provided for each type. In these cases, include an additional column that provides a grand total for the number of spaces required and the number of spaces provided for the entire development.*

Notes

- To prevent nuisance situations, all parking area lighting shall be designed, shielded and operated so as not to reflect or shine on adjacent properties and in accordance with City ordinances. All streets and driveways shall be lighted at night with a minimum intensity of two foot-candles' illumination if off-street parking or loading facilities are to be used at night.
- In all nonresidential and multi-family zoning districts, the perimeter of all parking lots and driveways shall be provided with concrete curbs. Parking shall not be permitted to encroach upon the public right-of-way.
- Parking space(s) for persons with disabilities and other associated provisions (e.g., clear and unobstructed pathways into building, crosswalks across parking lots, etc.) shall be provided according to building codes, State laws, and requirements of the Americans with Disabilities Act (ADA).

LANDSCAPING REQUIREMENTS

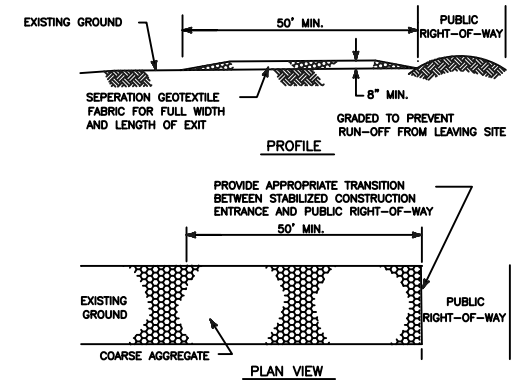
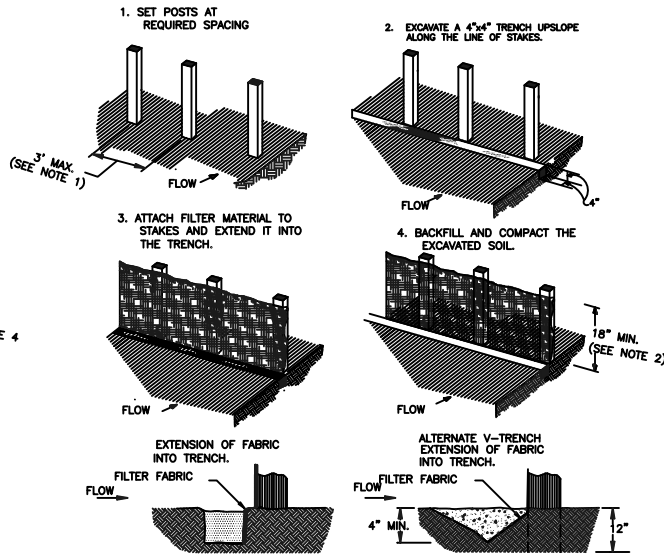
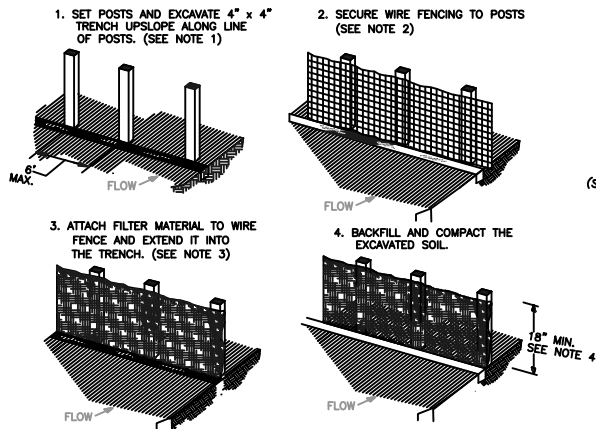
<i>Provide summary on site plan sheet</i>		
Landscape Summary		
Applicable Code:	Sect. 40, Zoning Ord.	
Total Area of Site (sf):		
Total Area of Covered by Buildings (sf):		
Total Area Not Covered by Buildings (sf):		
Applicable landscape development requirement in addition to front landscaped area (see section 40.6 A (i))		
	Required	Provided
Percent of landscaped area for front yard (15% required)	15%	
Total SF of Landscape Area:		
Rear Setback Landscape Area (SF):		
Required Landscape Area (SF)		
(Total SF of Landscape Area – Rear Setback Landscape Area):		
Number of Street Frontage Trees (1 tree/40 LF):		
Total Number of Trees:		
Lot Coverage Percentage (including main and accessory buildings)		
Impervious Coverage Percentage (including all buildings, parking areas, sidewalks, etc.)		

Notes:

- This table is required in addition to, not in lieu of, providing the information required as part of the landscaping plan as described by ordinance.
- Plant materials shall conform to the standards of the approved plant list for the City of Tomball. Grass seed, sod and other material shall be clean and reasonably free of weeds and noxious pests and insects.
- All required landscaped open areas shall be completely covered with living plant material. Landscaping materials such as wood chips and gravel may be used under trees, shrubs and other plants.
- If any groundcover plant should die, the owner shall replace these plants by the end of the next required landscaping tree, shrub, or planting season.
- Grass areas shall be sodded, plugged, sprigged, hydro-mulched and/or seeded, except that solid sod shall be used in swales, earthen berms or other areas subject to erosion.
- Ground covers used in lieu of grass in whole and in part shall be planted in such a manner as to present a finished appearance and reasonably completed coverage within one (1) year of planting.
- Any major or significant modification to a landscape development constructed or installed in association with this section must be in accordance with this section and must be approved by the city's Building Official.
- Landscape development located within the rear setback area of a building site, screened from adjacent properties and not adjacent to a public street shall not be considered when determining the minimum requirements of this section.
- Only shrubs and groundcovers (i.e., no trees) shall be used under existing or proposed overhead utility lines.
- Landscape areas should be located to define parking areas and to assist in clarifying appropriate circulation patterns. All landscape areas shall be protected by a monolithic concrete curb or wheel stops, and shall remain free of trash, litter, and car bumper overhangs.
- All existing trees that are to be preserved shall be provided with undisturbed, permeable surface area under (and extending outward to) the existing dripline of the tree.
- All new trees shall be provided with a permeable surface under the dripline a minimum of five (5) feet by five (5) feet.

- During any construction or land development, the developer shall clearly mark all trees to be preserved/retained on-site, and may be required to erect and maintain protective barriers around all such trees or groups of trees. The developer shall not allow the movement of equipment or the storage of equipment, materials, debris or fill to be placed within the dripline of any trees that are designated for preservation.
- During the construction stage of development, the developer shall not allow cleaning of equipment or material under the canopy of any tree or group of trees that are being preserved. Neither shall the developer allow the disposal of any waste/toxic material such as, but not limited to, paint, oil, solvents, asphalt, concrete, mortar, etc., under the canopy of any tree or groups of trees to remain.
- No attachment or wires of any kind, other than those of a protective or supportive nature, shall be attached to any tree.
- Rigid compliance with these landscaping requirements shall not be such as to cause visibility obstructions and/or blind corners at intersections.
- The owner, tenant and/or their agent, if any, shall be jointly and severally responsible for the maintenance of all landscaping. All required landscaping shall be maintained in a neat and orderly manner at all times. This shall include, but not to be limited to, mowing (of grass six inches or higher), edging, pruning, fertilizing, watering, weeding, and other such activities common to the maintenance of landscaping. Landscaped areas shall be kept free of trash, litter, weeds, and other such material or plants not a part of the landscaping. All plant material shall be maintained in a healthy and growing condition as is appropriate for the season of the year.
- Required plant materials which die shall be replaced with plant material of similar variety and size, within ninety (90) calendar days. Trees with a trunk diameter in excess of six (6) inches measured twenty-four (24) inches above the ground may be replaced with ones of similar variety having a trunk diameter of no less than three (3) inches measured twenty-four (24) inches above the ground on a caliper-inch for caliper-inch basis (e.g., for a 6" tree, two 3" replacement trees shall be required). A time extension for replacement of plant materials may be granted by the City Manager. Failure to maintain any landscape area in compliance with this Section is considered a violation of this Section and may be subject to penalties of Section 49 of the Zoning Ordinance.
- A person commits an offense if he removes or destroys a tree within a street right-of-way, or upon any public property, without first obtaining written authorization from the city manager. (Sec. 44-6. Trees within public rights-of-way.)

CONSTRUCTION DETAILS

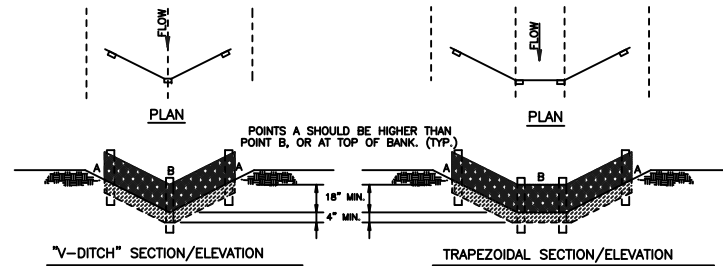


CONSTRUCTION NOTES:

1. LENGTH SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS, BUT NOT LESS THAN 50 FEET.
2. THICKNESS SHALL BE NOT LESS THAN 8 INCHES.
3. WIDTH SHALL BE NOT LESS THAN FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS.
4. STABILIZATION FOR OTHER AREAS SHALL HAVE THE SAME AGGREGATE THICKNESS AND WIDTH REQUIREMENTS AS THE STABILIZED CONSTRUCTION EXIT, UNLESS OTHERWISE SHOWN ON THE CONSTRUCTION DRAWINGS.
5. STABILIZED AREA MAY BE WIDENED OR LENGTHENED TO ACCOMMODATE A TRUCK WASHING AREA. AN OUTLET SEDIMENT TRAP MUST BE PROVIDED FOR THE TRUCK WASHING AREA.
6. SEE SECTION 01569 - STABILIZED CONSTRUCTION EXIT.

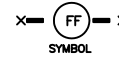


STABILIZED CONSTRUCTION EXIT



CONSTRUCTION NOTES:

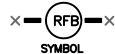
1. 1" THICK BY 2 INCH WOODEN STAKES TO BE SET AT MAXIMUM SPACING OF 3 FEET AND EMBEDDED A MINIMUM OF 8 INCHES. PREASSEMBLED FENCE WITH SUPPORT NETTING IS USED, SPACING OF POST MAY BE INCREASED TO 8 FEET MAXIMUM.
2. ATTACH FILTER FABRIC TO WOODEN STAKES. FILTER FABRIC FENCE SHALL HAVE A MINIMUM HEIGHT OF 18 INCHES AND MAXIMUM HEIGHT OF 36 INCHES ABOVE NATURAL GROUND.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHOULD BE OVERLAPPED 6 INCHES AT THE POSTS, AND FOLDED.
4. SEE SECTION 01567 - FILTER FABRIC FENCE.



FILTER FABRIC FENCE

CONSTRUCTION NOTES:

1. SET 1 INCH BY 2 INCH WOODEN STAKES SPACED A MAXIMUM OF 6 FEET APART AND EMBEDDED A MINIMUM OF 12 INCHES.
2. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH STAPLES.
3. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE, WITH TIES SPACED EVERY 24 INCHES AT TOP AND MIDSECTION.
4. MINIMUM HEIGHT OF FILTER SHOULD BE 18 INCHES AND A MAXIMUM OF 36 INCHES ABOVE NATURAL GROUND.
5. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED 6 INCHES AT THE POSTS, AND FOLDED.
6. SEE SECTION 01568 - REINFORCED FILTER FABRIC BARRIER.



REINFORCED FILTER FABRIC BARRIER

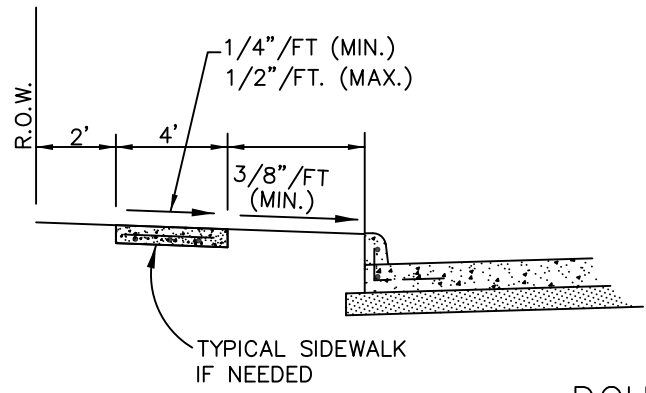
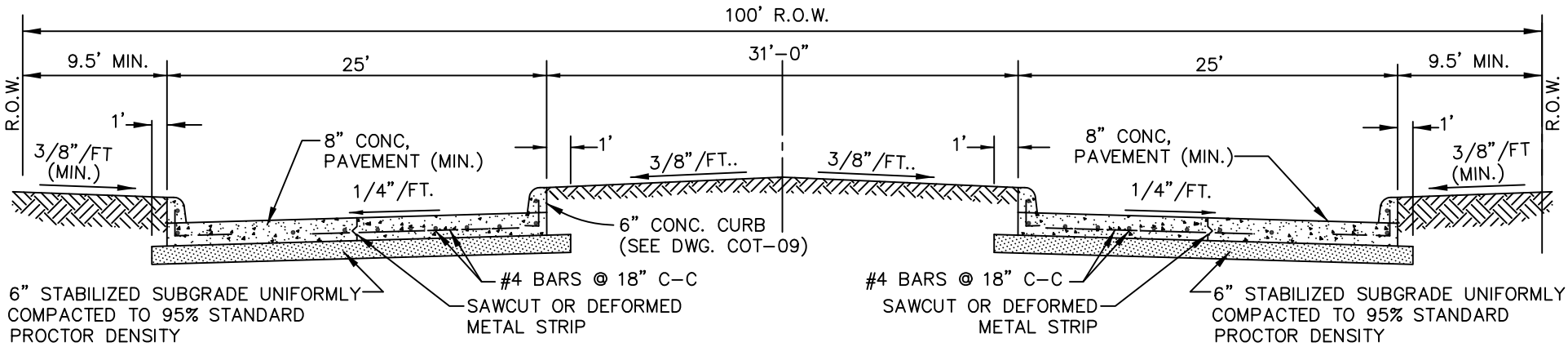
CITY OF TOMBALL

STORM WATER POLLUTION
PREVENTION PLAN DETAILS
(NOT TO SCALE)

APPROVED BY:	DWG. NO. COT-01
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

FILE INFO: G:\DWG\TOMBALL\LATEST\COT-03A.dwg 1=1 06/12/96 07:51 RBF

NOTE:
THICKNESS OF PAVEMENT SHALL BE SUPPORTED BY GEOTECHNICAL INVESTIGATION AND PAVEMENT DESIGN ANALYSIS



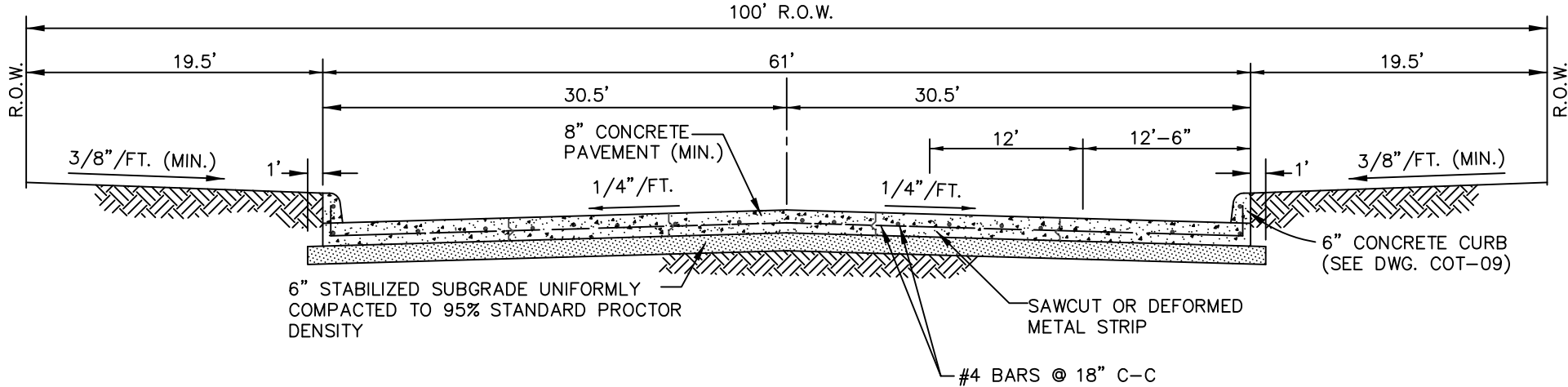
TYPICAL CROSS-SECTION
DOUBLE 25' WIDE CURBED CONCRETE
PAVEMENT WITH MEDIAN
(100' R.O.W.)

SCALE: N.T.S.

FIGURE 5-3

CITY OF TOMBALL	
ROADWAY SECTION A-2 (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-03
DIRECTOR OF PUBLIC WORKS	EFF. DATE:

NOTE:
 THICKNESS OF PAVEMENT
 SECTION SHALL BE SUPPORTED BY A
 GEOTECHNICAL INVESTIGATION AND
 PAVEMENT DESIGN ANALYSIS



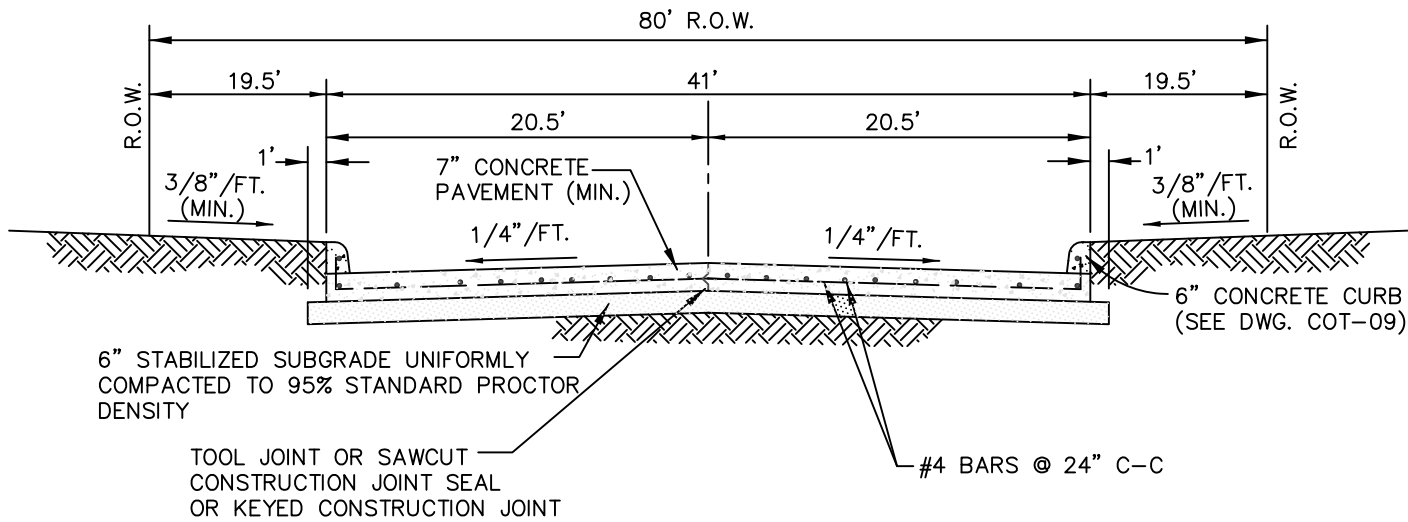
NOTE: EXPANSION JOINTS AT MAXIMUM DISTANCE OF 80'-0"

TYPICAL CROSS-SECTION
 61' WIDE CURBED CONCRETE PAVEMENT
 (100' R.O.W)

SCALE: N.T.S.

FIGURE 5-4

CITY OF TOMBALL	
ROADWAY SECTION A-1 (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-04
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

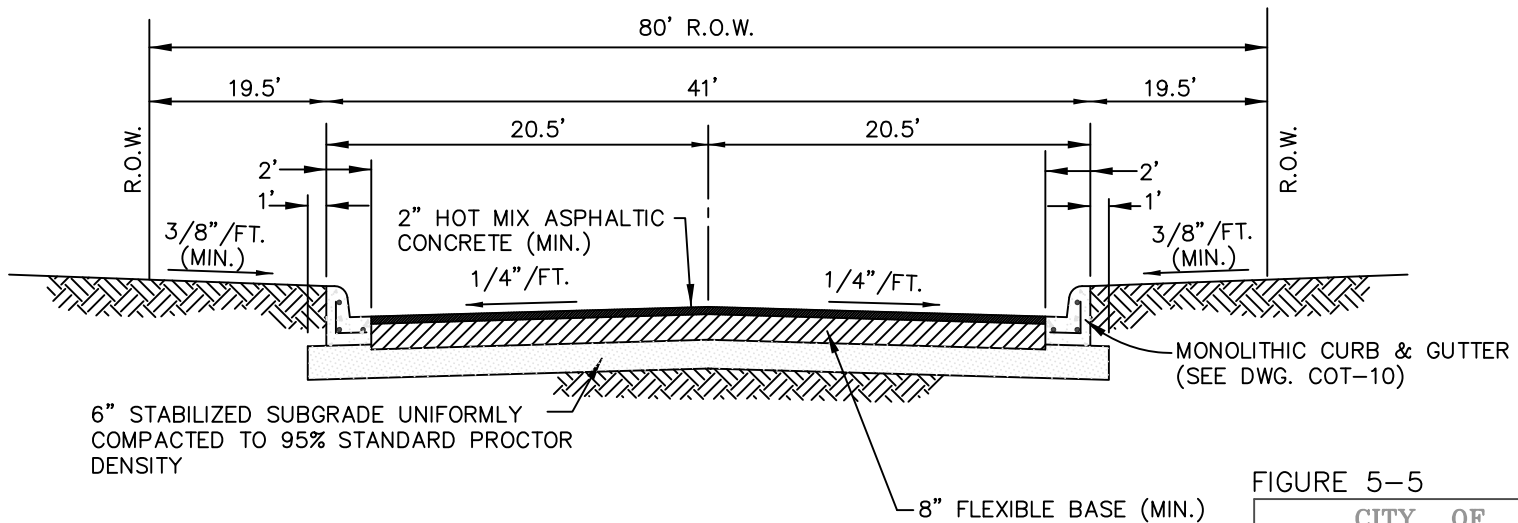


TYPICAL CROSS-SECTION OF
41' WIDE CURBED CONCRETE PAVEMENT
(80' R.O.W.)

SCALE: N.T.S.

NOTE:

THICKNESS OF PAVEMENT SECTION SHALL BE SUPPORTED BY A GEOTECHNICAL INVESTIGATION AND PAVEMENT DESIGN ANALYSIS



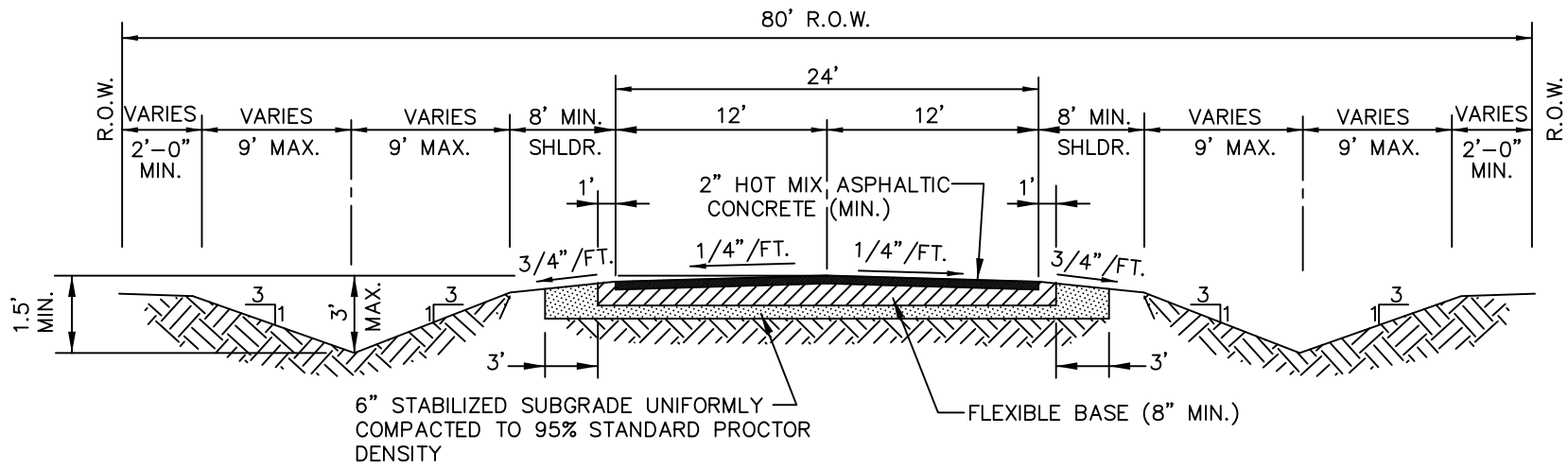
TYPICAL CROSS-SECTION
41' WIDE CURBED, ASPHALTIC CONCRETE STREET
(80' R.O.W.)

SCALE: N.T.S.

FIGURE 5-5

CITY OF TOMBALL	
ROADWAY SECTION C-1 (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-05
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

NOTE:
 THICKNESS OF PAVEMENT
 SECTION SHALL BE SUPPORTED BY A
 GEOTECHNICAL INVESTIGATION AND
 PAVEMENT DESIGN ANALYSIS



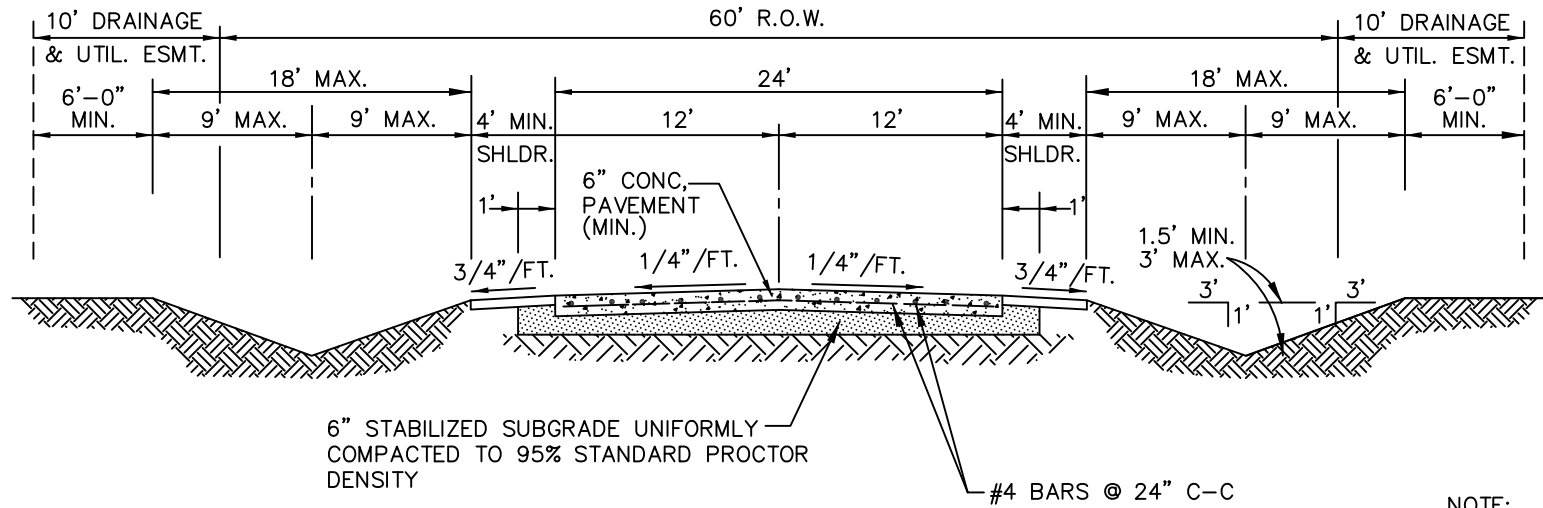
FLEXIBLE BASE PAVEMENT
 WITH ROADSIDE DITCHES
 (80' R.O.W.)

SCALE: N.T.S

FIGURE 5-6

CITY OF TOMBALL	
ROADWAY SECTION C-2 (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-06
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

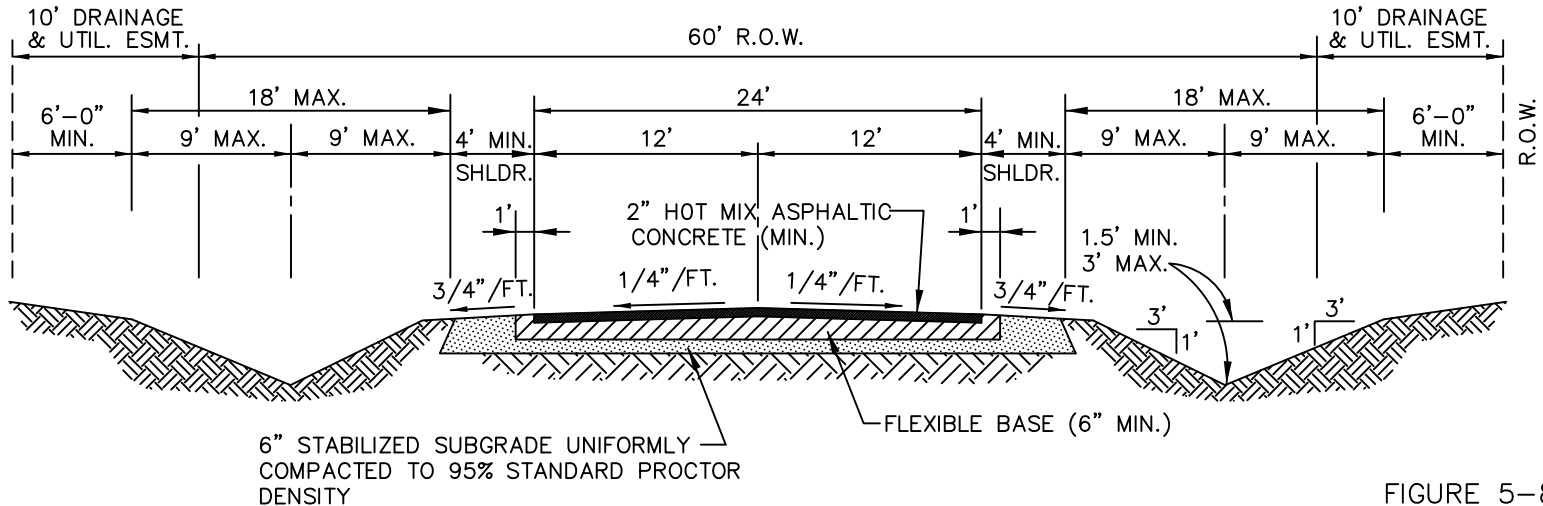
FILE INFO: G:\DWG\TOMBALL\LATEST\COT-08A.dwg 1=1 06/12/96 07:55 RBF



TYPICAL CROSS-SECTION OF 24' CONCRETE PAVEMENT WITH ROADSIDE DITCHES (60' R.O.W)

SCALE: N.T.S

NOTE:
FLEXIBLE BASE THICKNESS OF PAVEMENT SECTION SHALL BE SUPPORTED BY A GEOTECHNICAL INVESTIGATION AND PAVEMENT DESIGN ANALYSIS

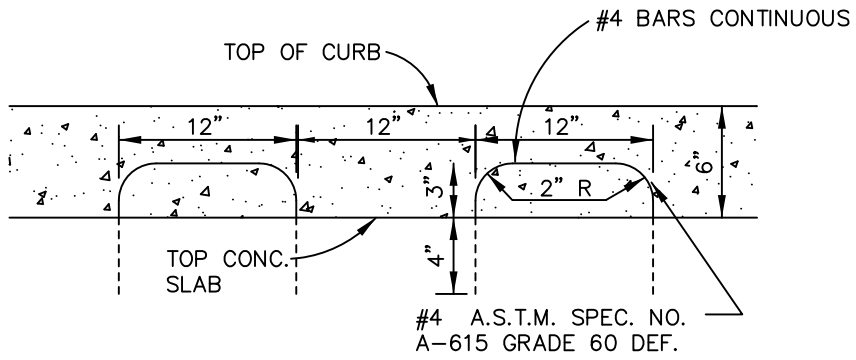


TYPICAL CROSS-SECTION OF 24' ASPHALTIC PAVEMENT WITH ROADSIDE DITCHES (60' R.O.W.)

SCALE: N.T.S

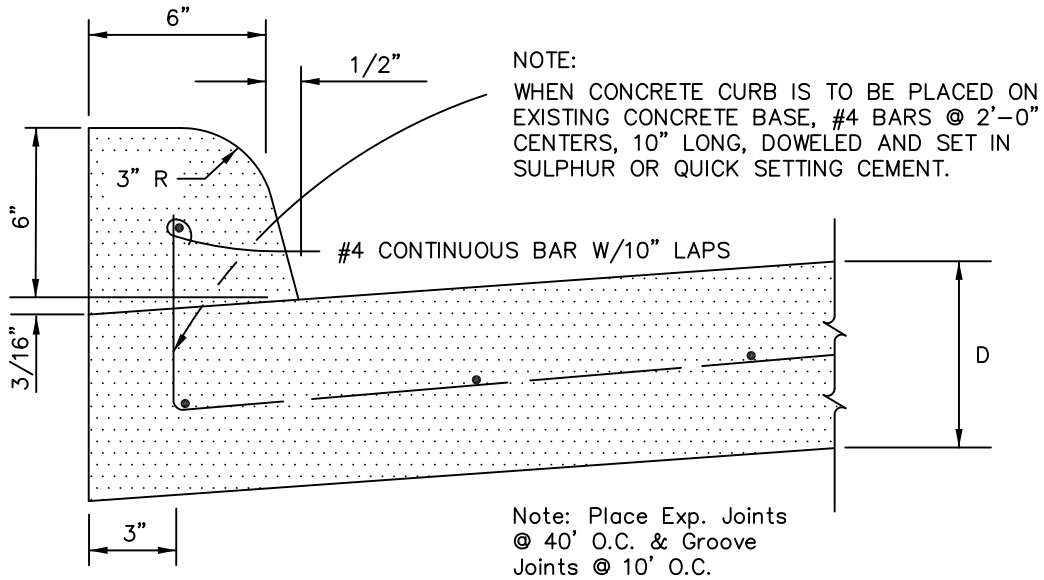
FIGURE 5-8

CITY OF TOMBALL	
ROADWAY SECTION R-2 (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-08
DIRECTOR OF PUBLIC WORKS	EFF. DATE:



ALTERNATE CURB REINFORCING

N.T.S.



FINISH TO BE ACCOMPLISHED BY FLOATING, STEEL TROWELLING AND THEN BRUSHING. HAND FINISH NOT REQUIRED WHEN CURB AND GUTTER IS POURED BY A MACHINE, BUT CURB IS TO HAVE THE SAME OUTSIDE DIMENSIONS, AND HAVE A BRUSHED FINISH.

6" CONCRETE CURB

N.T.S.

CITY OF TOMBALL

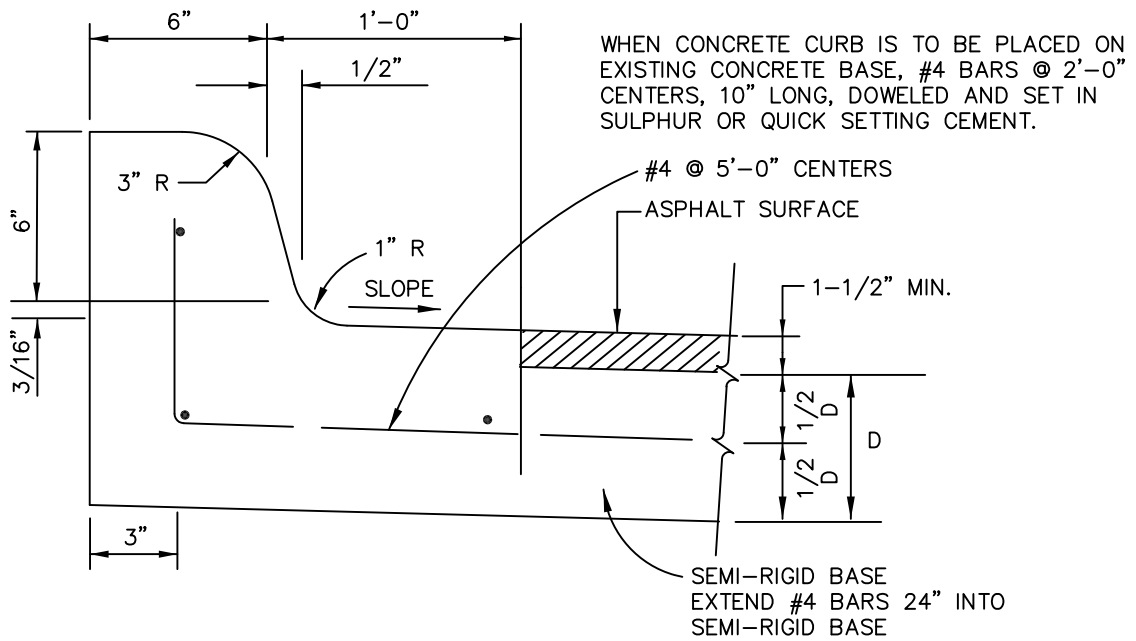
CONCRETE CURB
(NOT TO SCALE)

APPROVED BY:

DWG. NO. COT-09

DIRECTOR OF PUBLIC WORKS

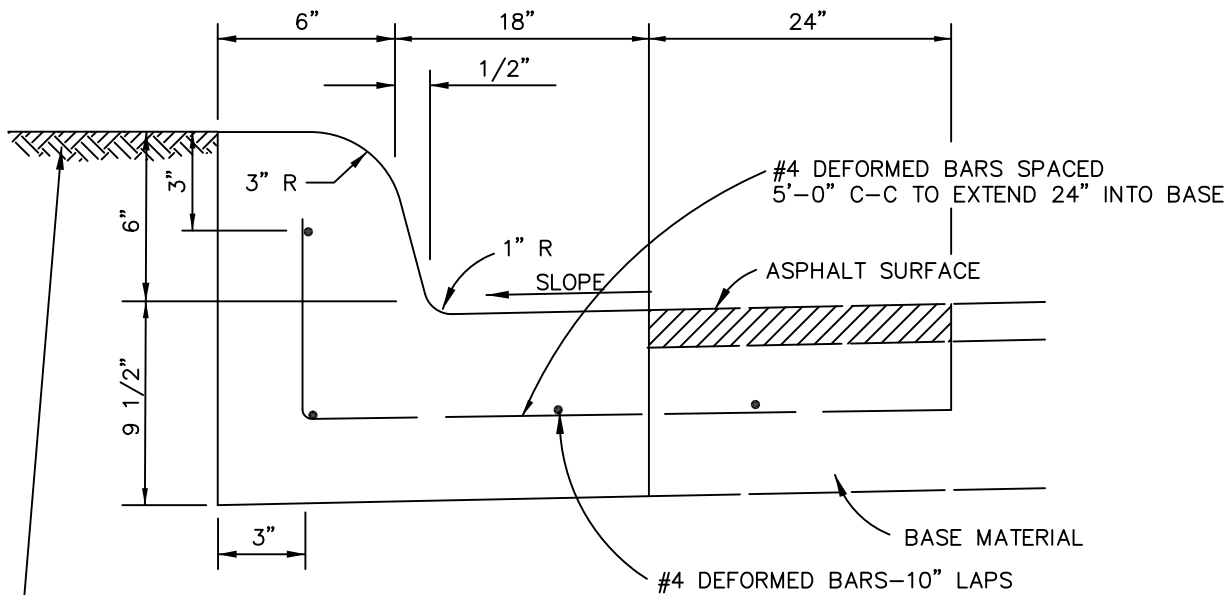
EFF. DATE: 07/25/94



FINISH TO BE ACCOMPLISHED BY FLOATING, STEEL TROWELLING AND THEN BRUSHING. HAND FINISH NOT REQUIRED WHEN CURB AND GUTTER IS POURED BY A MACHINE, BUT CURB IS TO HAVE THE SAME OUTSIDE DIMENSIONS, AND HAVE A BRUSHED FINISH.

ESPLANADE CURB AND GUTTER

N.T.S

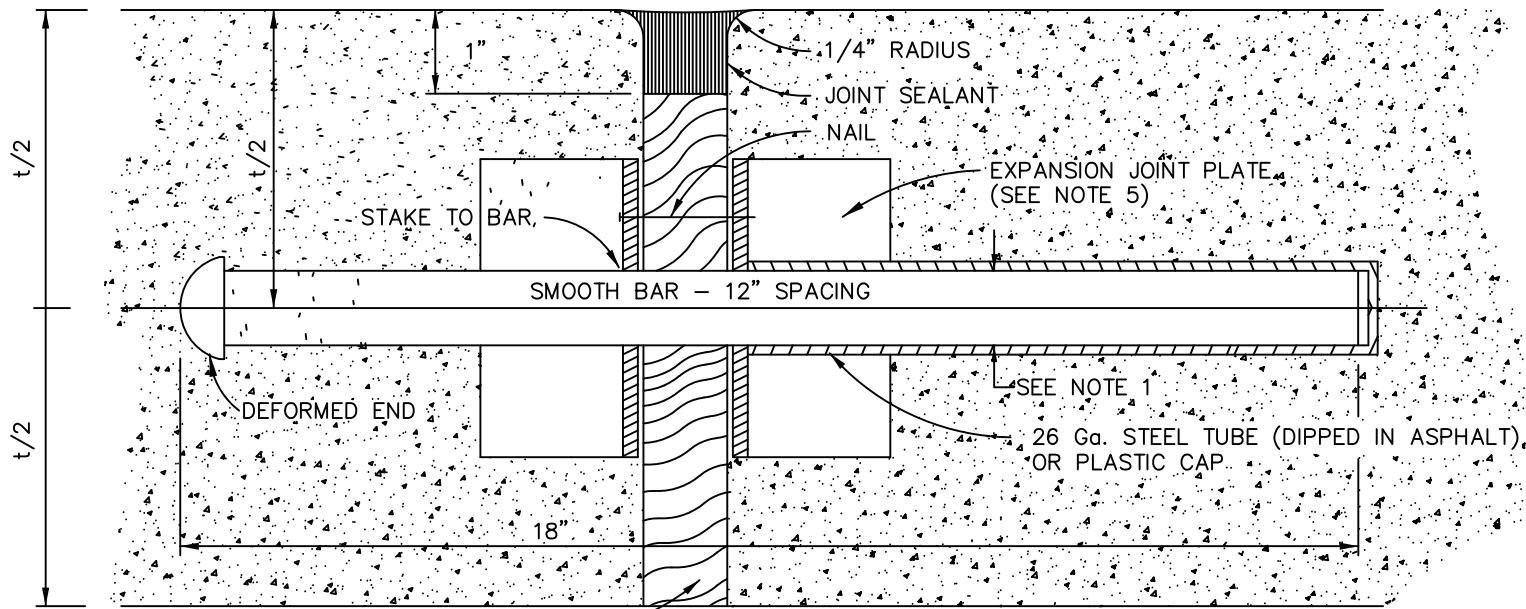


NOTE:
 SOIL SHALL BE COMPACTED IN ACCORDANCE WITH SPECIFICATIONS PRIOR TO FURTHER ROADWAY CONSTRUCTION

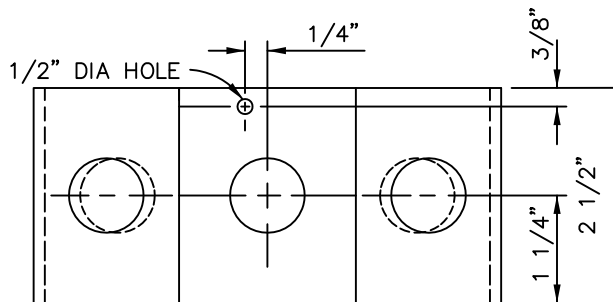
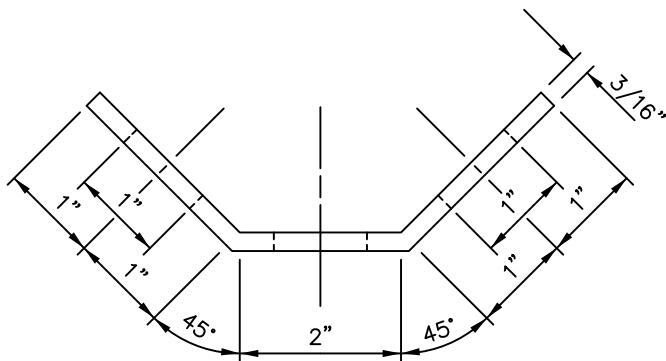
MONOLITHIC CURB & GUTTER

N.T.S

CITY OF TOMBALL		
STANDARD MONOLITHIC CONCRETE CURB AND GUTTER (NOT TO SCALE)		
APPROVED BY:	DWG. NO.	COT-10
DIRECTOR OF PUBLIC WORKS	EFF. DATE:	07/25/94



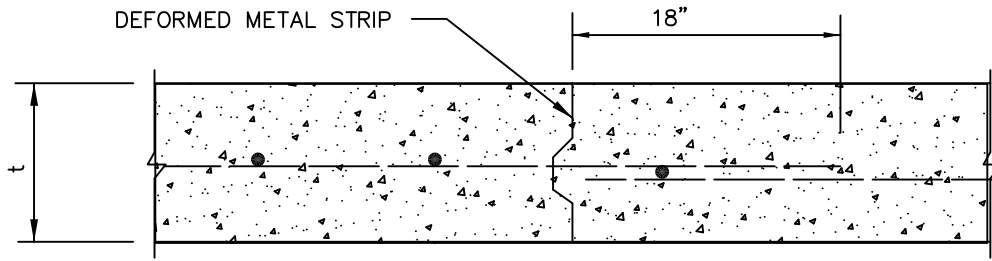
1" BOARD EXPANSION JOINT FILLER (REDWOOD)



NOTE:

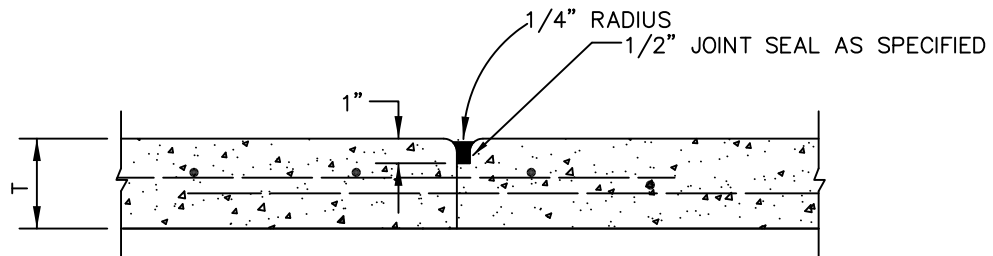
1. DOWELS FOR PAVEMENT EXPANSION JOINTS SHALL BE 3/4" DIA. FOR 6" TO LESS THAN 7" PAVEMENT THICKNESS, 1" FOR 7" TO LESS THAN 9" PAVEMENT THICKNESS AND 1-1/4" DIA. FOR 9" OR GREATER PAVEMENT THICKNESS.
2. EXPANSION JOINT SHALL BE PLACED AT THE END OF EACH CURB RETURN AND AT MAXIMUM 80' SPACING (SEE PLANS).
3. ALL JOINT SEAL MATERIAL SHALL BE ASPHALT RUBBER IN ACCORDANCE WITH ASTM DESIGNATION D3405.
4. IF DEFORMED METAL STRIPS ARE ALLOWED, THEY SHALL BE STAKED IN PLACE WITH #3 BARS.
5. PRE-MANUFACTURED JOINT PLATE.

CITY OF TOMBALL	
DOWEL TYPE EXPANSION JOINT (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-11
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



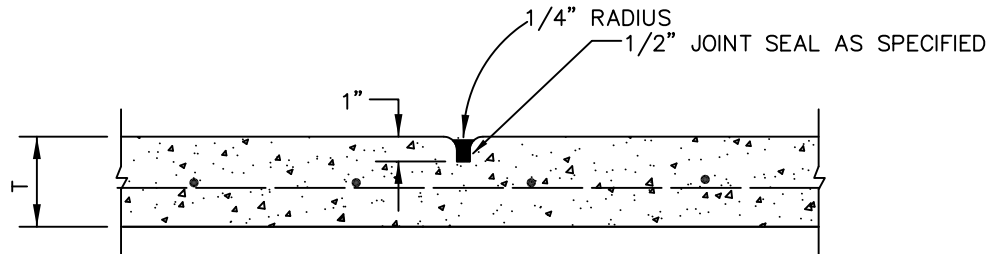
THE LOCATION OF CONSTRUCTION JOINTS AND DEFORMED METAL STRIPS
MAY BE VARIED, WITH THE APPROVAL OF THE DIRECTOR OF THE
DEPARTMENT OF PUBLIC WORKS

DEFORMED METAL STRIP



CONSTRUCTION JOINT PAVEMENT REPAIR

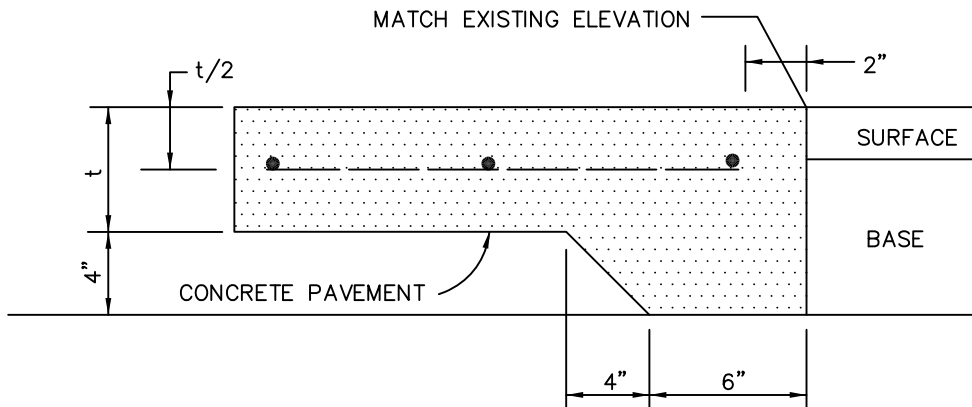
N.T.S.



CONTRACTION JOINT

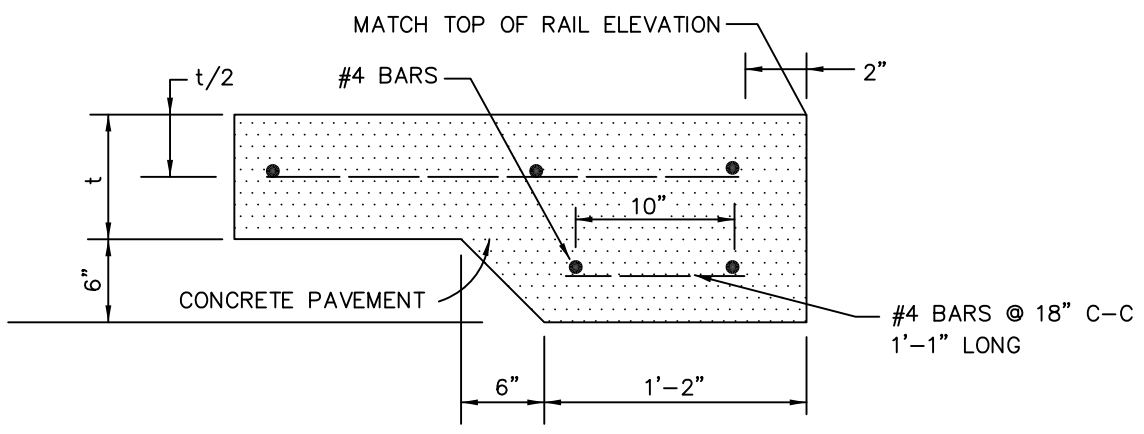
N.T.S.

CITY OF TOMBALL		
CONSTRUCTION JOINTS DETAIL (NOT TO SCALE)		
APPROVED BY:	DWG. NO.	COT-12
DIRECTOR OF PUBLIC WORKS	EFF. DATE:	07/25/94



CONCRETE TO ASPHALT PAVING HEADER

N.T.S.



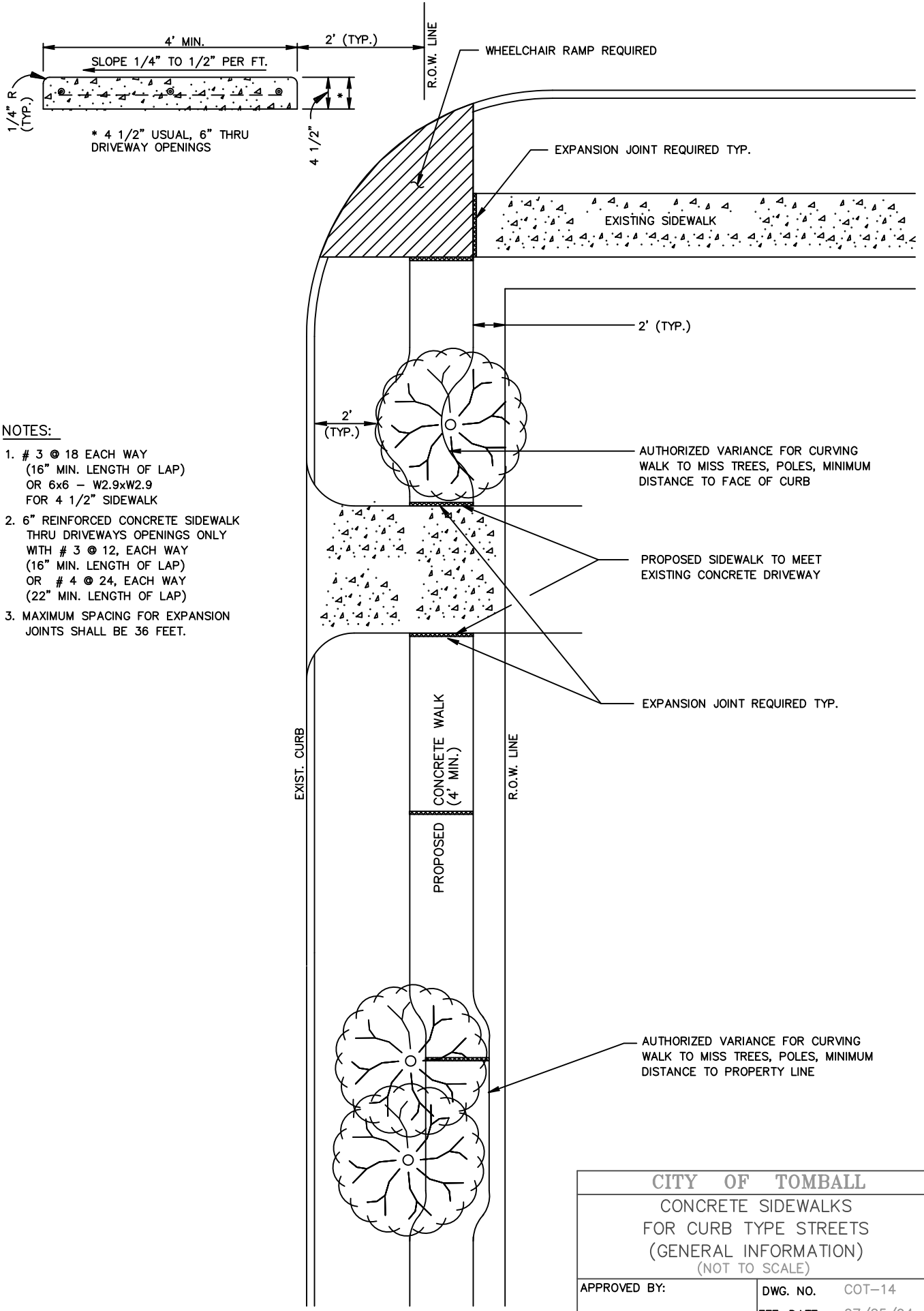
RAILROAD HEADER

N.T.S.

NOTES:

1. RAILROAD AND PAVING HEADERS TO BE POURED MONOLITHICALLY WITH CONCRETE PAVEMENT.
2. t = CONCRETE PAVEMENT THICKNESS IN INCHES.

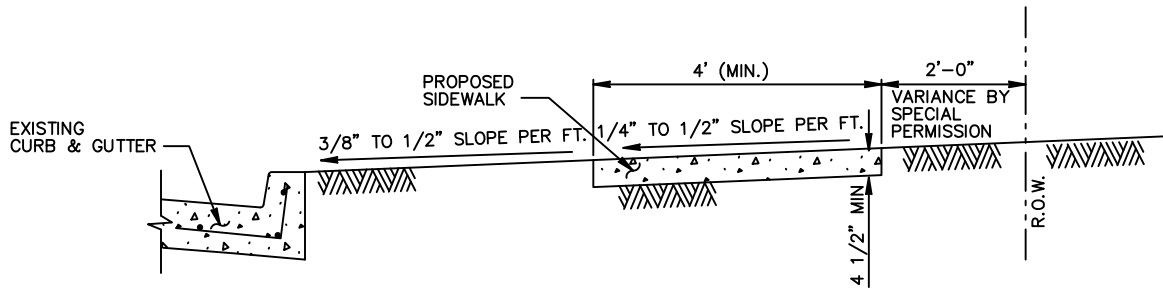
CITY OF TOMBALL	
STANDARD PAVING HEADER (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-13
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



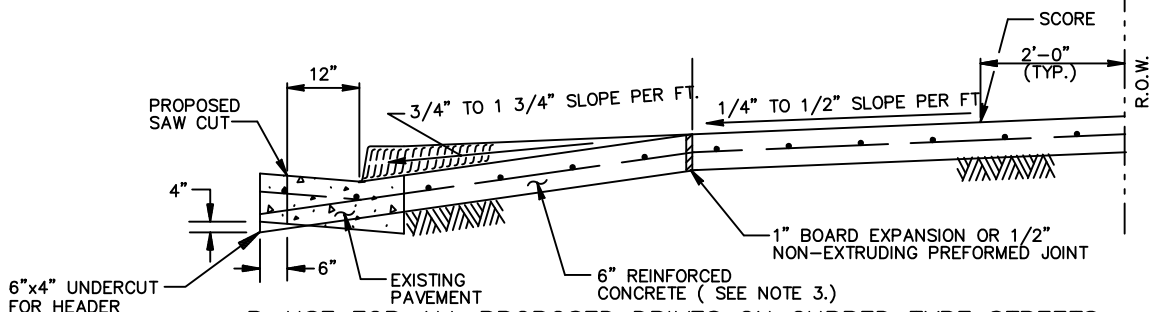
NOTES:

1. # 3 @ 18 EACH WAY
(16" MIN. LENGTH OF LAP)
OR 6x6 - W2.9xW2.9
FOR 4 1/2" SIDEWALK
2. 6" REINFORCED CONCRETE SIDEWALK
THRU DRIVEWAYS OPENINGS ONLY
WITH # 3 @ 12, EACH WAY
(16" MIN. LENGTH OF LAP)
OR # 4 @ 24, EACH WAY
(22" MIN. LENGTH OF LAP)
3. MAXIMUM SPACING FOR EXPANSION
JOINTS SHALL BE 36 FEET.

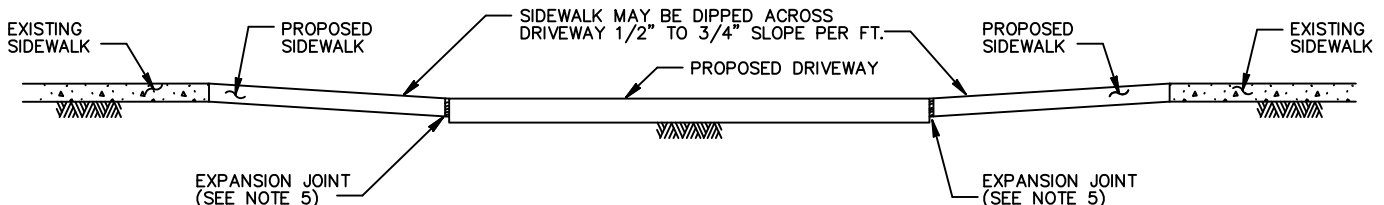
CITY OF TOMBALL		
CONCRETE SIDEWALKS FOR CURB TYPE STREETS (GENERAL INFORMATION) (NOT TO SCALE)		
APPROVED BY:	DWG. NO.	COT-14
DIRECTOR OF PUBLIC WORKS	EFF. DATE:	07/25/94



A-USE WHERE SIDEWALKS TO BE BUILT OTHER THAN DRIVEWAY

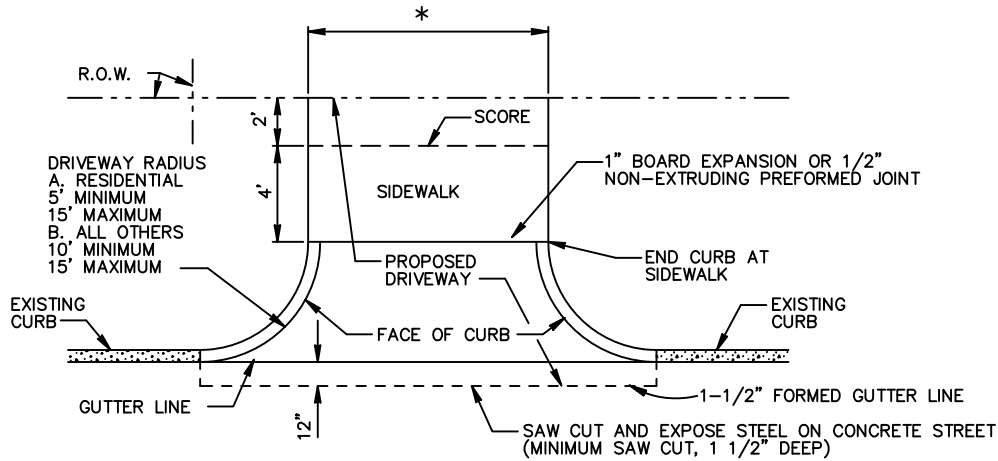


B-USE FOR ALL PROPOSED DRIVES ON CURBED TYPE STREETS



C-USE WHERE PROPOSED DRIVEWAY IS TO BE BUILT WITH EXISTING SIDEWALKS, WITH EXCESSIVE GRADES

- * DRIVEWAY
- A. RESIDENTIAL
ONE WAY 12' MIN. 20' MAX.
TWO WAY 12' MIN. 24' MAX.
 - B. ALL OTHERS
ONE WAY 15' MIN. 20' MAX.
TWO WAY 24' MIN. 35' MAX.



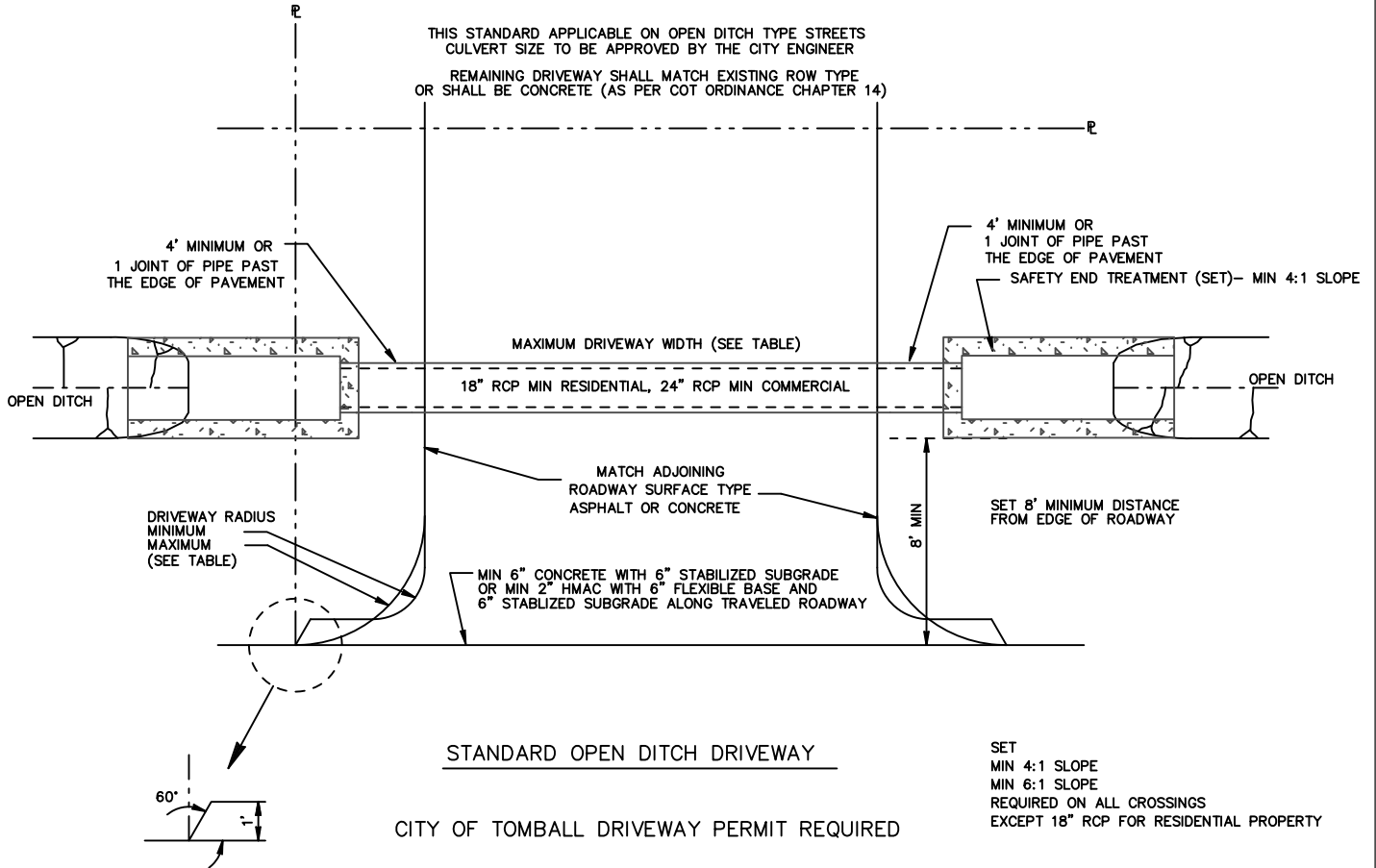
IF NO REINFORCING STEEL EXISTS USE HORIZONTAL DOWELS @ 24, UNLESS OTHERWISE SPECIFIED.
HORIZONTAL DOWELS SHALL BE # 6 BARS, 24" LONG, DRILLED AND EMBEDDED 8" INTO THE CENTER OF THE EXISTING SIZE WITH "PO ROC" OR EQUAL.

D-PROPOSED DRIVEWAY PLAN

NOTES:

1. SIDEWALK, DRIVEWAY, CURB AND GUTTER AND GRADE SHALL BE APPROVED BY PUBLIC WORKS DIRECTOR.
2. SIDEWALKS SHALL BE CONSTRUCTED WITH PORTLAND CEMENT CONCRETE, 5.5 SACK CEMENT PER CUBIC YARD (MIN. 3000 PSI), 4 1/2" THICK, 4'-0" MINIMUM WIDTH, AND BE REINFORCED WITH # 3 @ 18 EACH WAY OR 6x6-W2.9xW2.9 WELDED WIRE FABRIC.
3. DRIVEWAYS SHALL BE CONSTRUCTED WITH PORTLAND CEMENT CONCRETE, 5.5 SACK CEMENT PER CUBIC YARD (MIN. 3000 PSI), 6" THICK, FROM CURB TO PROPERTY LINE AND BE REINFORCED WITH MINIMUM # 3 @ 12 EACH WAY (16" MIN. LENGTH OF LAP) OR # 4 @ 24 EACH WAY (22" MIN. LENGTH OF LAP).
4. ONE-INCH BOARD EXPANSION OR 1/2" NON-EXTRUDING PREFORMED JOINT; AT INTERVALS OF 36 FT. (MAXIMUM) THROUGHOUT ENTIRE LENGTH OF SIDEWALKS, WHERE NEW WALK MEETS OLD WALK AND/OR NEW DRIVEWAY.
5. ONE-INCH BOARD EXPANSION OR 1/2" NON-EXTRUDING PREFORMED JOINT, BETWEEN SIDEWALK AND CURB, AROUND FIRE HYDRANTS AND UTILITY POLES.
6. NO WORK PRIOR TO OBTAINING A CITY OF TOMBALL DRIVEWAY PERMIT

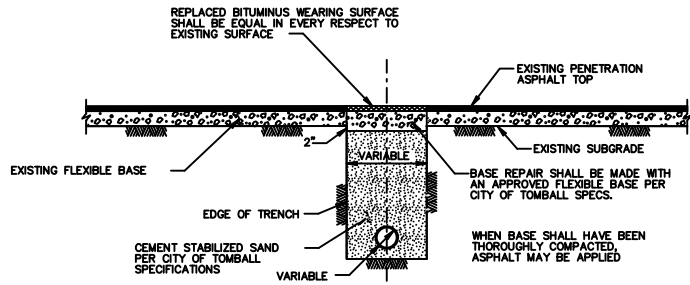
CITY OF TOMBALL	
SIDEWALK AND DRIVEWAY DETAILS FOR CURBED TYPE STREETS (NOT TO SCALE)	
APPROVED BY:	DWG. NO. 1
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 8/03



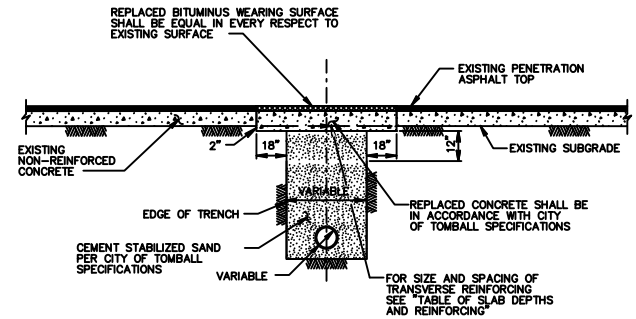
"A" DRIVEWAY WIDTH	RESIDENTIAL	ALL OTHERS
ONE WAY	12' MIN, 20' MAX	15' MIN 20' MAX
TWO WAY - CITY	12' MIN 24' MAX	24' MIN 35' MAX
TWO WAY - ETJ	12' MIN, 24' MAX	24' MIN, 35' MAX
"R" DRIVEWAY RADIUS		
CITY	5' MIN - 15' MAX	10' MIN - 15' MAX
ETJ	5' MIN - 15' MAX	10' MIN - 15' MAX

RADI AND WIDTHS FOR DRIVEWAYS

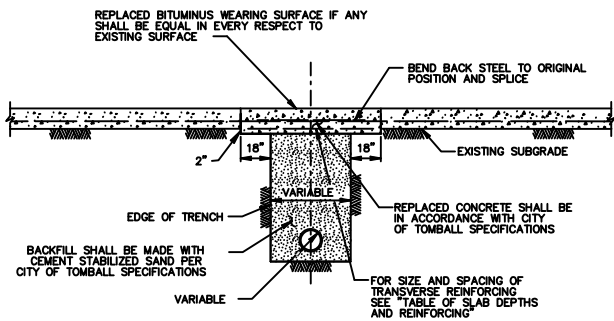
CITY OF TOMBALL	
CONSTRUCTION DETAILS FOR DRIVEWAYS ALONG OPEN DITCH TYPE STREETS (NOT TO SCALE)	
APPROVED BY:	DWG. NO. 2
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 8/03



SECTION SHOWING METHOD OF REPAIR OF FLEXIBLE BASE PAVEMENT



SECTION SHOWING METHOD OF REPAIR OF NON-REINFORCED CONCRETE PAVEMENT



SECTION SHOWING METHOD OF REPAIR OF REINFORCED CONCRETE PAVEMENT

MINIMUM DEPTH OF SLAB		NO.	WIDTH OF TRENCH		SPACING	LENGTH OF BAR
INCH	INCH		INCH	INCH		
8	18	4	9	52		
8	24	4	8	58		
8	30	4	7	64		
8	36	4	6	70		
10	42	4	8 1/2	76		
10	48	4	7 1/2	82		
10	54	4	7	88		
10	60	4	6 1/2	94		
10	66	5	9	100		
10	72	6	8 1/2	106		
10	78	6	8	112		
10	84	6	7 1/2	118		

TABLE OF SLAB DEPTHS AND REINFORCING

CITY OF TOMBALL

SECTIONS SHOWING METHOD OF REPAIR ON PAVEMENT SURFACES (NOT TO SCALE)

APPROVED BY: DIRECTOR OF PUBLIC WORKS
 DWG. NO. COT-17
 EFF. DATE: 07/25/94

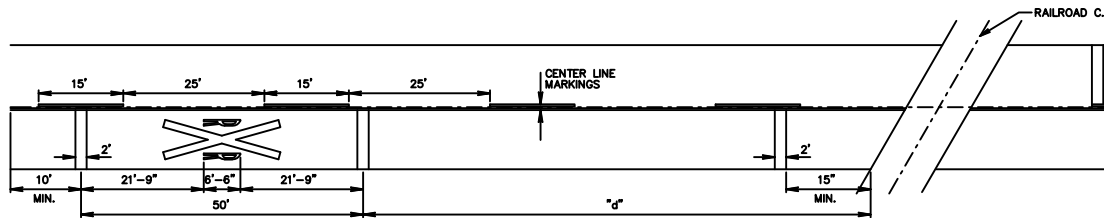


TABLE 1: ADVANCE WARNING PAVEMENT MARKING PLACEMENT

APPROACH SPEED (mph)	DESIRABLE PLACEMENT DISTANCE "d" (Feet)
30	50 (Min) - 80 (Usual)
35	70 - 170
40	150 - 250
45	235 - 335
50	315 - 415
50	400 - Up (500 Usual)

TABLE 2: VARIABLE MARKING DIMENSIONS

LANE WIDTH (Feet)	"x" (Feet)	"s" (Feet)
9	6.5	21.0
9 to 11	7	21.2
12	8	21.9
13	9	21.9
≥ 14	10	22.4

BASIS FOR ESTIMATE QUANTITIES FOR CENTER LINE AND LANE MARKINGS

MARKING	RANGE	TYPICAL QUANTITY (LF)
REQUIRED FOUR INCH SOLID NO-PASSING LINE	150 - 560	300
FOUR INCH BROKEN CENTER LINE	37 - 140	75
FOUR INCH SOLID NO-PASSING LINE (FOR OPPOSING TRAFFIC)	150 - 560	300
EIGHT INCH SOLID LANE LINE	150 - 560	300

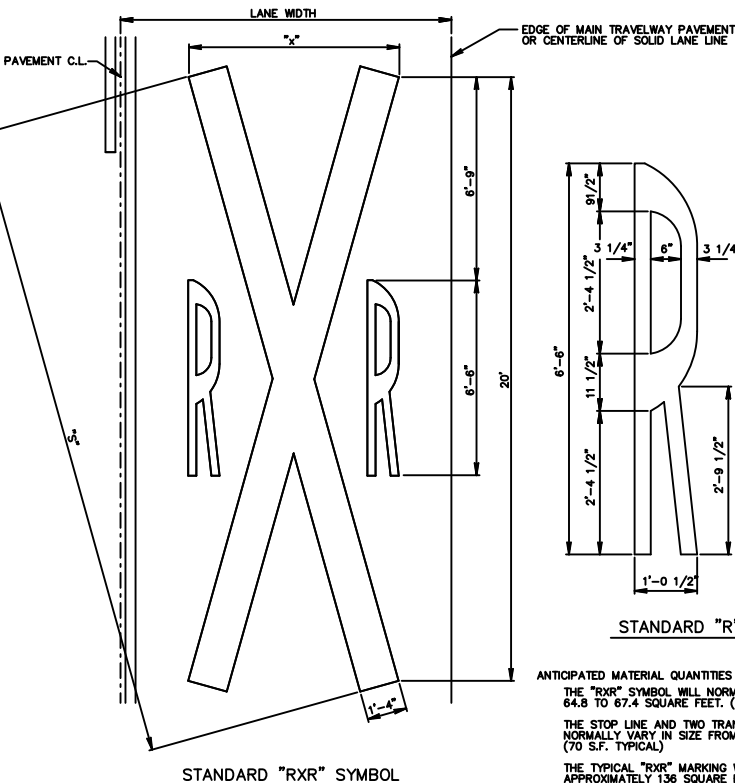
TOTAL FOUR INCH YELLOW MARKING MATERIAL REQUIRED (LF) = NALM (375A + 600B)

TOTAL EIGHT INCH WHITE MARKING MATERIAL REQUIRED (LF) = NALM (300B)

WHERE NALM = NUMBER OF "RR X-ING" MARKINGS

GENERAL NOTES

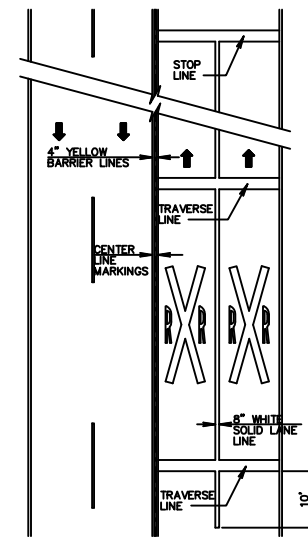
- THE PAVEMENT MARKINGS ON AN APPROACH TO A RAILROAD GRADE CROSSING SHALL CONSIST OF A "RRX" SYMBOL IN EACH APPROACH LANE, A STOP LINE, TWO TRANSVERSE LINES, A NO-PASSING BARRIER LINE AND SOLID LANE LINES ON MULTI-LANE APPROACHES. FOR BID ITEM PURPOSES, THESE MARKINGS ARE FURTHER DESCRIBED AS FOLLOWS:
 - FOR RAILROAD CROSSING MARKING, THE STOP LINE AND TWO TRANSVERSE LINES WILL NOT BE MEASURED, BUT WILL BE INCLUDED IN THE PAY ITEM, PREFORMED PAVEMENT MARKING "RRX".
 - FOR MULTI-LANE APPROACHES TO RAILROAD CROSSINGS, THE SOLID 8" LANE LINE(S) WILL BE MEASURED IN LINEAR FEET, COMPLETE IN PLACE.
- MARKINGS OTHER THAN CENTER LINE MARKINGS, SHALL BE WHITE. CENTER LINE MARKINGS SHALL BE YELLOW. A BROKEN OR SOLID FOUR INCH YELLOW NO-PASSING BARRIER LINE FOR APPROACHING TRAFFIC SHALL BE IN PLACE.
- MARKINGS SHOULD NOT BE PLACED IN APPROACH LANES LESS THAN EIGHT FEET WIDE.
- MARKINGS SHOULD NOT BE PLACED WHERE LESS THAN 100' OF APPROACH ROADWAY IS AVAILABLE FOR PLACEMENT.
- THE INSTALLATION SHOULD NORMALLY PROVIDE FOR PLACEMENT OF "RRX" SYMBOLS IN THE CENTER OF EACH AVAILABLE APPROACH LANE.
- TRANSVERSE LINES, INCLUDING STOP LINES, SHOULD BE PLACED AT RIGHT ANGLES TO THE CENTER LINE AND ACROSS ALL APPROACH LANES.
- DIMENSION "d" SHOULD BE DETERMINED ACCORDING TO TABLE 1, UNLESS ROADWAY ALIGNMENT DICTATES ANOTHER PLACEMENT DISTANCE. HOWEVER "d" SHOULD NOT BE LESS THAN 50 FEET IN AN URBAN AREA OR LESS THAN 300 FEET IN A RURAL SITUATION.
- DIMENSION "x" SHOULD BE SUCH THAT A MINIMUM OF 1/2 FOOT IS PROVIDED BETWEEN THE EXTREME POINTS OF THE "RRX" SYMBOL AND THE ADJACENT CENTER LINE OR LANE MARKINGS. TABLE 2 SHOULD BE USED TO DETERMINE THE APPROPRIATE SIZE.
- EXISTING NONSTANDARD PAVEMENT MARKINGS ON EACH APPROACH TO THE CROSSING SHALL BE REMOVED. TYPICALLY, SUCH MARKINGS ARE NONSTANDARD BECAUSE ONE "RRX" SYMBOL HAS BEEN PLACED ACROSS ALL APPROACH LANES ON A MULTI-LANE APPROACH. REMOVAL OF SUCH MARKINGS TO:
 - ON A TWO LANE APPROACH, 70 SQUARE FEET PER LANE
 - ON A THREE LANE APPROACH, 63 SQUARE FEET PER LANE



ANTICIPATED MATERIAL QUANTITIES FOR "RRX" X-ING MARKINGS THE "RRX" SYMBOL WILL NORMALLY VARY IN SIZE FROM 64.8 TO 67.4 SQUARE FEET. (66 S.F. TYPICAL)

THE STOP LINE AND TWO TRANSVERSE LINES WILL NORMALLY VARY IN SIZE FROM 48 TO 90 SQUARE FEET. (70 S.F. TYPICAL)

THE TYPICAL "RRX" MARKING WILL REQUIRE APPROXIMATELY 136 SQUARE FEET OF MARKING MATERIAL.



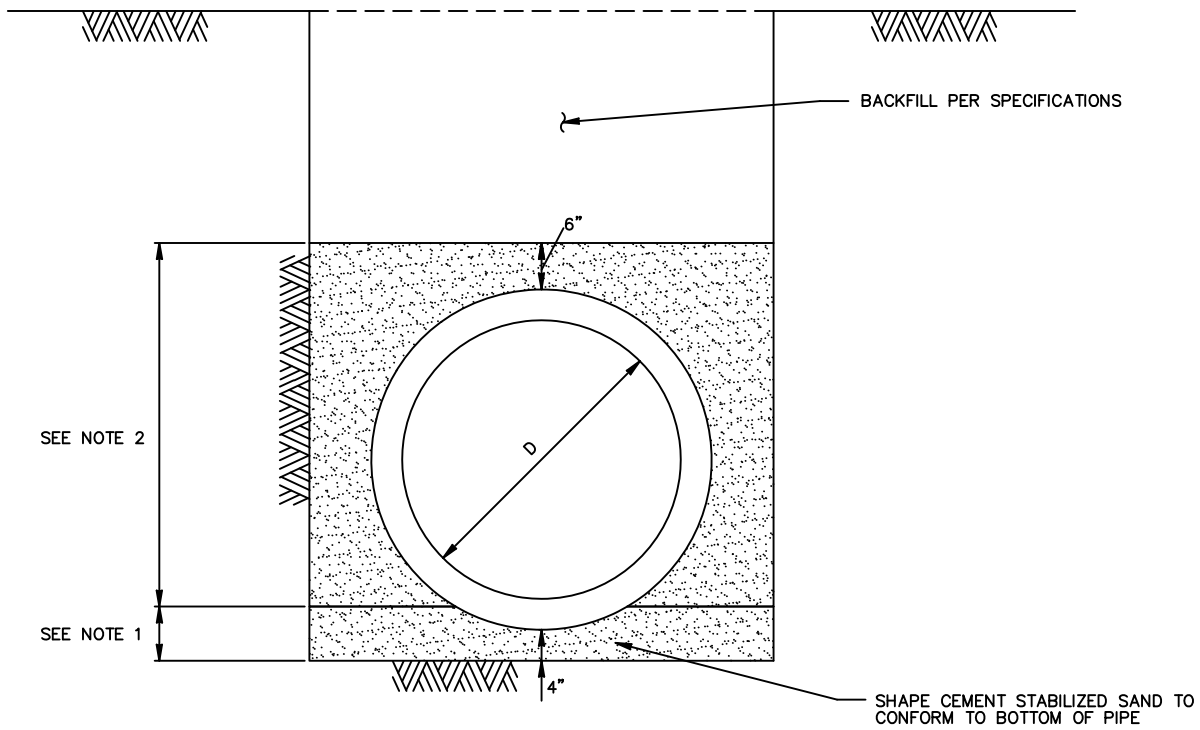
TYPICAL APPROACH LANE MARKINGS (APPROACH WITH TWO (2) APPROACH LANE MARKINGS)

CITY OF TOMBALL

RAILROAD CROSSING
PAVEMENT MARKING

(NOT TO SCALE)

APPROVED BY:	DWG. NO.	COT-19
DIRECTOR OF PUBLIC WORKS	EFF. DATE:	07/25/94

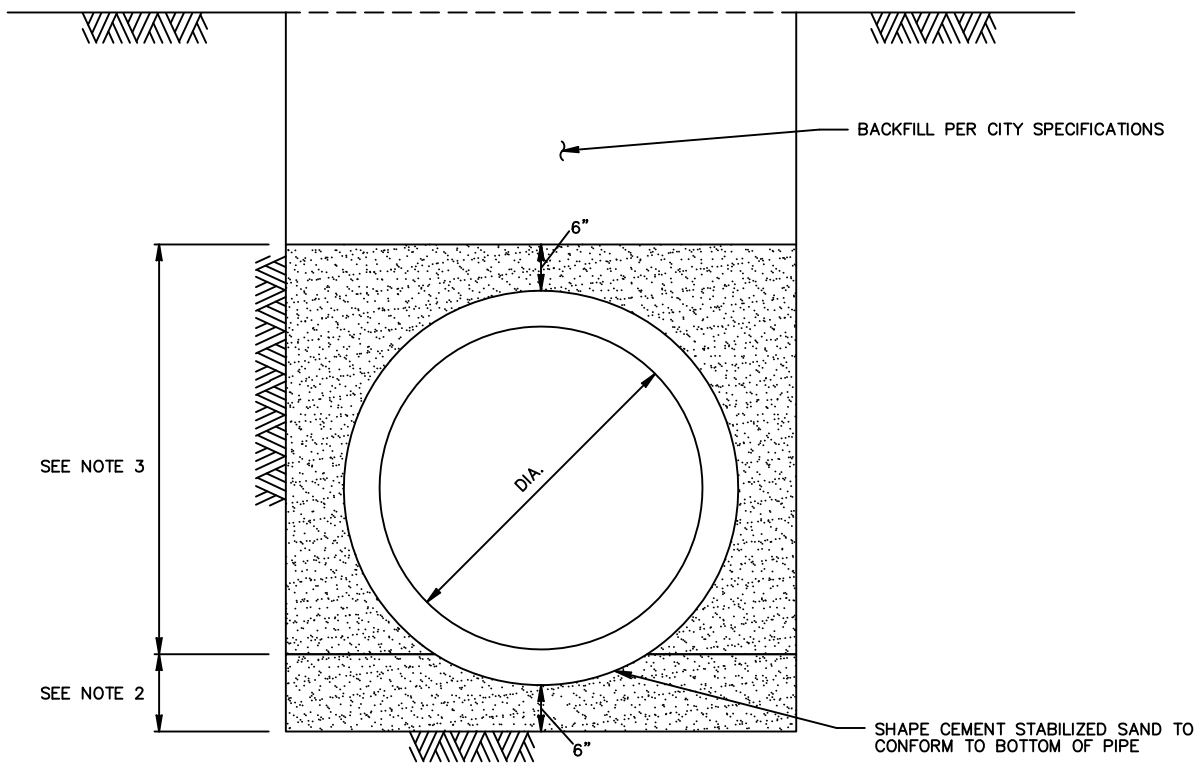


SEWER SIZE	TRENCH WIDTH
LESS THAN 30"	MINIMUM = PIPE O.D. +12" MAXIMUM = PIPE O.D. +18"
30" TO 36"	MINIMUM = PIPE O.D. +16" MAXIMUM = PIPE O.D. +24"

NOTES:

1. CEMENT STABILIZED SAND PLACED BEFORE PIPE IS LAID (7" MINIMUM).
2. CEMENT STABILIZED SAND, THOROUGHLY RODDED, PLACED AFTER PIPE IS LAID.
3. WHERE SOIL CONDITIONS REQUIRE, THE ENGINEER MAY ORDER USE OF GRANULAR MATERIAL IN LIEU OF CEMENT STABILIZED SAND BEDDING.
4. WHERE WET SAND IS ENCOUNTERED, REINFORCED CONCRETE PIPE SEWERS SHALL BE CONSTRUCTED USING DWG. NO. C.O.T.-36 OR APPROVED SPECIAL DESIGN AS SHOWN ON PLANS.

CITY OF TOMBALL	
BEDDING DETAIL FOR REINFORCED CONCRETE PIPE STORM SEWERS 36" AND SMALLER IN DIAMETER (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-30
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



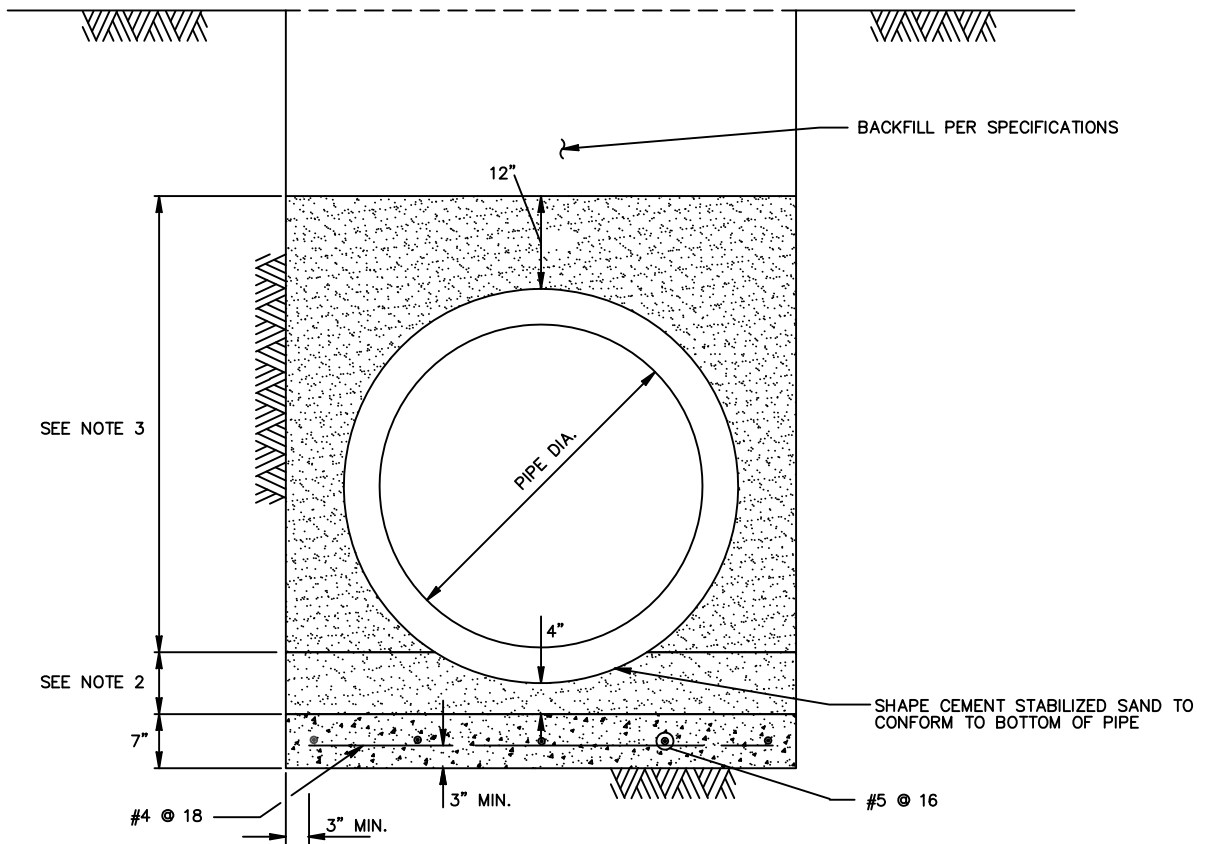
TRENCH WIDTH
 MINIMUM = PIPE O.D. + 16"
 MAXIMUM = PIPE O.D. + 24"

NOTES:

1. THE METHOD OF INSTALLING CONCRETE PIPE STORM SEWERS SHOWN HEREON TO BE USED ONLY WHERE SOIL CONDITIONS ARE AS FOLLOWS:
 - A. STRATA FROM THE SPRINGLINE (CENTER) TO 3 FT. BELOW THE FLOWLINE OF THE PIPE CONSIST OF NON-WATERBEARING COHESIVE SOILS HAVING A SHEAR STRENGTH OF 1000 PSF OR GREATER.
 - B. NO WET SAND STRATA EXIST IN THE AREA FROM 1 FT. ABOVE THE TOP OF THE PIPE TO 3 FT. BELOW THE FLOWLINE.

FOR ALL OTHER SOIL CONDITIONS USE R.C.P. INSTALLED PER DWG. NO. COT-32, M.R.C. CONSTRUCTION PER DWG. NO. COT-72 OR APPROVED SPECIAL DESIGN AS SHOWN ON PLANS.
2. CEMENT STABILIZED SAND PLACED BEFORE PIPE IS LAID (10" MINIMUM FOR 42" TO 60", 14" MINIMUM FOR 66" AND LARGER).
3. CEMENT STABILIZED SAND, THOROUGHLY RODDED, PLACED AFTER PIPE IS LAID.

CITY OF TOMBALL	
BEDDING DETAIL FOR REINFORCED CONCRETE PIPE STORM SEWERS 42" AND LARGER DIAMETER WHERE SATISFACTORY SOIL CONDITIONS EXIST (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-31
DIRECTOR OF PUBLIC WORKS	EFF. DATE: FEB-17-94



TRENCH WIDTH

MINIMUM = PIPE O.D. +16"
 MAXIMUM = PIPE O.D. +24"

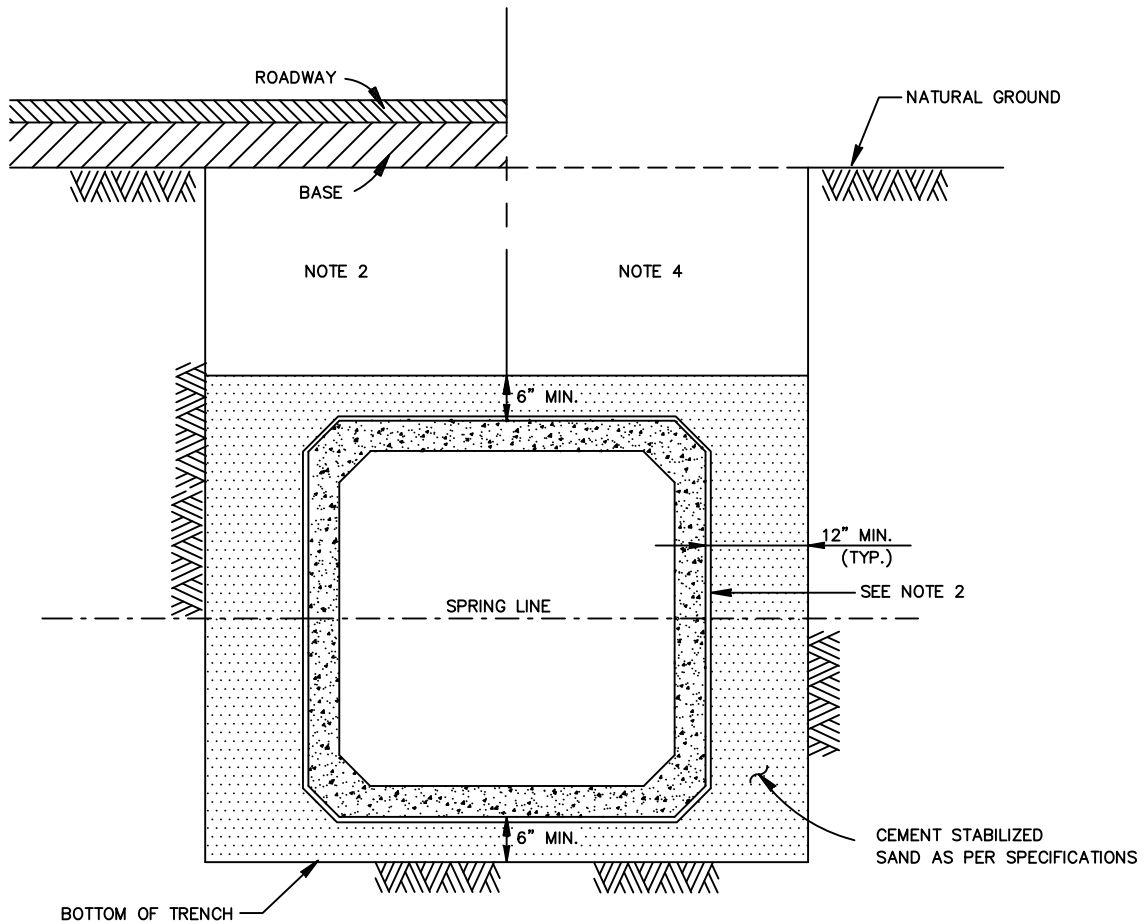
NOTES:

1. THE METHOD OF INSTALLING CONCRETE PIPE STORM SEWERS SHOWN HEREON TO BE USED FOR ALL LOCATIONS WHERE SOIL CONDITIONS DO NOT CONFORM TO REQUIREMENTS SPECIFIED IN NOTE 1, DWG. NO. COT-31.
2. CEMENT STABILIZED SAND PLACED BEFORE PIPE IS LAID (8" MINIMUM FOR 42" TO 60", 12" MINIMUM FOR 66" AND LARGER).
3. CEMENT STABILIZED SAND, THOROUGHLY RODDED, PLACED AFTER PIPE IS LAID.
4. REINFORCED CONCRETE SLAB, PIPE AND BEDDING TO BE PLACED IN DRY TRENCH ONLY.
5. CONCRETE IN SLAB TO HAVE COMPRESSIVE STRENGTH OF 1000 PSI BEFORE PIPE IS LAID.
6. MONOLITHIC REINFORCED CONCRETE STORM SEWERS, PER CITY DWG. NO. COT-72, MAY BE CONSTRUCTED IN LIEU OF R.C.P. STORM SEWERS INSTALLED AS SHOWN HEREON.

CITY OF TOMBALL	
BEDDING DETAIL FOR REINFORCED CONCRETE PIPE STORM SEWERS 42" AND LARGER WHERE UNSATISFACTORY SOIL CONDITIONS EXIST (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-32
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

NOTES:

1. THIS DETAIL TO BE USED ONLY WHERE SOIL CONDITIONS ARE AS FOLLOWS:
 - A. STRATA FROM SPRINGLINE (CENTER) TO 3 FEET BELOW THE FLOWLINE OF THE BOX TO CONSIST OF NON-WATERBEARING COHESIVE SOIL HAVING A SHEAR STRENGTH OF 1000 PSF OR GREATER.
 - B. NO WET SAND STRATA TO EXIST IN THE AREA FROM 1 FT. ABOVE THE TOP OF THE BOX TO 3 FT. BELOW THE FLOWLINE.
2. ALL JOINTS TO BE WRAPPED WITH 24" WIDE APPROVED FILTER FABRIC CENTERED ON ALL JOINTS.
3. BACKFILL WITH IN-SITU MATERIAL COMPACTED TO 95% STANDARD PROCTOR DENSITY UNDER ROADWAY UP TO BASE MATERIAL.
4. BACKFILL WITH IN-SITU MATERIAL COMPACTED TO 90% STANDARD PROCTOR DENSITY.



CITY OF TOMBALL

BEDDING DETAIL FOR PRECAST
CONCRETE BOX STORM SEWERS
FOR SATISFACTORY SOIL CONDITIONS
(NOT TO SCALE)

APPROVED BY:

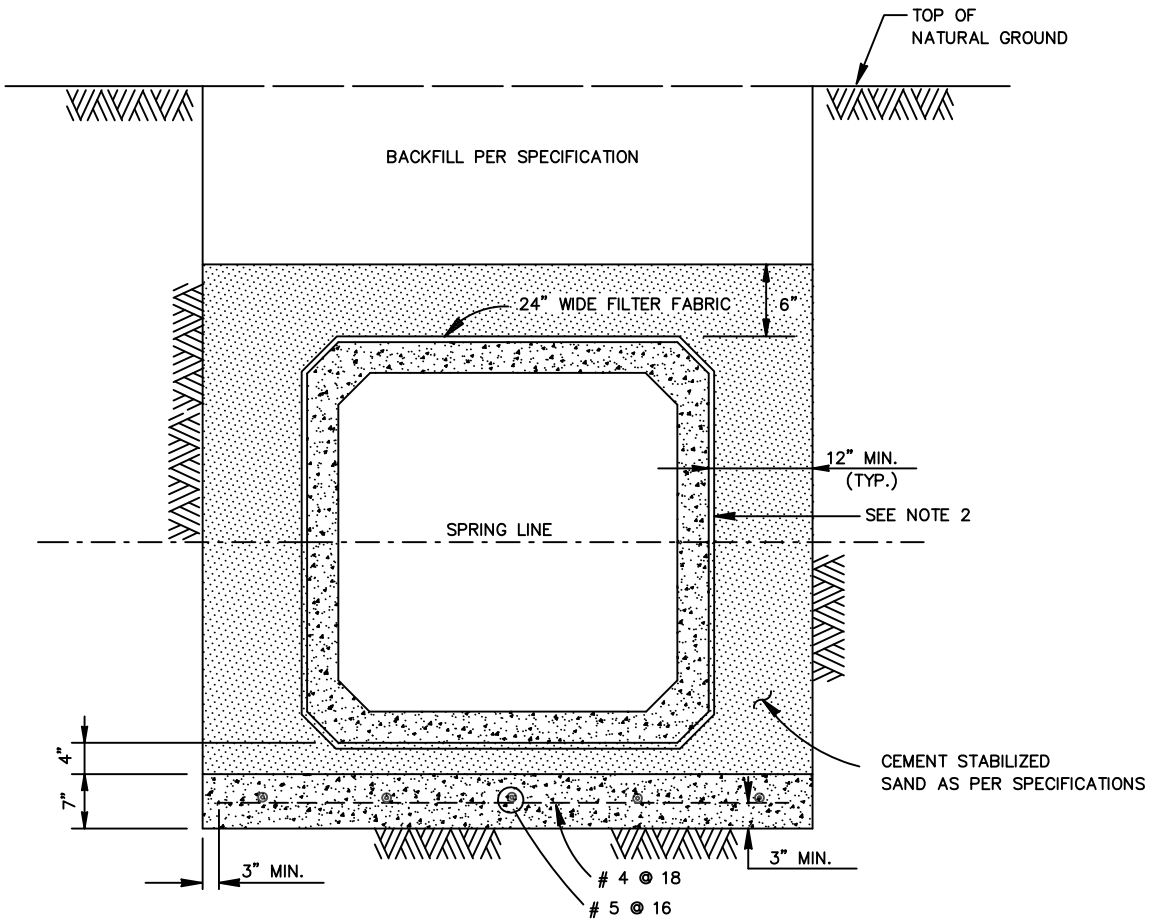
DWG. NO. COT-33

DIRECTOR OF PUBLIC WORKS

EFF. DATE: 07/25/94

NOTES:

1. THIS BEDDING DETAIL TO BE USED FOR ALL LOCATIONS WHERE SOIL CONDITIONS DO NOT CONFORM TO REQUIREMENTS SPECIFIED IN NOTE 1, DWG. NO. COT-33.
2. ALL JOINTS TO BE WRAPPED WITH 24" WIDE APPROVED FILTER FABRIC CENTERED ON ALL JOINTS.
3. REINFORCED CONCRETE SLAB TO BE POURED IN DRY TRENCH ONLY.
4. CONCRETE SLAB TO HAVE COMPRESSIVE STRENGTH OF 1,000 PSI BEFORE BOX IS LAID AND 2500 PSI AT 28 DAYS.



CITY OF TOMBALL

BEDDING DETAIL FOR PRECAST
CONCRETE BOX STORM SEWERS FOR
UNSATISFACTORY SOIL CONDITIONS
(NOT TO SCALE)

APPROVED BY:

DWG. NO. COT-34

DIRECTOR OF PUBLIC WORKS

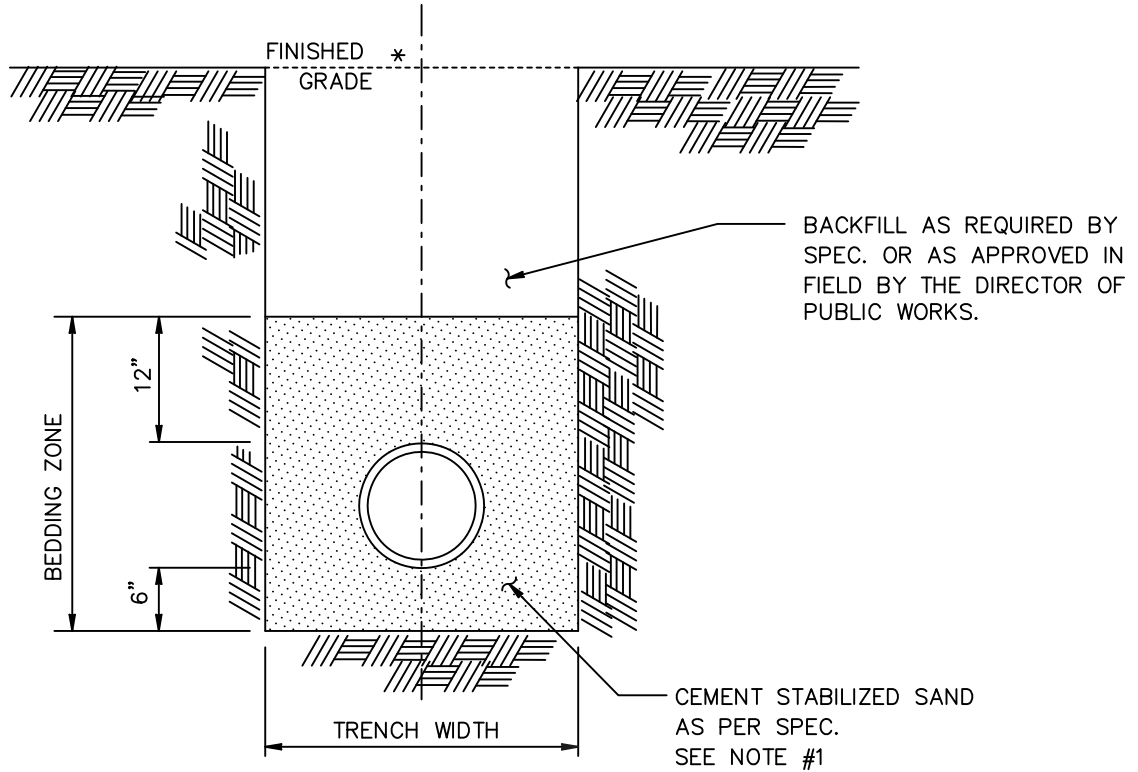
EFF. DATE: 07/25/94

NOTES:

1. EXCESS EXCAVATION SHALL BE BACKFILLED WITH CEMENT STABILIZED SAND AT NO EXTRA COST TO THE CITY.

2. TRENCH SAFETY SHALL BE INSTALLED IN ACCORDANCE WITH TRENCH SAFETY SPECIFICATION SECTION 01526.

* IF UNDER PAVEMENT SEE DWG. COT-17



SEWER SIZE

LESS THAN 30"

TRENCH WIDTH:

MINIMUM = PIPE O.D. + 12"
 MAXIMUM = PIPE O.D. + 18"

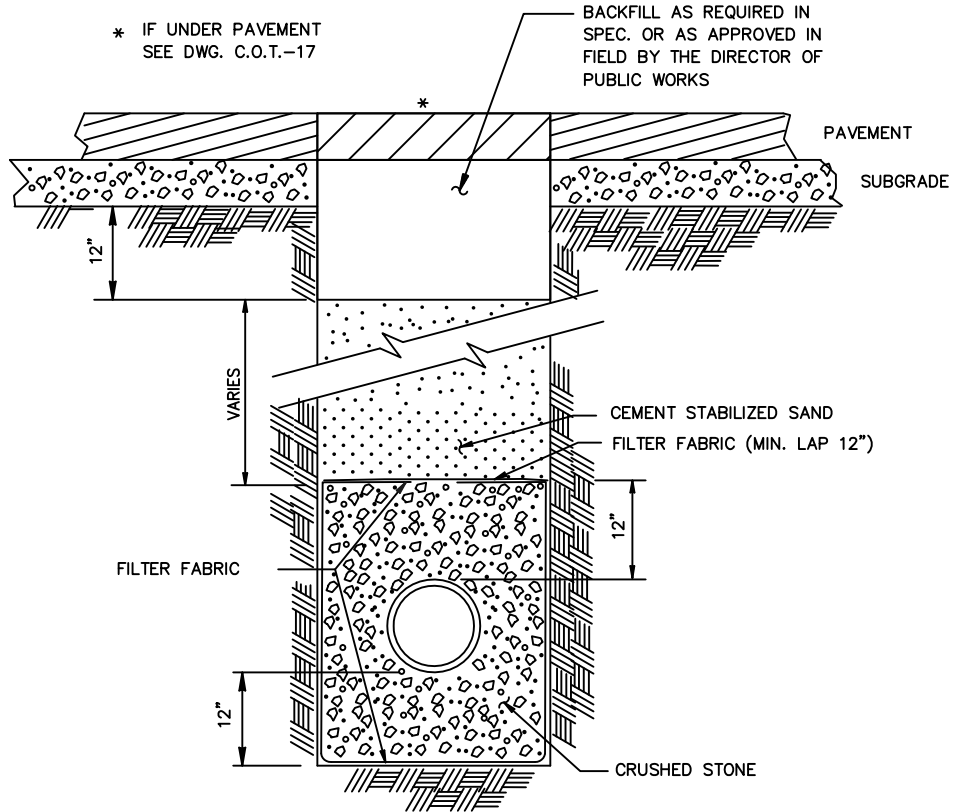
GREATER THAN 30"

MINIMUM = PIPE O.D. + 16"
 MAXIMUM = PIPE O.D. + 24"

CITY OF TOMBALL	
BEDDING AND BACKFILL FOR SANITARY SEWER (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-35
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

NOTES:

1. EXCESS EXCAVATION SHALL BE BACKFILLED AT NO EXTRA COST TO THE CITY.
2. TRENCH SAFETY SHALL BE INSTALLED IN ACCORDANCE WITH TRENCH SAFETY SPECIFICATION SECTION 01526.



SEWER SIZE

LESS THAN 30"

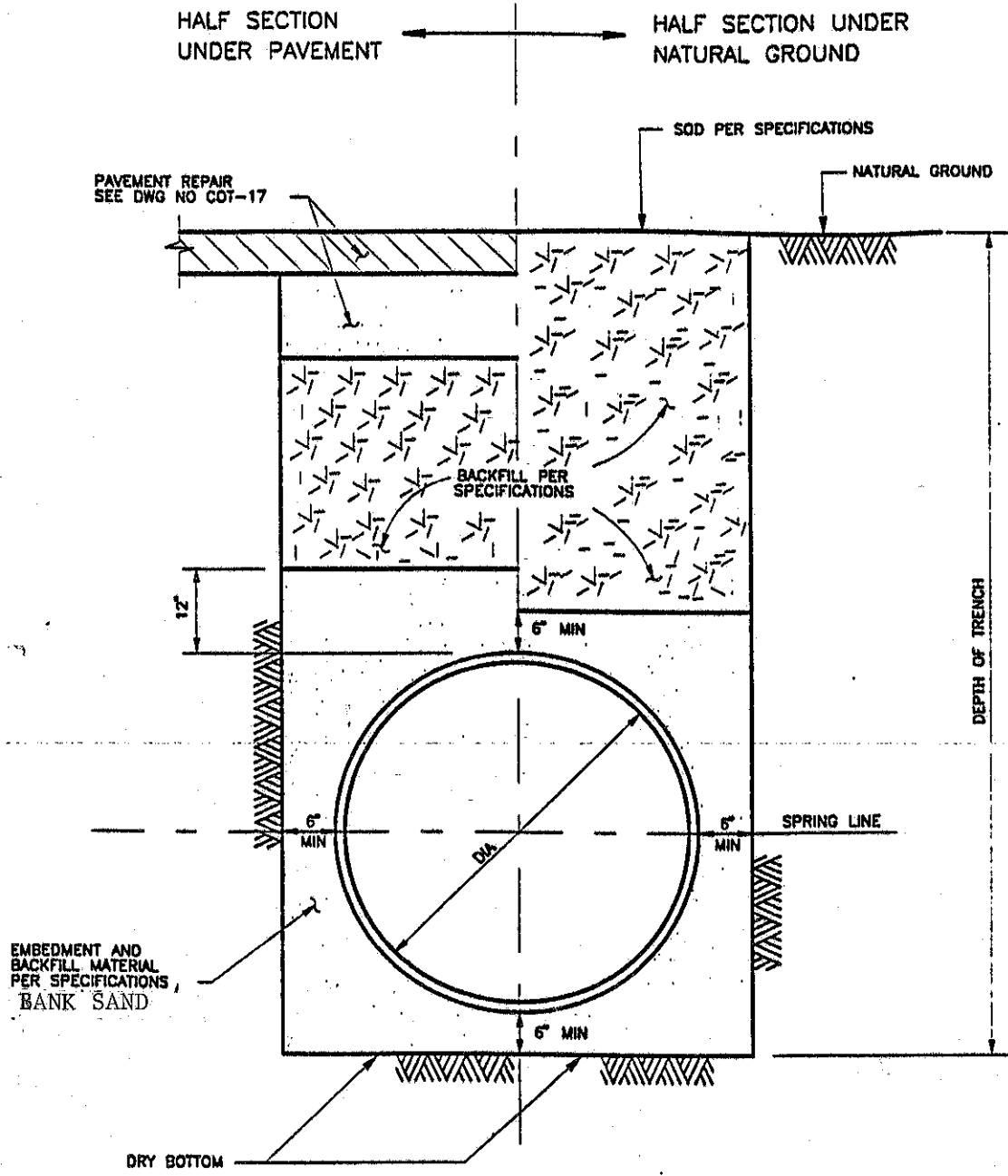
GREATER THAN 30"

TRENCH WIDTH:

MINIMUM = PIPE O.D. + 12"
 MAXIMUM = PIPE O.D. + 18"

MINIMUM = PIPE O.D. + 16"
 MAXIMUM = PIPE O.D. + 24"

CITY OF TOMBALL BEDDING AND BACKFILL FOR WET SAND CONSTRUCTION OF SANITARY SEWER (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-36
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



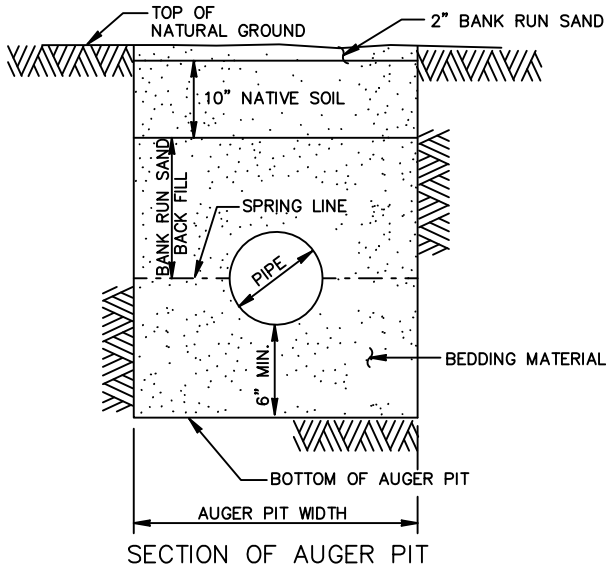
CITY OF TOMBALL

**WATER DISTRIBUTION MAIN
BEDDING AND BACKFILL FOR
OPEN CUT TRENCHES**

(Not to Scale)

APPROVED BY: _____ EFF DATE: JAN-3'-95

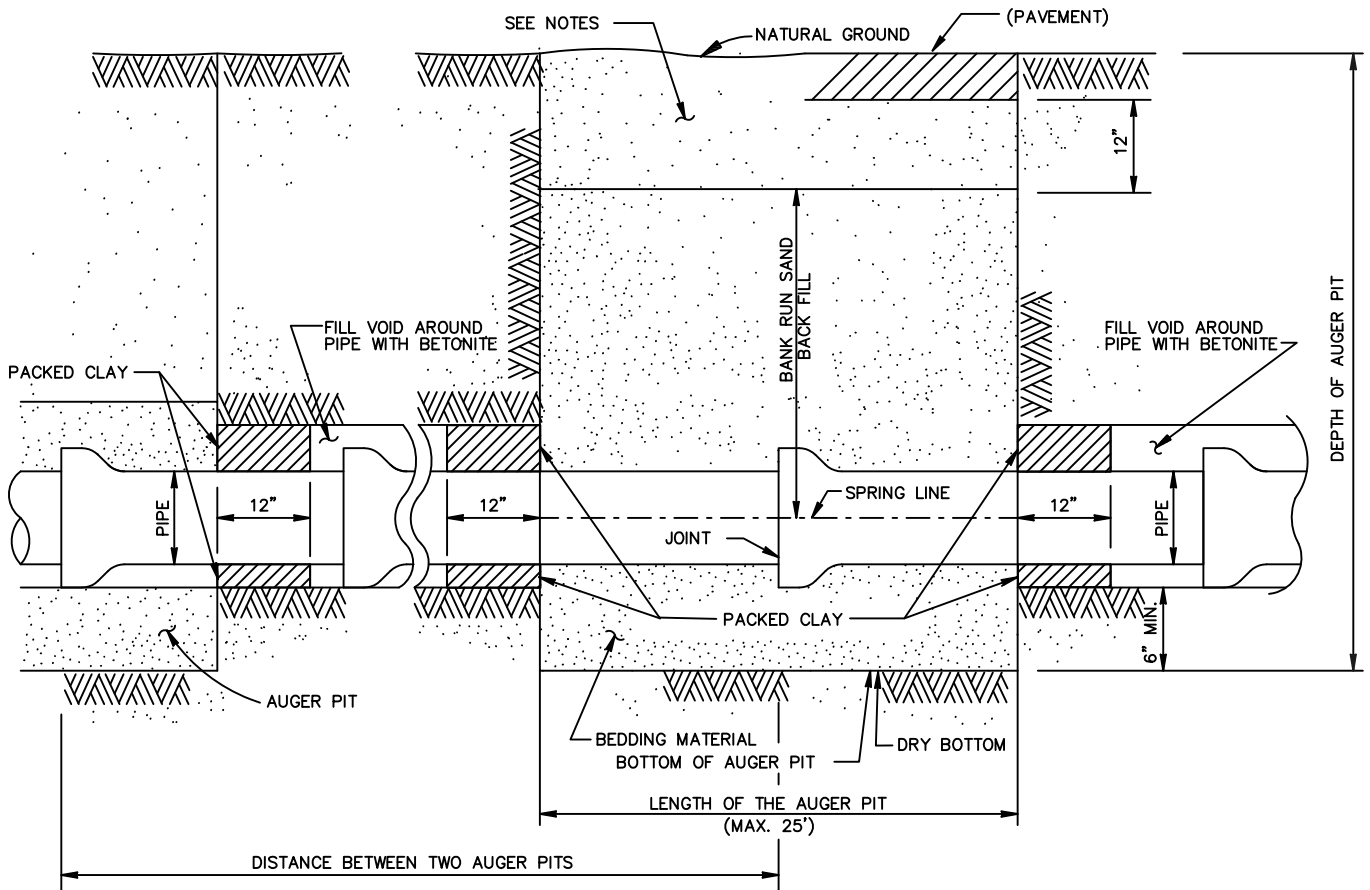
DIRECTOR OF PUBLIC WORKS: JWC NO: COT-37



NOTES:

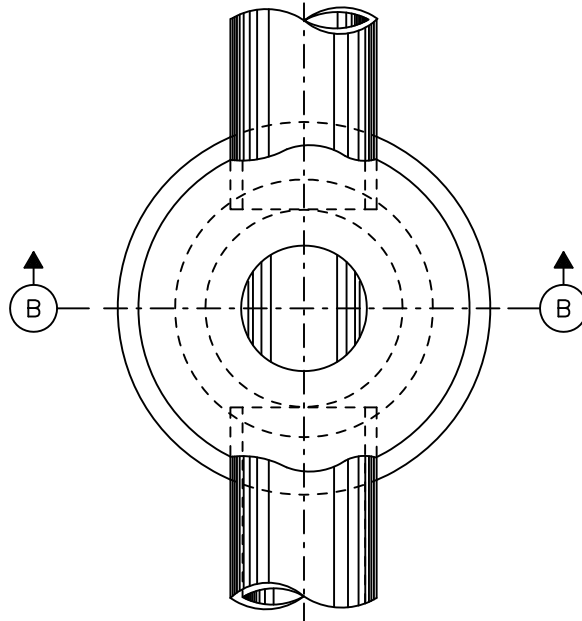
1. FOR PITS IN AREAS OTHER THAN PAVEMENT OR TRAFFIC THE UPPER 12" SHOULD CONSIST OF 10" NATIVE SOIL AND 2" OF BANK RUN SAND. (AS SHOWN TO THE LEFT)
2. IF UNDER PAVEMENT, THE UPPER 12" BELOW SUBGRADE SHALL BE BACKFILLED WITH CEMENT STABILIZED SAND. SEE DWG. NO. COT-17 FOR PAVEMENT DETAIL.

PIPE SIZE	AUGER PIT WIDTH
LESS THAN 30"	MINIMUM = PIPE O.D. +12"
	MAXIMUM = PIPE O.D. +18"

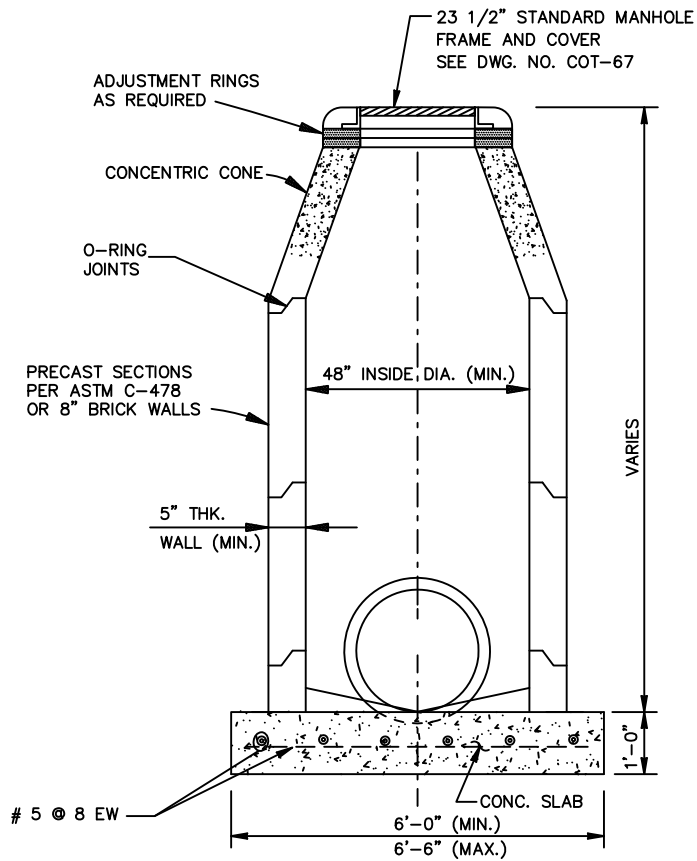


CITY OF TOMBALL	
EXCAVATION, BEDDING & BACKFILL AUGER PIT & AUGER HOLE FOR WATER MAIN CONSTRUCTION (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-38
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

NOTE: BRICK WALLS
 12'-0" BELOW
 TOP OF CASTING
 TO BE 12" THICK.



PLAN OF TYPE "C"
 (COVER NOT SHOWN)



SECTION B-B

CITY OF TOMBALL

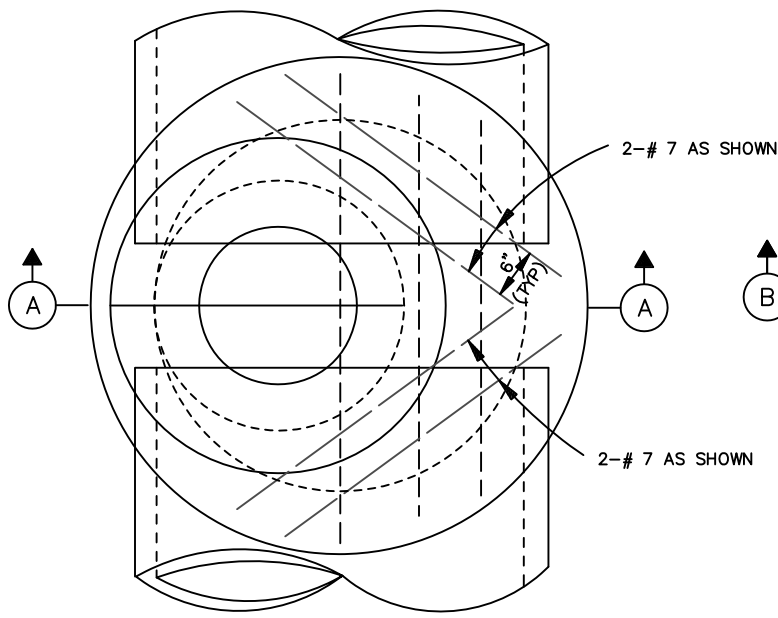
TYPE "C"
 STORM SEWER MANHOLE FOR
 42" PIPE AND SMALLER
 (NOT TO SCALE)

APPROVED BY:

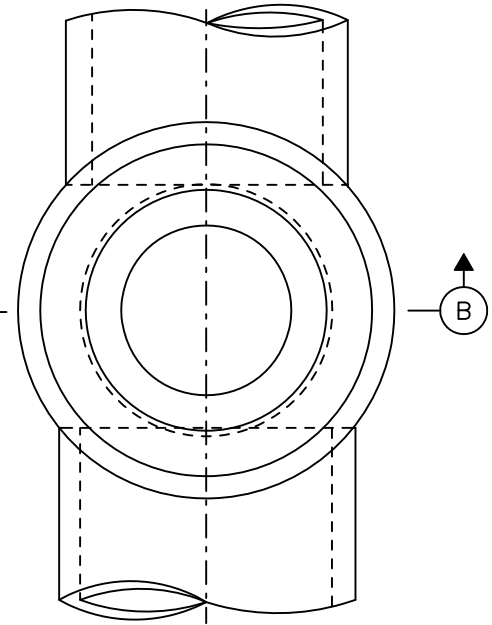
DWG. NO. COT-40

DIRECTOR OF PUBLIC WORKS

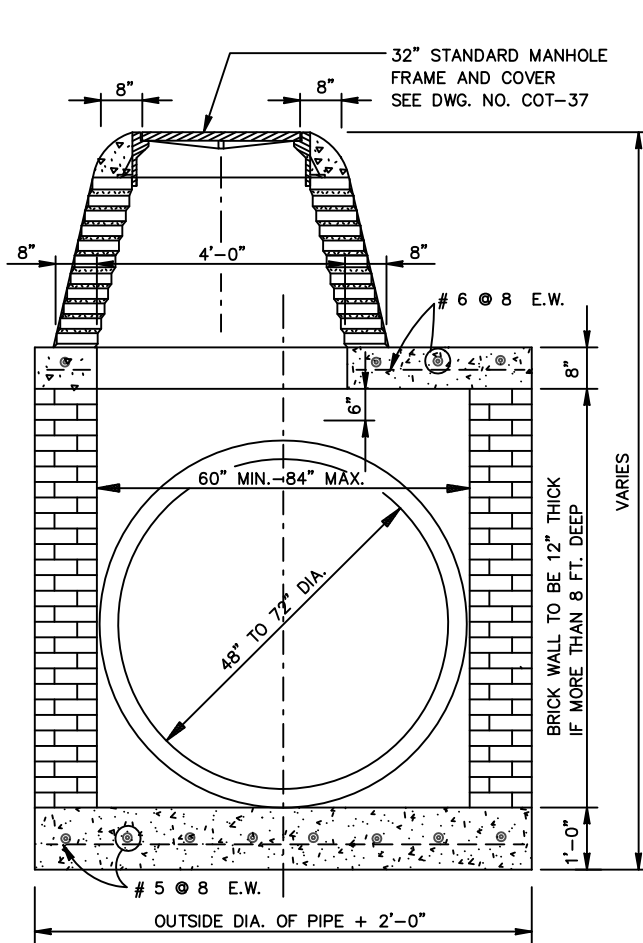
EFF. DATE: 07/25/94



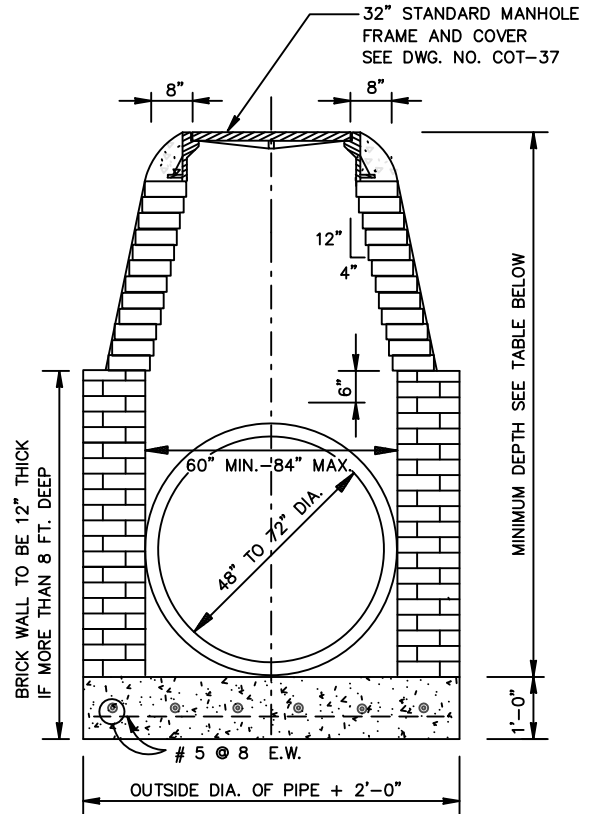
PLAN



PLAN



SECTION A-A



SECTION B-B

NOTES:

1. WHEN MANHOLE HAS LESS DEPTH THAN MIN. SHOWN ON CHART, BUILD SECTION A-A OTHERWISE BUILD SECTION B-B.
2. MANHOLE MAY BE CONSTRUCTED OF PRECAST REINFORCED CONCRETE.

SIZE OF PIPE	MIN. DEPTH
48"	8'-0"
54"	9'-4"
60"	10'-7"
66"	11'-10"
72"	13'-2"

CITY OF TOMBALL

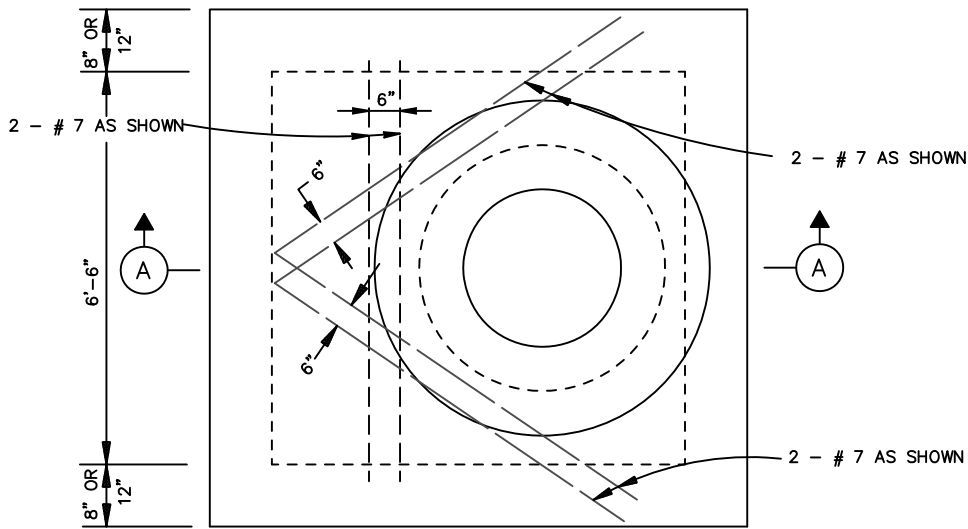
TYPE "C" MANHOLE FOR
48" TO 72" CONCRETE PIPE
STORM SEWERS
(NOT TO SCALE)

APPROVED BY:

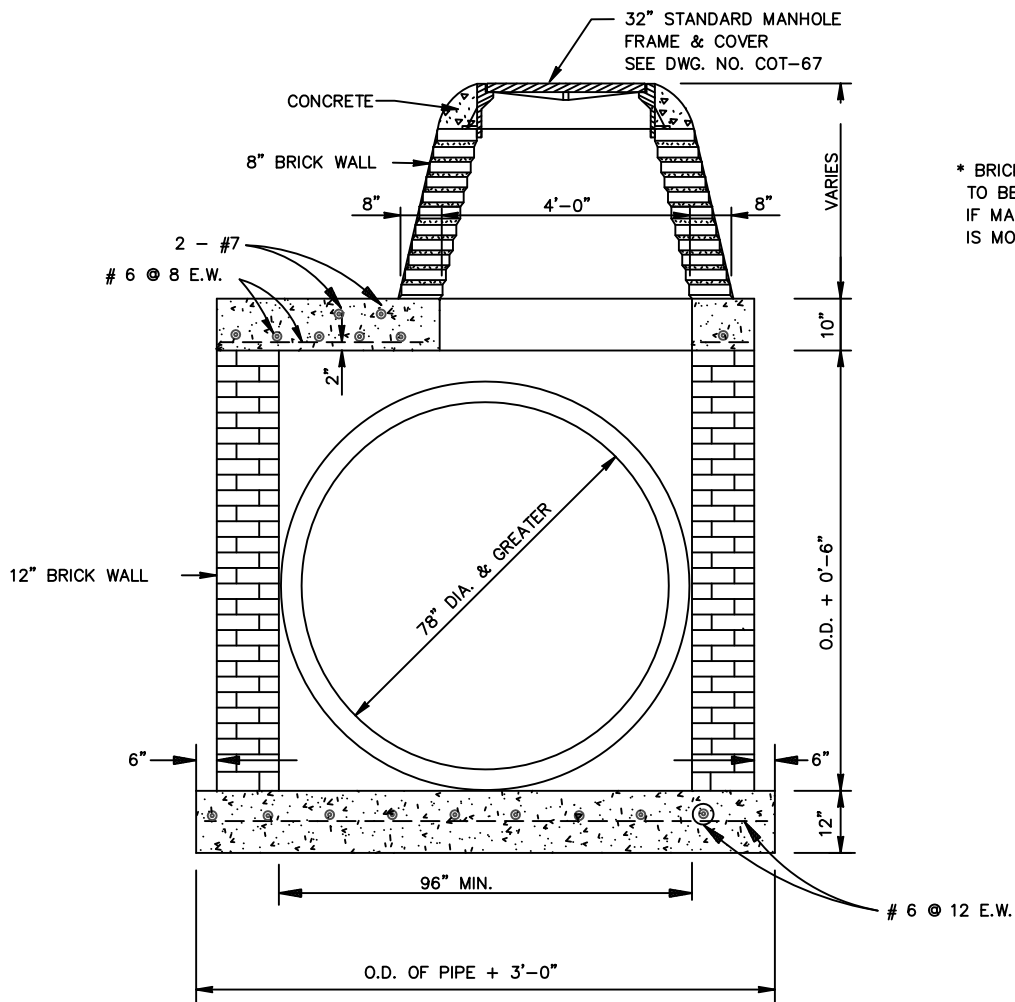
DWG. NO. COT-41

DIRECTOR OF PUBLIC WORKS

EFF. DATE: 07/25/94



PLAN

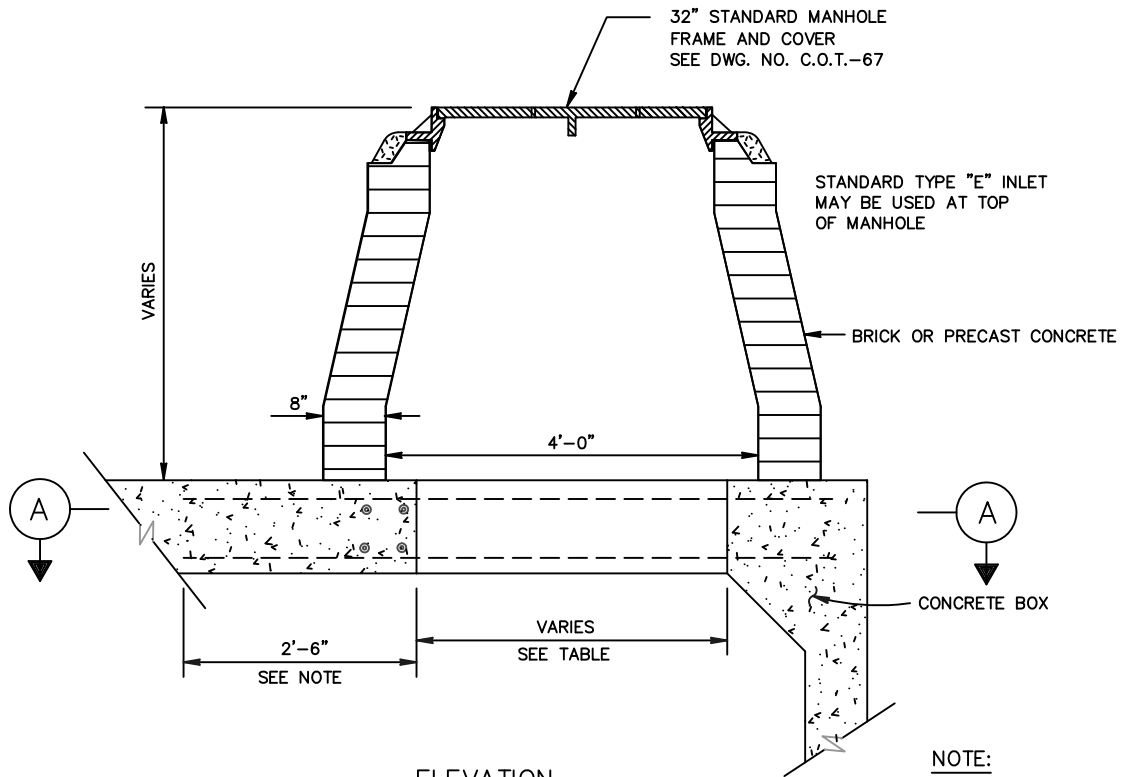


* BRICK WALLS
TO BE 12" THICK
IF MANHOLE DEPTH
IS MORE THAN 8 FT.

SECTION A-A

NOTE:
1. MANHOLE MAY BE CONSTRUCTED OF PRECAST REINFORCED CONCRETE.

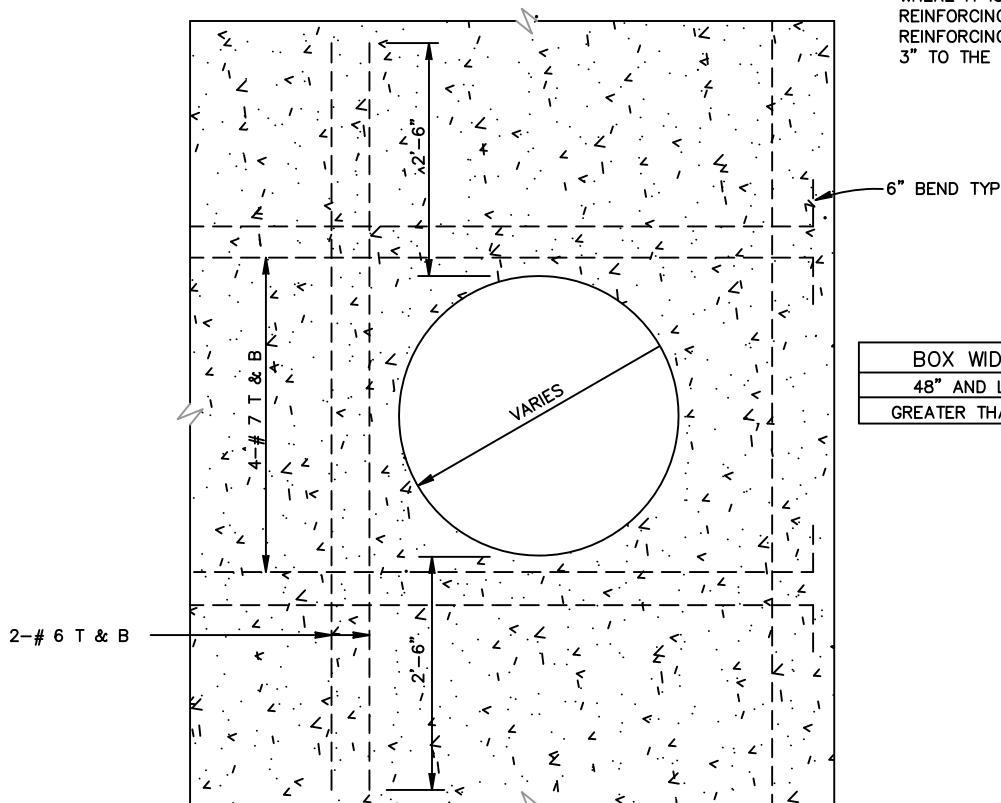
CITY OF TOMBALL	
SPECIAL TYPE "C" STORM SEWER MANHOLE FOR 78" PIPE AND GREATER (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-42
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



ELEVATION

NOTE:

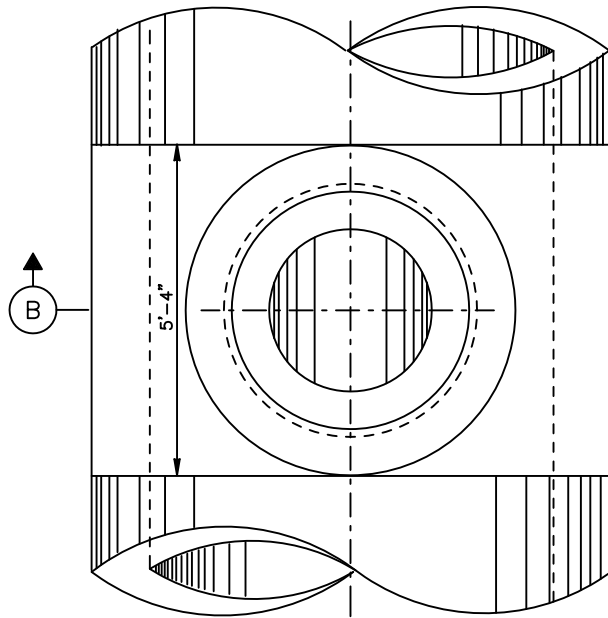
FOR SMALLER BOX SEWER WIDTHS, WHERE IT IS NOT POSSIBLE TO EXTEND REINFORCING STEEL BEYOND THE OPENING, REINFORCING STEEL SHALL BE EXTENDED 3" TO THE EDGE OF THE WALL.



SECTION A-A

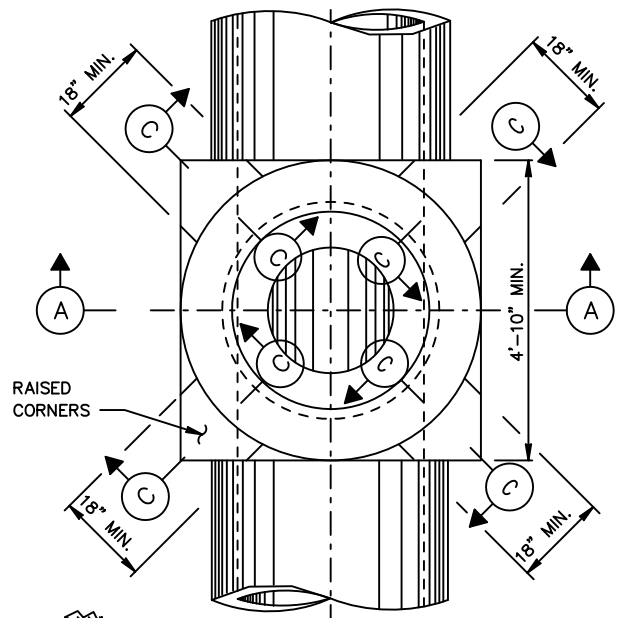
BOX WIDTH	OPENING SIZE
48" AND LESS	36"
GREATER THAN 48"	48"

CITY OF TOMBALL	
MANHOLE FOR PROPOSED BOX STORM SEWER (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-43
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



PLAN OF TYPE "B"

FOR SEWERS 54" TO 78" IN DIA.
(COVER NOT SHOWN)

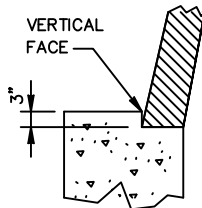


PLAN OF TYPE "A"

FOR PIPE SEWERS
36" TO 48" IN DIA.
(COVER NOT SHOWN)

SIZES AND SPACING OF
STEEL TO BE THE SAME
AS SHOWN IN STD.
SECTION OF SEWER

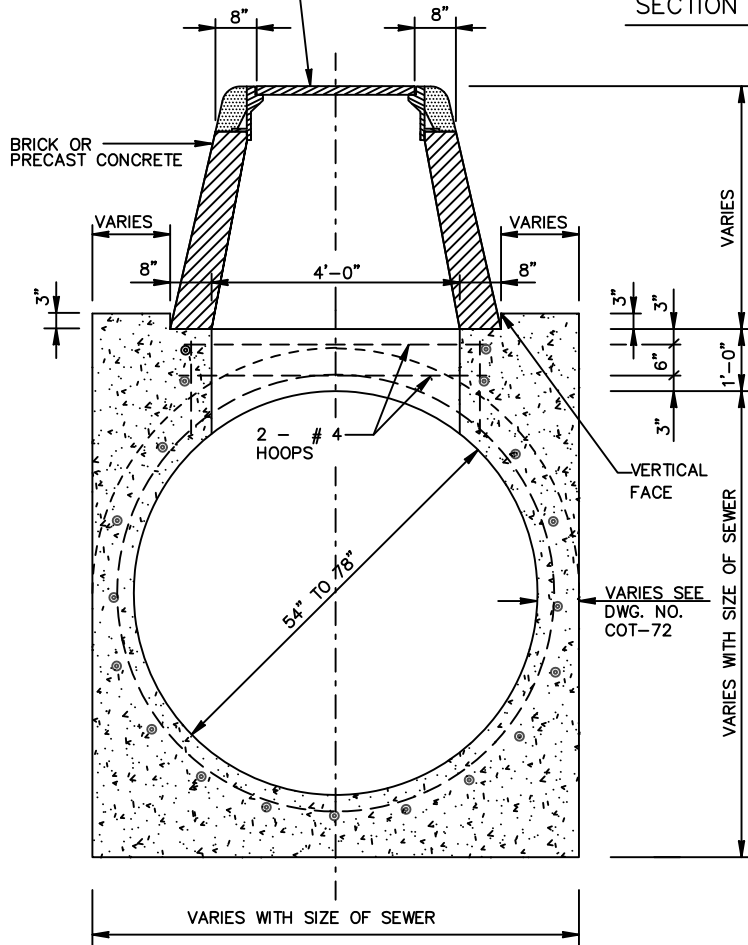
32" STANDARD MANHOLE
FRAME AND COVER
SEE DWG. NO. COT-67



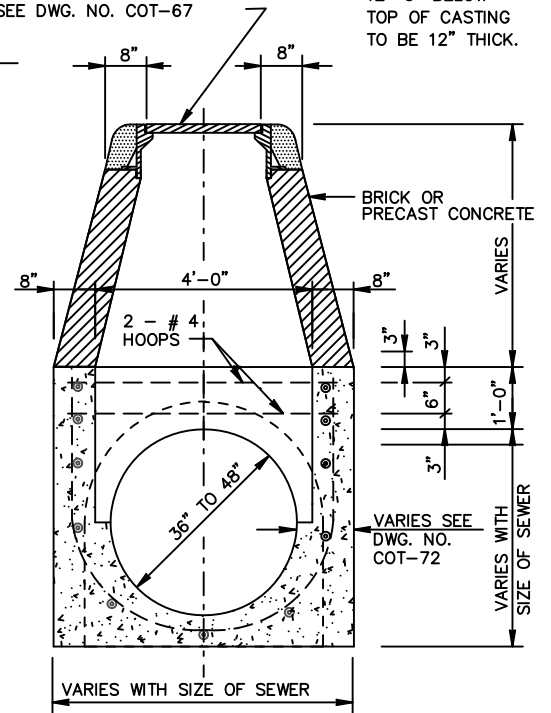
SECTION C-C

32" STANDARD MANHOLE
FRAME AND COVER
SEE DWG. NO. COT-67

NOTE: BRICK WALLS
12'-0" BELOW
TOP OF CASTING
TO BE 12" THICK.



SECTION B-B



SECTION A-A

CITY OF TOMBALL

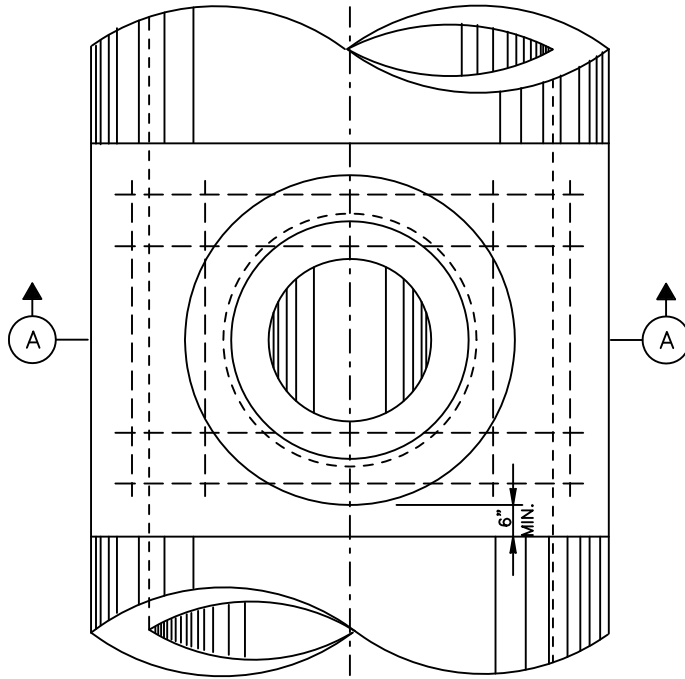
REINFORCED MONOLITHIC
CONCRETE STORM SEWER MANHOLE
TYPE "A" AND TYPE "B"
(NOT TO SCALE)

APPROVED BY:

DWG. NO. COT-44

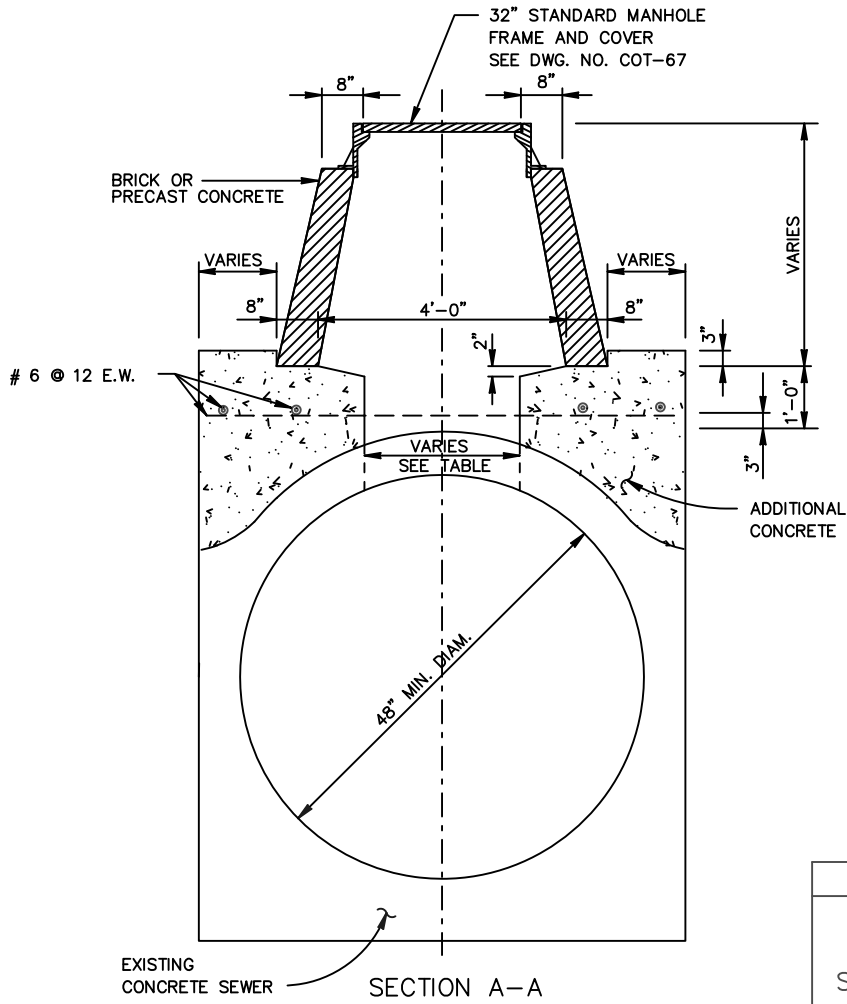
DIRECTOR OF PUBLIC WORKS

EFF. DATE: 07/25/94



PLAN OF TYPE "E"

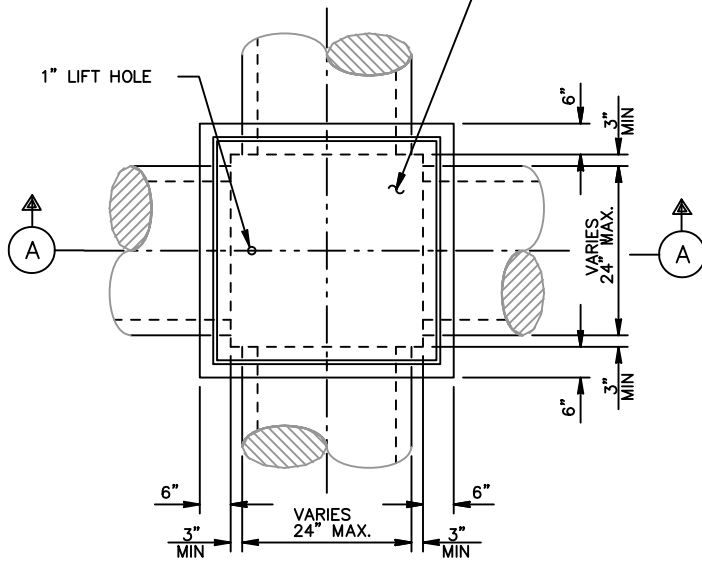
FOR CONSTRUCTION ON TOP OF EXISTING
SEWERS OF 48" & GREATER DIA
(COVER NOT SHOWN)



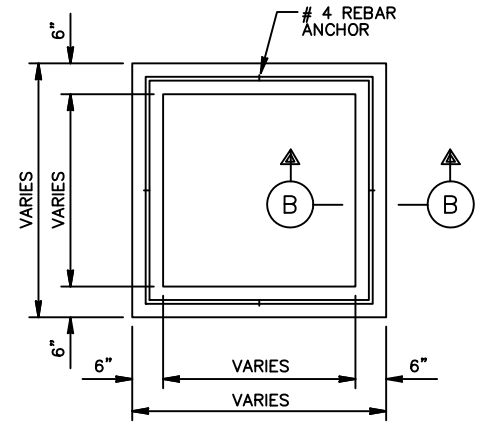
SEWER SIZE	OPENING SIZE
48"	30"
54"	36"
60"	42"
66" AND GREATER	48"

CITY OF TOMBALL	
TYPE "E" MANHOLE FOR EXISTING MONO. CONCRETE SEWERS OF 48" & GREATER DIAM. (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-46
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/24/94

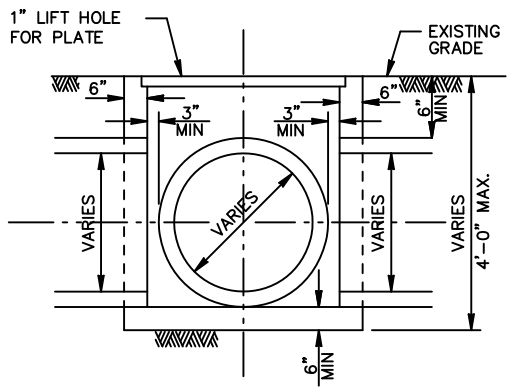
VULCAN 5700 SERIES FRAME & GUTTER
OR 6700 SERIES FRAME & SOLID COVER



PLAN VIEW

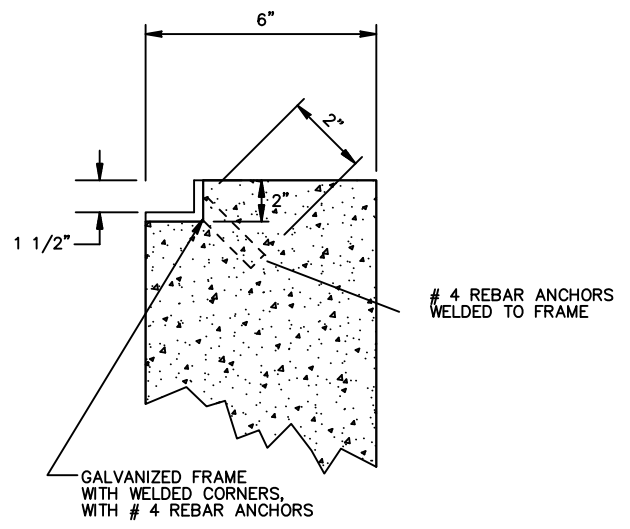


PLAN VIEW



SECTION A-A

JUNCTION BOX DETAIL



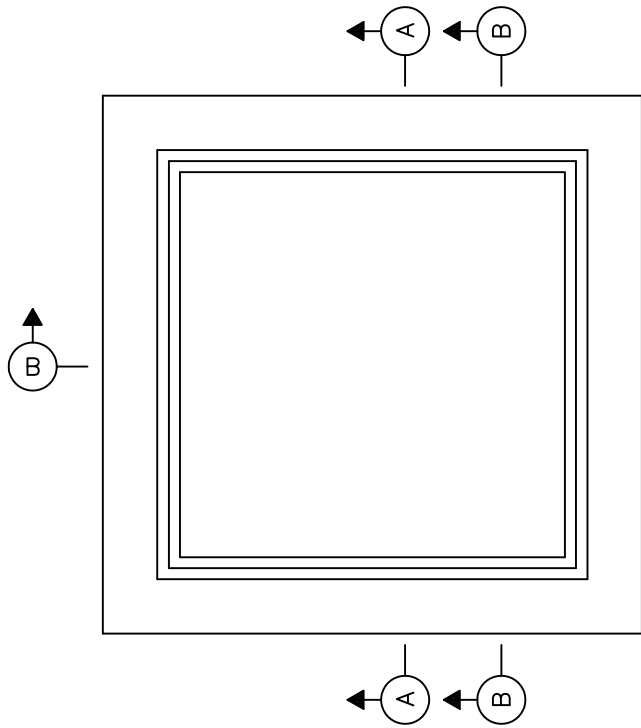
SECTION B-B

LID FRAME DETAIL

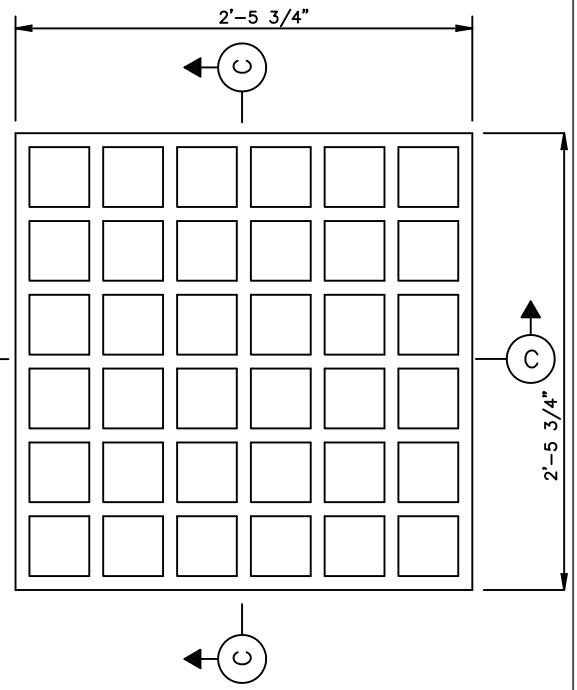
NOTES:

1. WALLS AND BOTTOM TO BE 6" CONCRETE (WALLS TO BE 8" THICK IF CONSTRUCTED OF BRICK).
2. NOT TO BE USED IN STREET. FOR AREA BETWEEN CURB AND PROPERTY LINE ONLY.

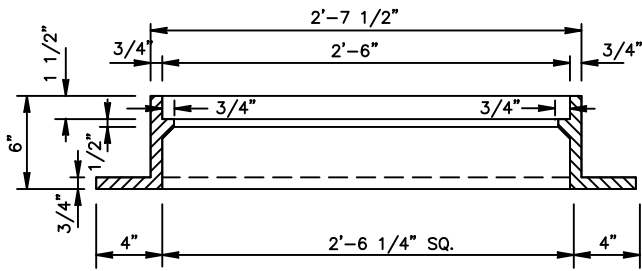
CITY OF TOMBALL	
PRECAST REINFORCED CONCRETE JUNCTION BOX WITH LEAD (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-47
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



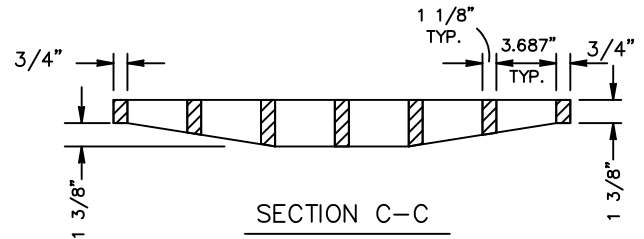
PLAN OF FRAME



PLAN OF PLATE

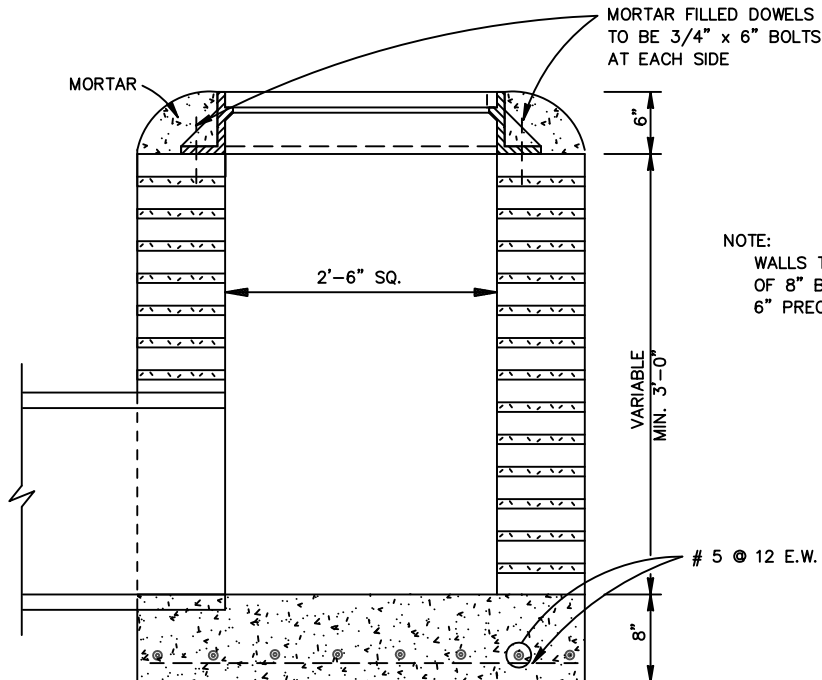


FRAME SECTION B-B



SECTION C-C

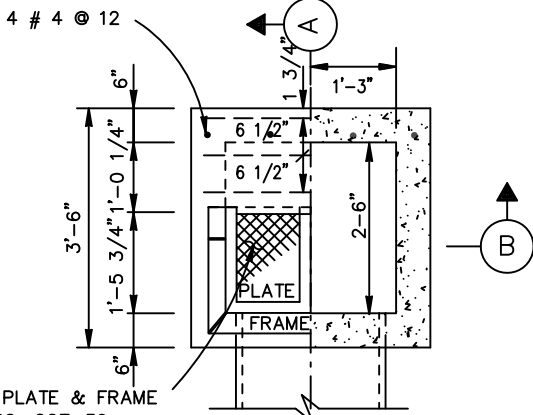
NOTE:
 FRAME: VULCAN MODEL V 4880
 GRATE: VULCAN MODEL V 4880-1



SECTION A-A

NOTE:
 WALLS TO BE CONSTRUCTED
 OF 8" BRICK MASONRY OR
 6" PRECAST CONCRETE.

CITY OF TOMBALL	
TYPE "A" GRATE INLET (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-48
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



CAST IRON PLATE & FRAME
SEE DWG. NO. COT-39

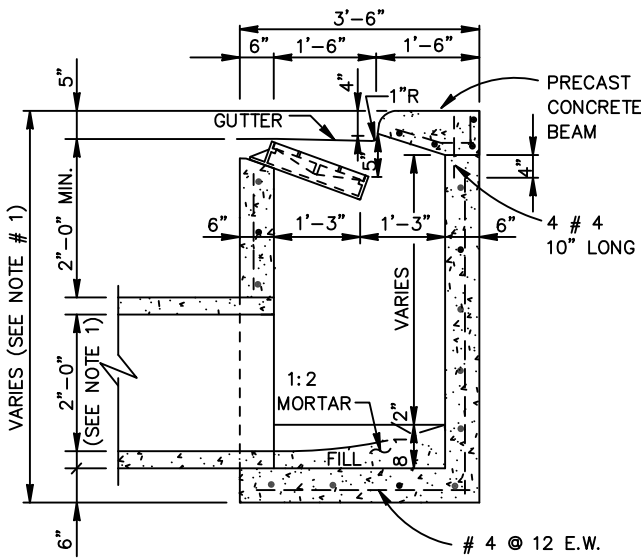
HALF PLAN HALF SECT. PLAN

GENERAL NOTES:

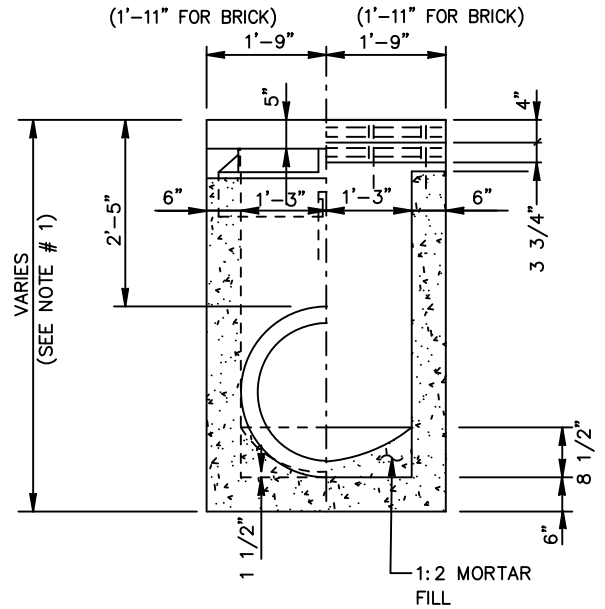
USE STANDARD CAST IRON FRAME & PLATES.
LEAD SHALL LEAVE INLET AT LOCATION
AND GRADE REQUIRED.
WHEN BRICK INLETS ARE BUILT EXTEND DOWELS
4 INCHES FROM CURB BEAM INTO BRICKWORK.
WHEN BRICK INLETS ARE BUILT, WALLS SHALL
BE INCREASED TO 8 INCHES, AND INLET
BEAMS TO BE 4 INCHES LONGER.

NOTES:

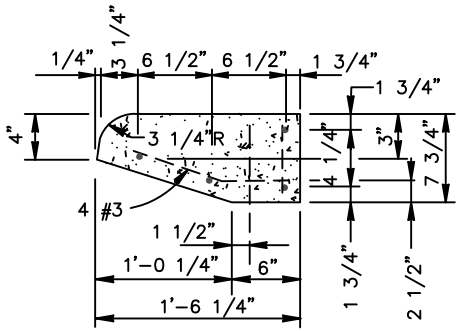
1. DIMENSION VARIES BASED ON PIPE DIAMETER
AND WALL THICKNESS.



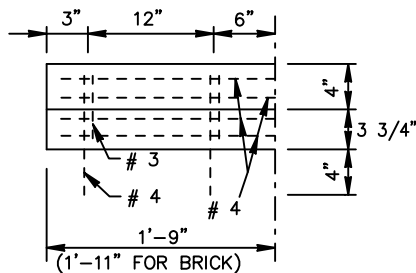
SECTION A-A



HALF FRONT ELEV. HALF SECT. B-B



TRANS. SECTION



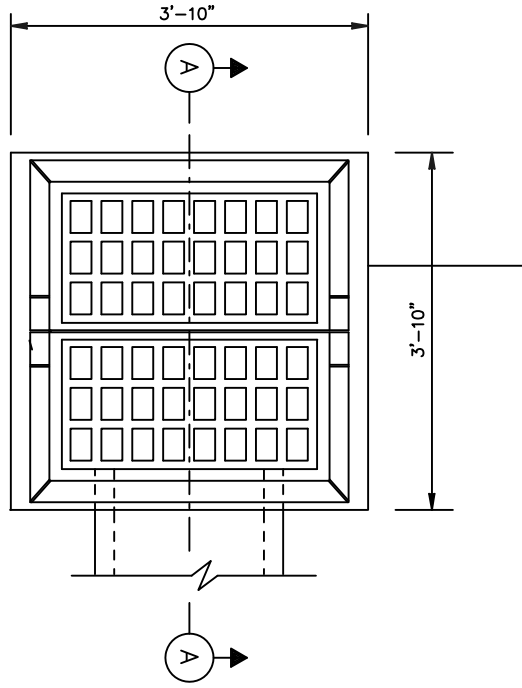
HALF FRONT ELEV.
PRECAST CURB BEAM

CURB BEAM BAR LIST				
NO.	SIZE	LENGTH	SHAPE	LOC.
4	# 4	3'-3"	ST.	HOR.
4	# 4	0'-10"	ST.	VERT.
4	# 3	1'-6"	BT.	

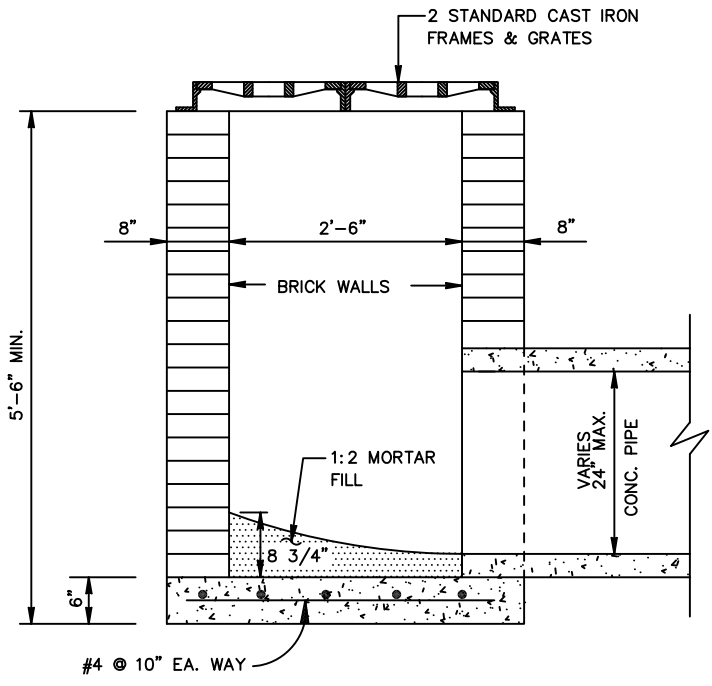
CITY OF TOMBALL		
TYPE "B" INLET		
(NOT TO SCALE)		
APPROVED BY:	DWG. NO.	COT-49
DIRECTOR OF PUBLIC WORKS	EFF. DATE:	07/25/94

GENERAL NOTES

1. USE CAST IRON FRAME PER DWG. COT-70
USE CAST IRON GRATES PER DWG. COT-68.
2. USE TWO FRAMES AND GRATES FOR EACH INLET.
3. INLETS TO BE BUILT WITH BRICK WALLS 8" THICK.
4. BASE AND WALLS TO MEET THE SIZE AND REQUIREMENTS OF TYPE B INLETS.



PLAN



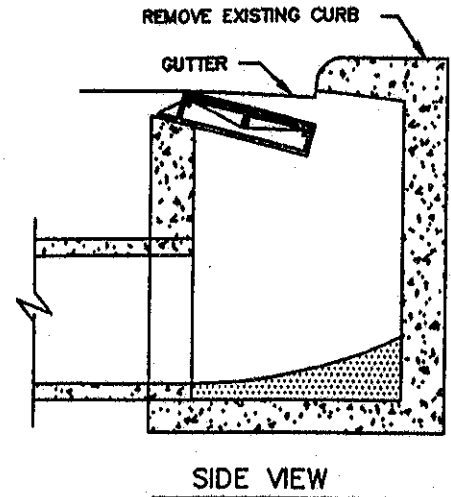
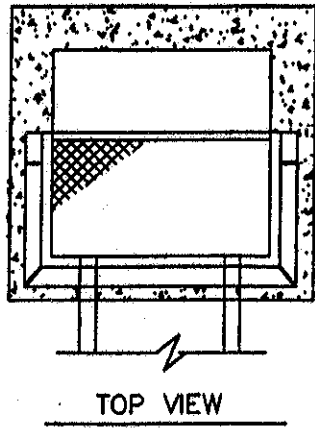
SECTION A-A

CITY OF TOMBALL

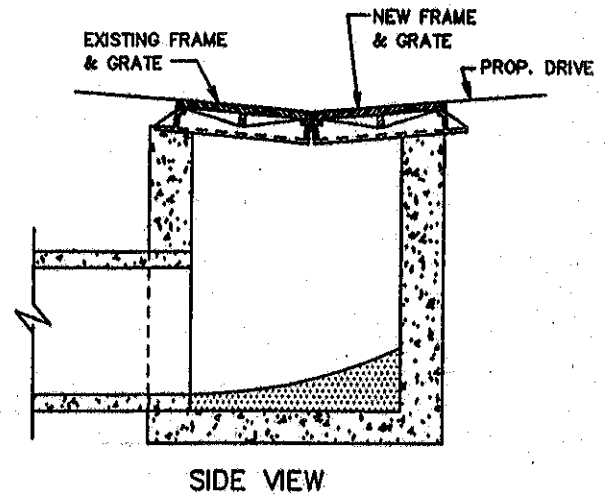
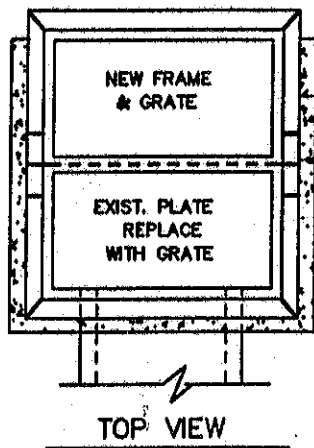
TYPE "B" INLET
WITH GRATE TOP
(NOT TO SCALE)

APPROVED BY:	DWG. NO. COT-50
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

STEP: 1 EXISTING TYPE "B" INLET

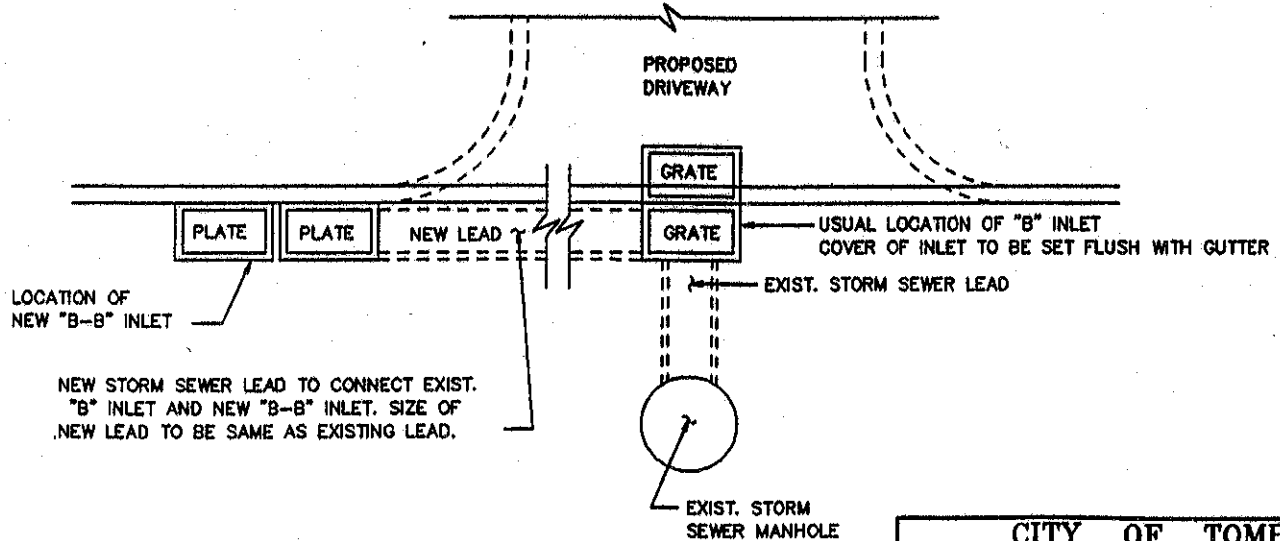


STEP: 2



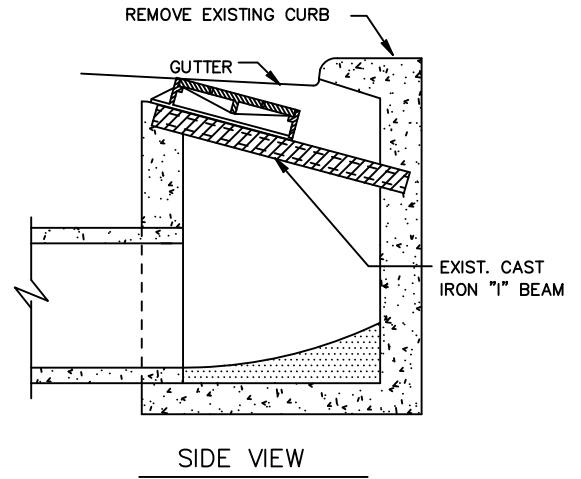
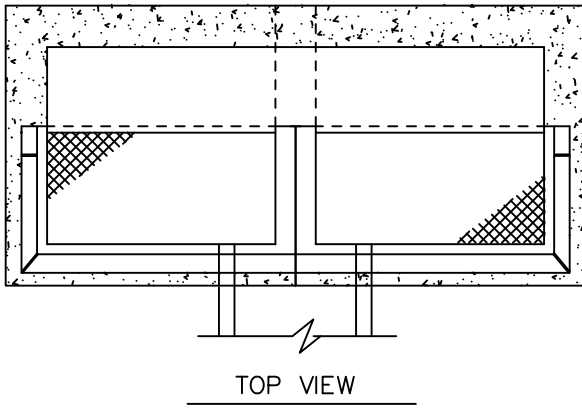
1. AFTER REMOVING EXIST. CURB, RAISE EXISTING FRAME TO GUTTER GRADE.
2. REPLACE EXIST. PLATE WITH A GRATE.
3. ADD NEW FRAME AND GRATE NEXT TO EXISTING FRAME.
4. BACKFILL INLET TO A POINT ONE FOOT BEHIND THE CURB WITH 1 SACK/TON CEMENT STABILIZED SAND.

STEP: 3 CONSTRUCT NEW TYPE "B-B" INLET ON CURB RETURN OF PROPOSED DRIVEWAY.

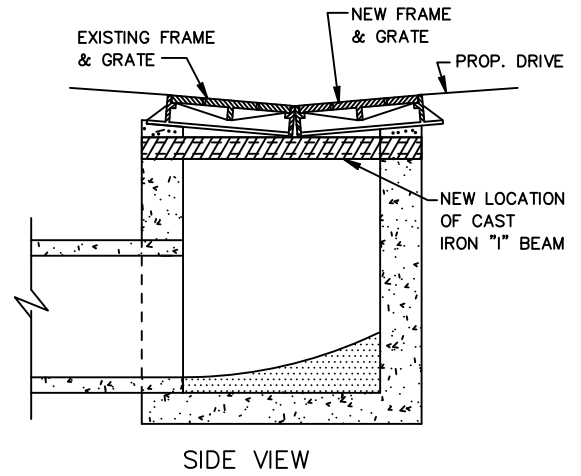
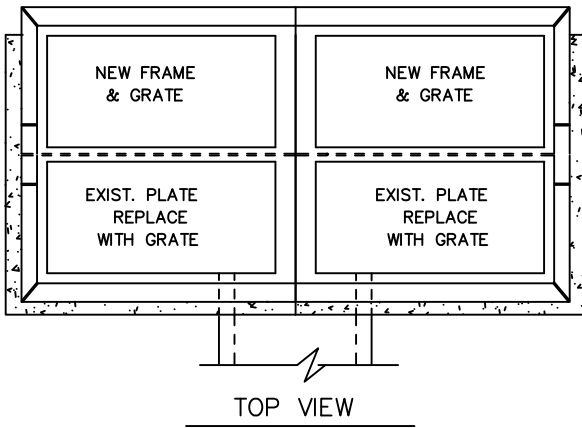


CITY OF TOMBALL	
TYPE "B"	
INLET RELOCATION	
(NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-51
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

STEP: 1 EXISTING TYPE "B-B" INLET

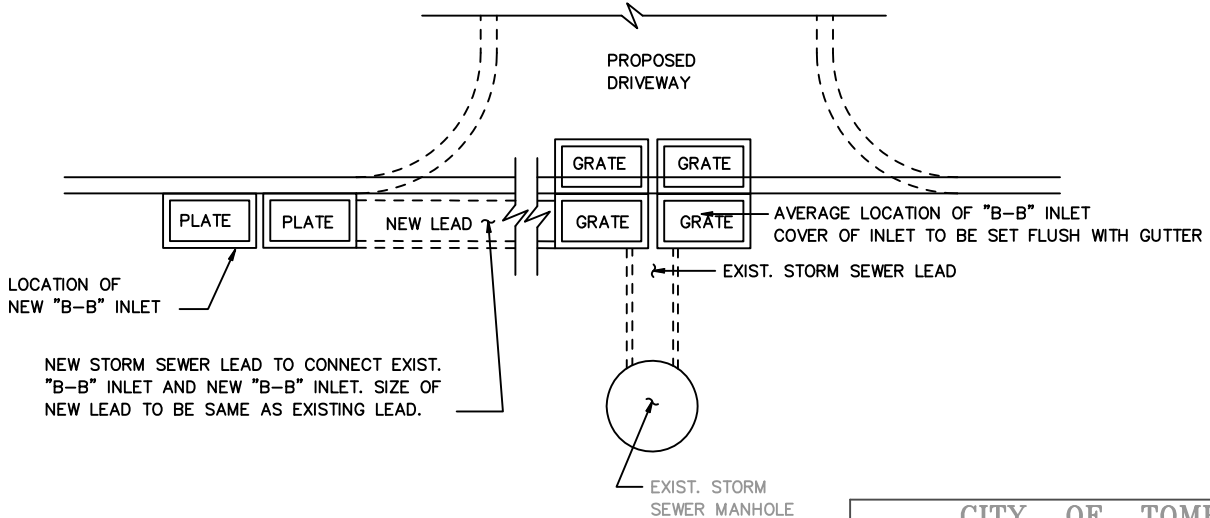


STEP: 2



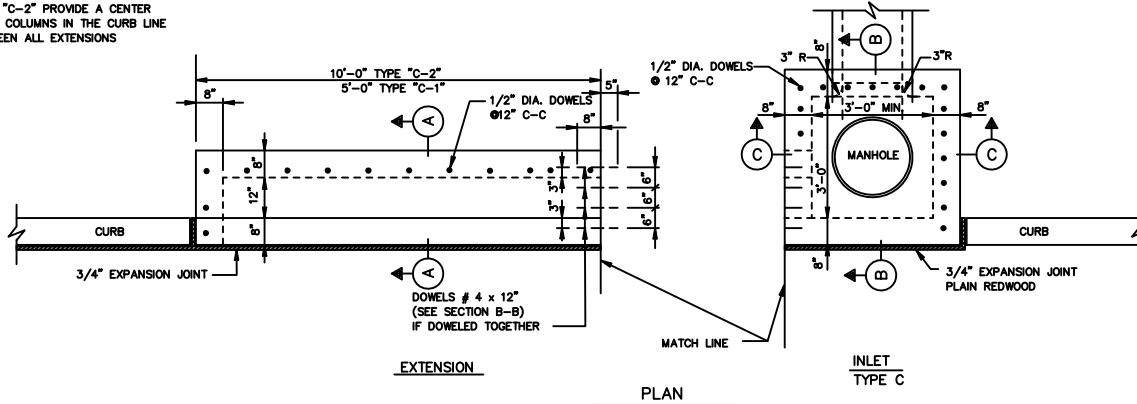
1. AFTER REMOVING EXIST. CURB, RAISE EXIST. "I" BEAM TO GRADE AND RESET EXIST. FRAMES.
2. REPLACE EXIST. PLATES WITH GRATES.
3. ADD NEW FRAMES AND GRATES NEXT TO EXISTING FRAMES.
4. BACKFILL INLET TO A POINT ONE FOOT BEHIND THE CURB WITH 1 SACK/TON CEMENT STABILIZED SAND.

STEP: 3 CONSTRUCT NEW TYPE "B-B" INLET ON CURB RETURN OF PROPOSED DRIVEWAY.



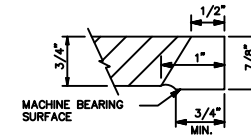
CITY OF TOMBALL	
TYPE "B-B" INLET RELOCATION (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-53
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

NOTE: TYPE "C-2" PROVIDE A CENTER 6"x6" COLUMNS IN THE CURB LINE BETWEEN ALL EXTENSIONS

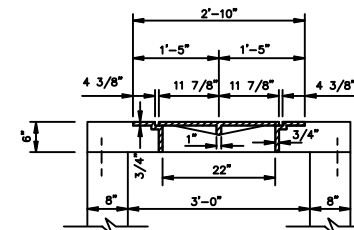
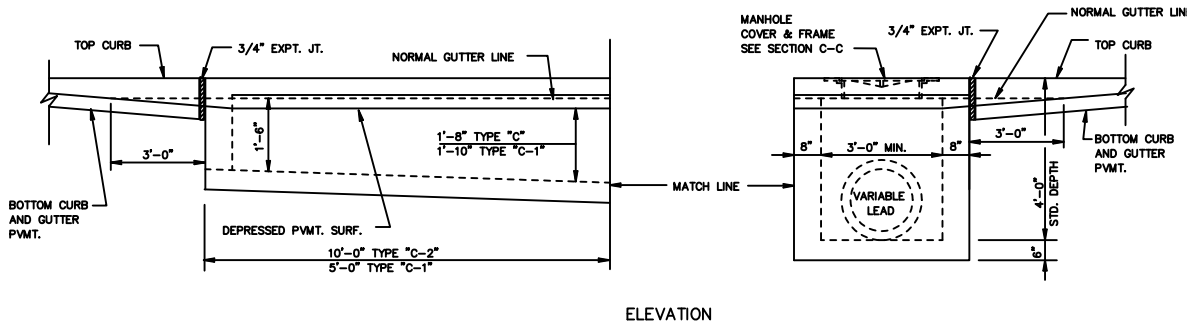
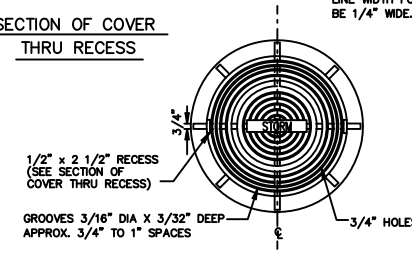


GENERAL NOTE:

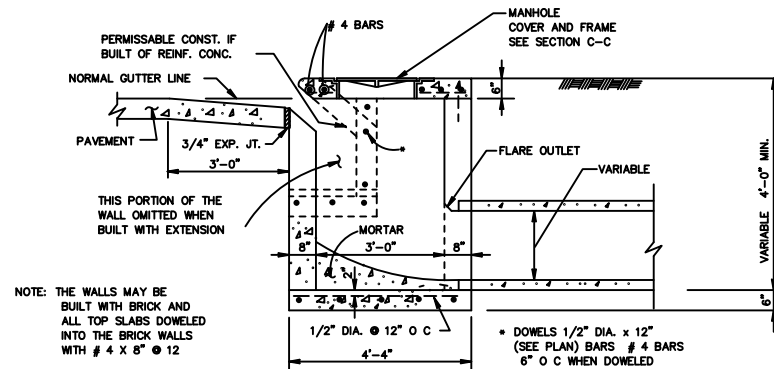
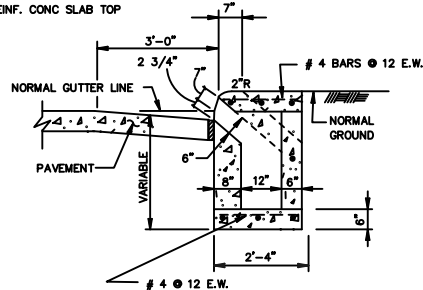
- TYPE "C" INLET WITH ONE EXTENSION (5'-0" LONG)
- TYPE "C-1" INLET WITH DOUBLE EXTENSION (10'-0" LONG)
- TYPE "C-2" INLET WITH ONE EXTENSION ON EACH SIDE
- TYPE "C-3" INLET WITH NO EXTENSION



ALL LETTERS SHALL BE 2" HIGH AND SHALL BE RAISED 1/8" LINE WIDTH FOR LETTERS SHALL BE 1/4" WIDE.



WALLS TO BE 6" REINF. CONC. OR MAY BE MADE OF BRICK, IF SO USE STRAIGHT WALL IN BACK WITH 6" REINF. CONC SLAB TOP

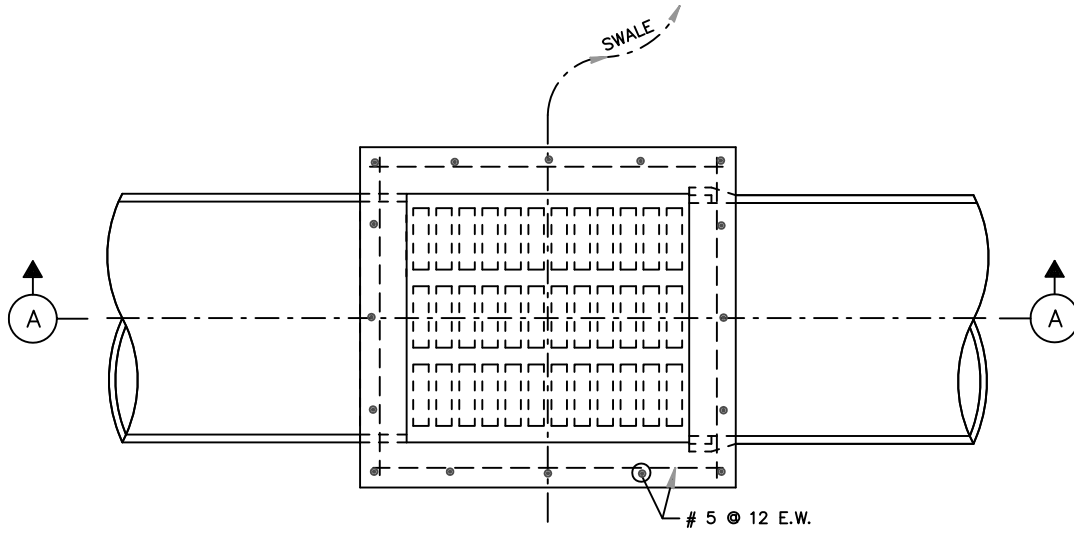


CITY OF TOMBALL

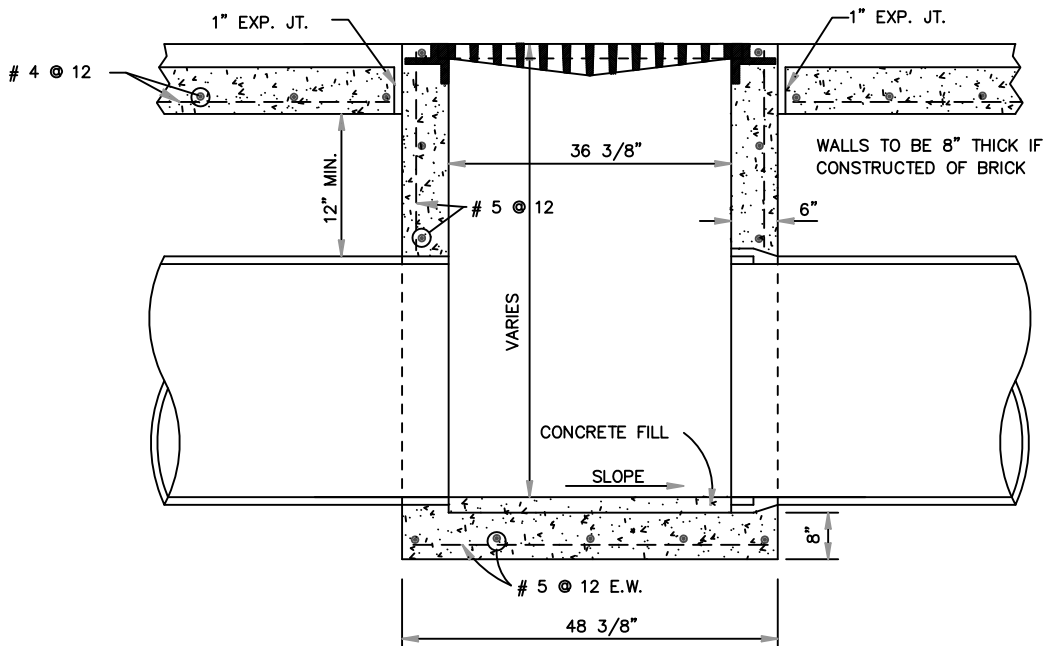
TYPE "C", "C-1", "C-2", "C-3" INLETS

(NOT TO SCALE)

APPROVED BY: _____ DWG. NO. COT-54
DIRECTOR OF PUBLIC WORKS EFF. DATE: 07/25/94



PLAN



SECTION A-A

CITY OF TOMBALL

TYPE "D" INLET

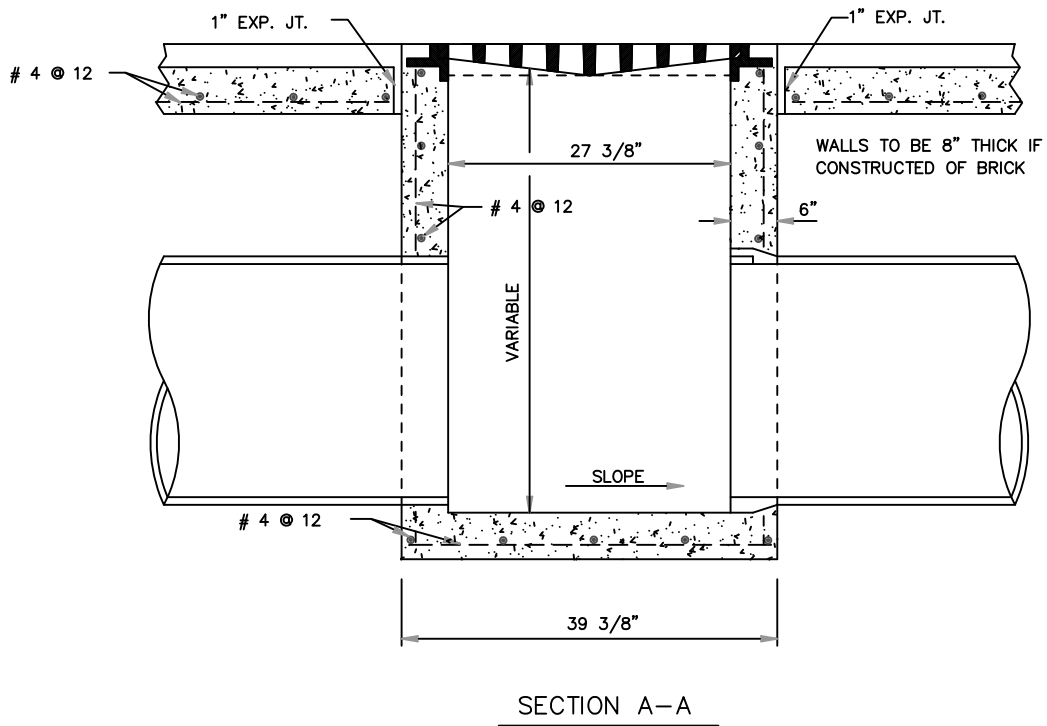
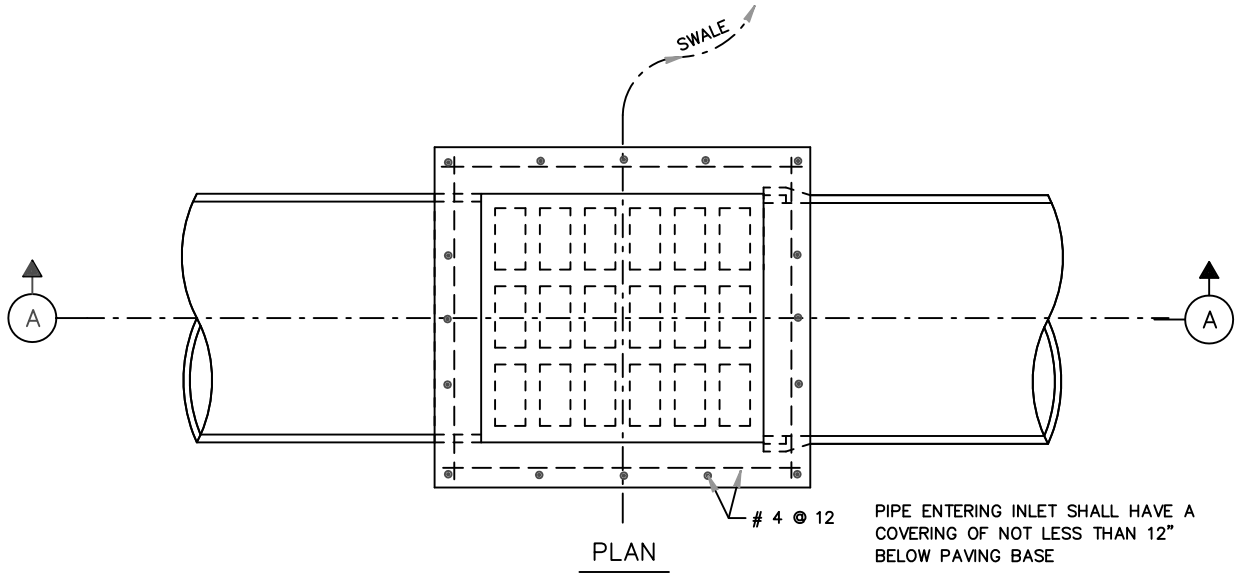
(NOT TO SCALE)

APPROVED BY:

DWG. NO. COT-55

DIRECTOR OF PUBLIC WORKS

EFF. DATE: 07/25/94



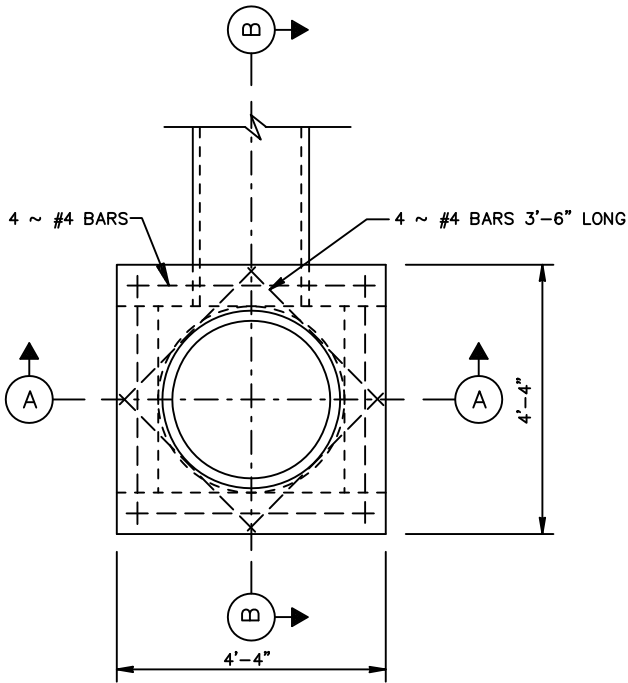
TYPE "D-1" INLET SPACING MAX

15"	CULVERT	30"
18"	"	30"
24"	"	30"
30"	"	50"
36"	"	60"

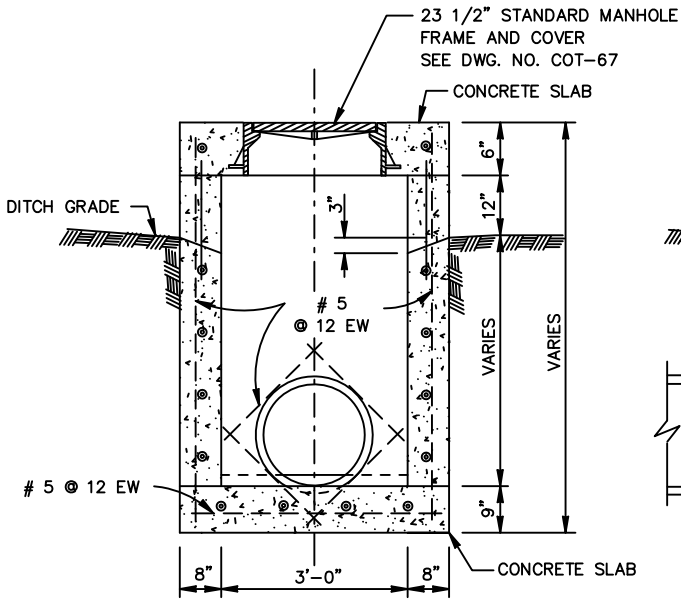
CITY OF TOMBALL		
TYPE "D-1" INLET (NOT TO SCALE)		
APPROVED BY:	DWG. NO.	COT-33
DIRECTOR OF PUBLIC WORKS	EFF. DATE:	07/25/94

NOTE:

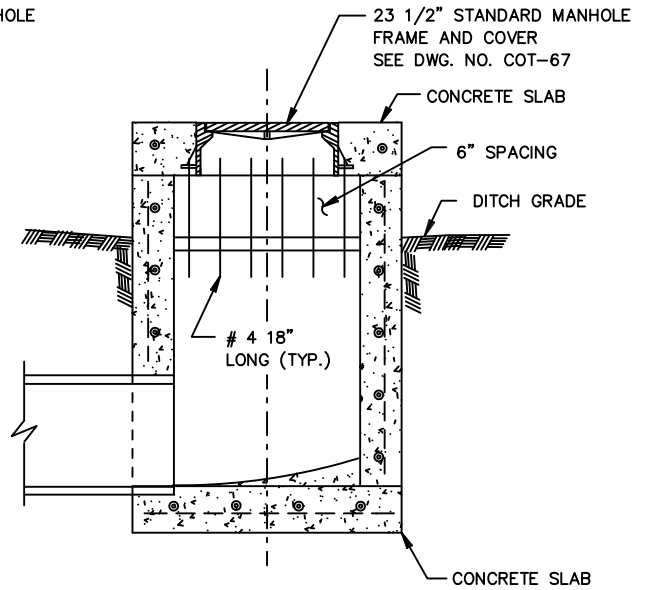
8" BRICK WALLS MAY BE
CONSTRUCTED IN LIEU OF 8"
CONCRETE WALLS SHOWN.



PLAN



SECTION A-A



SECTION B-B

CITY OF TOMBALL

TYPE "E" INLET

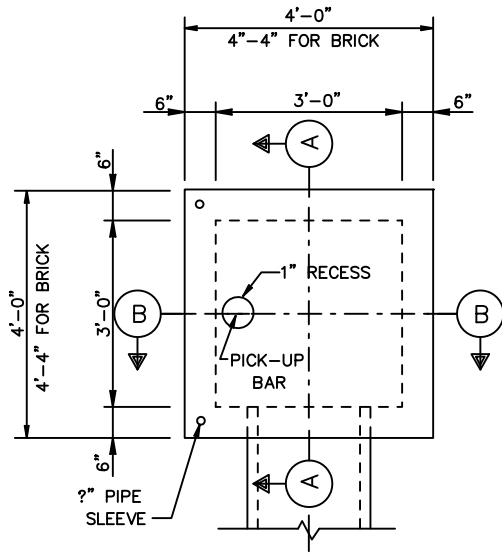
(NOT TO SCALE)

APPROVED BY:

DWG. NO. COT-57

DIRECTOR OF PUBLIC WORKS

EFF. DATE: 07/25/94

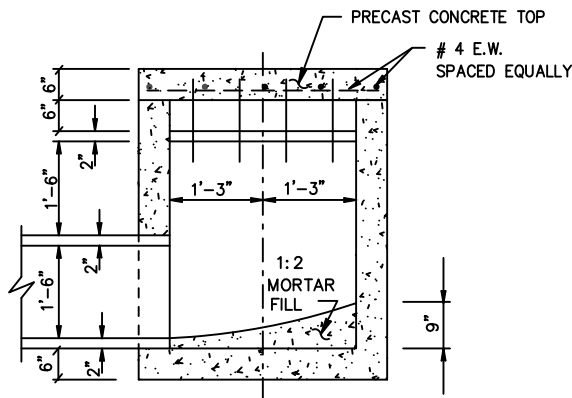


PLAN

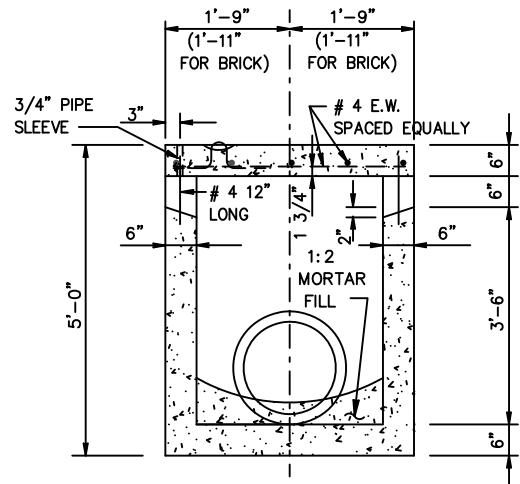
BAR LIST				
NO. REQD.	SIZE	LENGTH	SHAPE	LOCATION
4	# 4	1'-0"	STRAIGHT	VERT.
10	# 4	3'-3"	STRAIGHT	HORIZ.
2	# 4	1'-11 1/2"	BENT	-

GENERAL NOTES

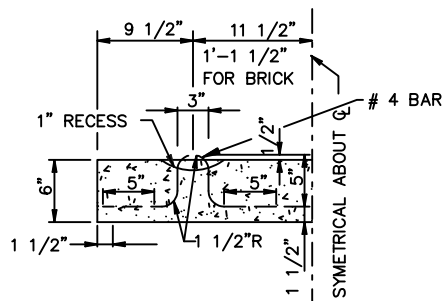
- 8" BRICK WALLS MAY BE COSTRUCTED IN LIEU OF 6" CONCRETE WALLS SHOWN
- INCREASE LENGTH OF HORIZONTAL BARS IN PRECAST CONCRETE TOP TO 3'-7" IF BRICK WALLS ARE USED



SECTION A-A



SECTION B-B



HALF SECTION
PRECAST CONCRETE TOP

CITY OF TOMBALL

TYPE "F" INLET

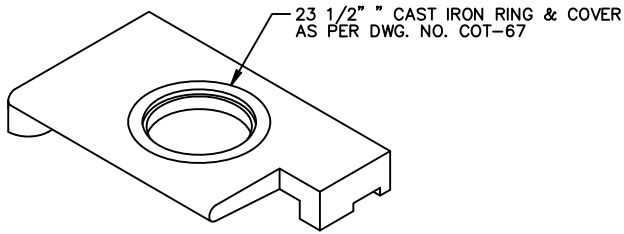
(NOT TO SCALE)

APPROVED BY:

DWG. NO. COT-58

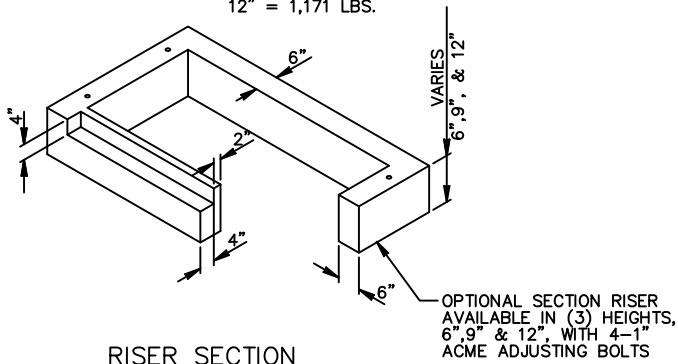
DIRECTOR OF PUBLIC WORKS

EFF. DATE: 07/25/94

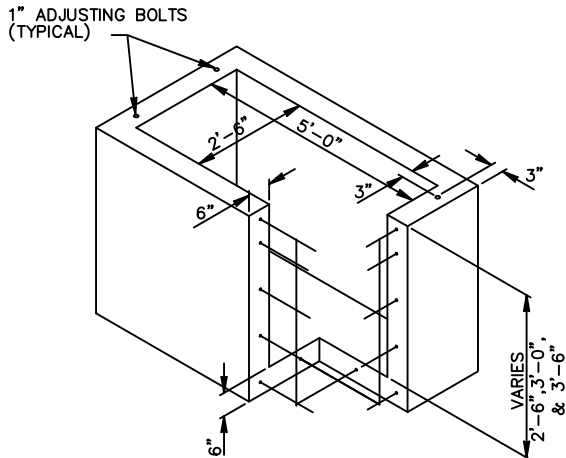


TOP SECTION VIEW

RISER SECTION WEIGHTS
 6" = 542 LBS.
 9" = 857 LBS.
 12" = 1,171 LBS.



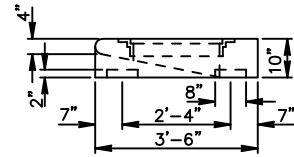
RISER SECTION



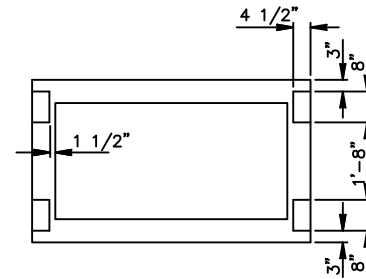
TOP SECTION WEIGHT, 2027 LBS.
 BOTTOM SECTION WEIGHTS, 2'-6" = 4704 LBS
 3'-0" = 5333 LBS
 3'-6" = 5963 LBS

NOTE:

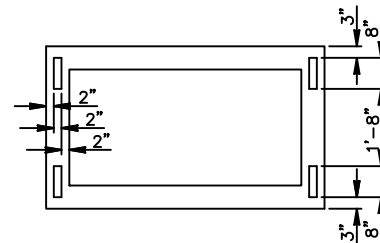
GRADE 60 REINFORCEMENT
 4500 PSI CONCRETE FOR S.B.C. 800 &
 A.C.I. - 31877 SIDEWALK LOADING



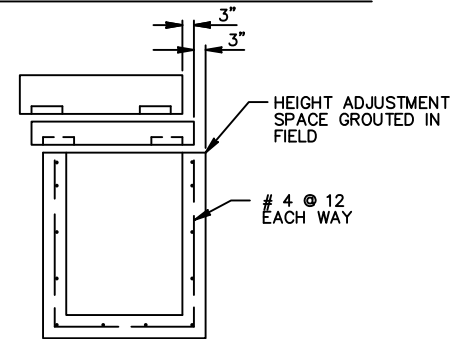
SIDE VIEW OF TOP SECTION



BOTTOM VIEW OF TOP SECTION



BOTTOM VIEW OF RISER SECTION



MAY BE RACKED FOR ADJUSTMENT

CITY OF TOMBALL

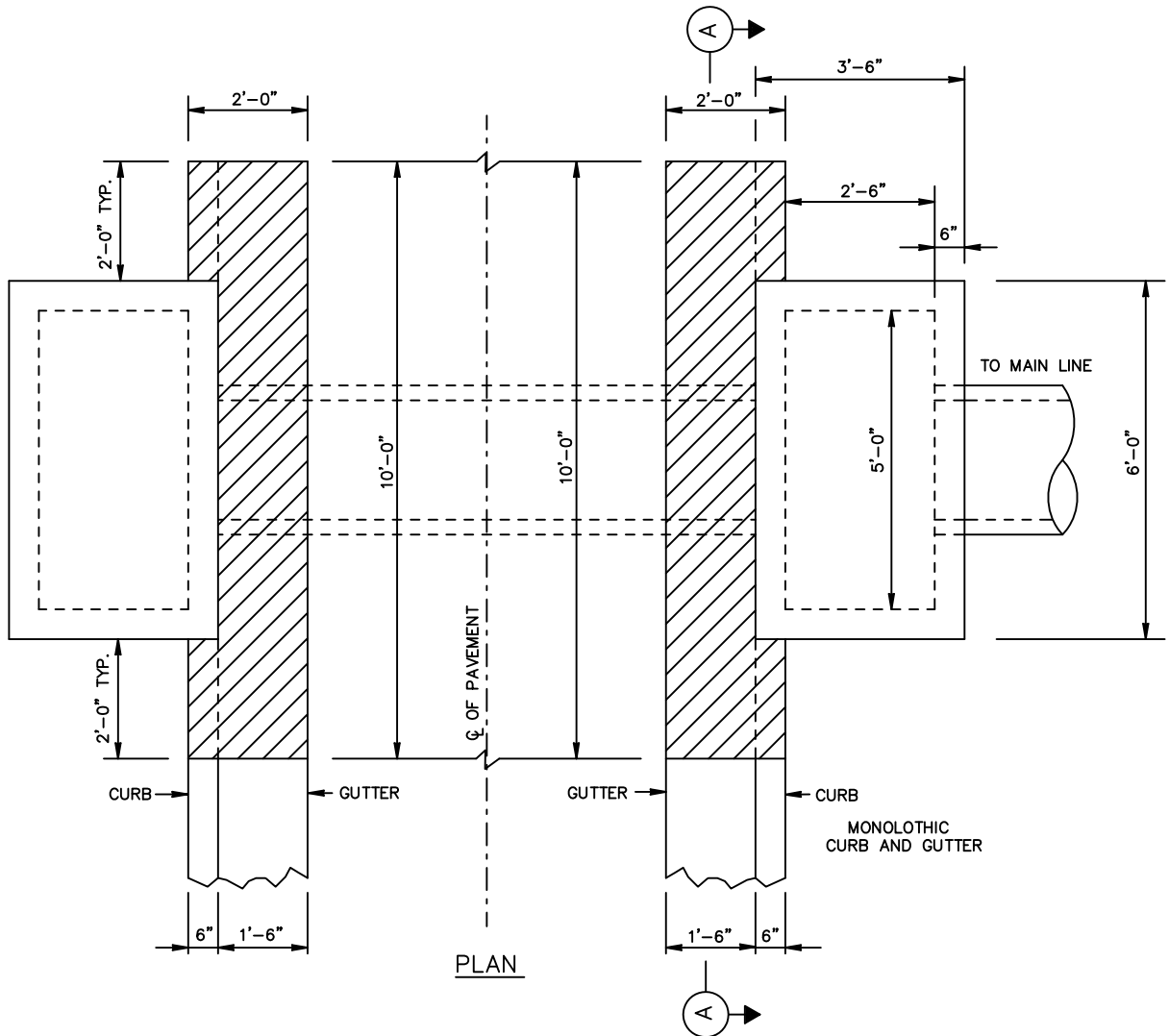
5'-0" PRECAST INLET
 TYPE "H-2" WITH RISER SECTION
 (NOT TO SCALE)

APPROVED BY:

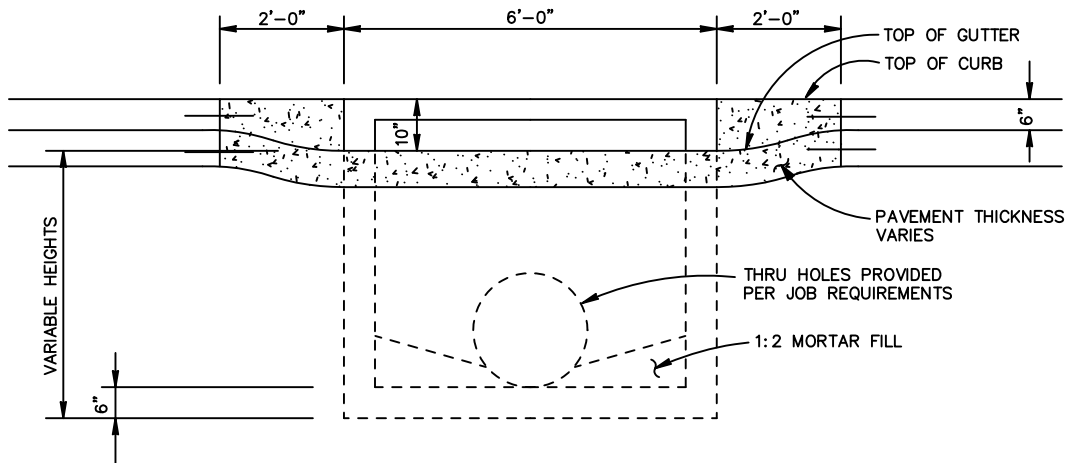
DWG. NO. COT-59

DIRECTOR OF PUBLIC WORKS

EFF. DATE: 07/25/94



PLAN



SECTION A-A

CITY OF TOMBALL

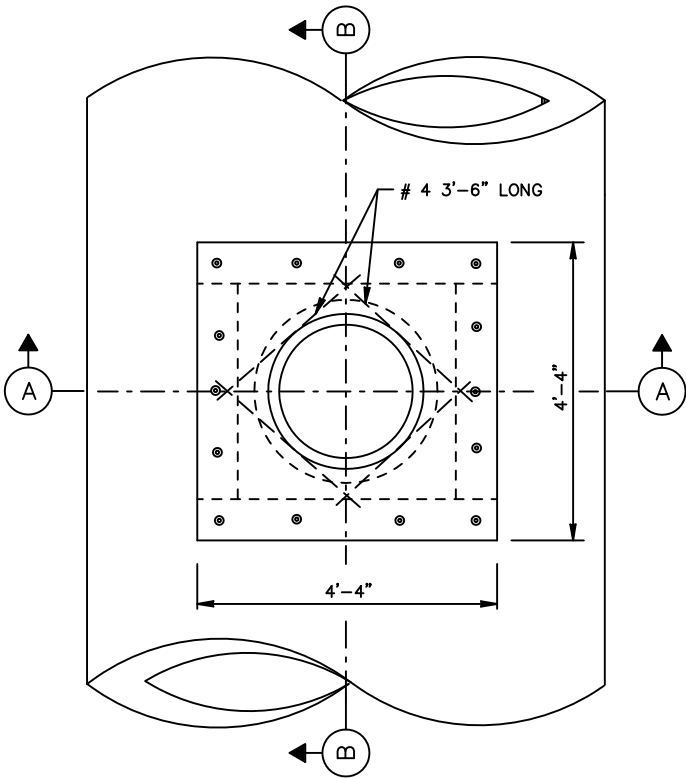
PRECAST TYPE "H-2" INLET
FOR ASPHALT STREET SECTION
(NOT TO SCALE)

APPROVED BY:

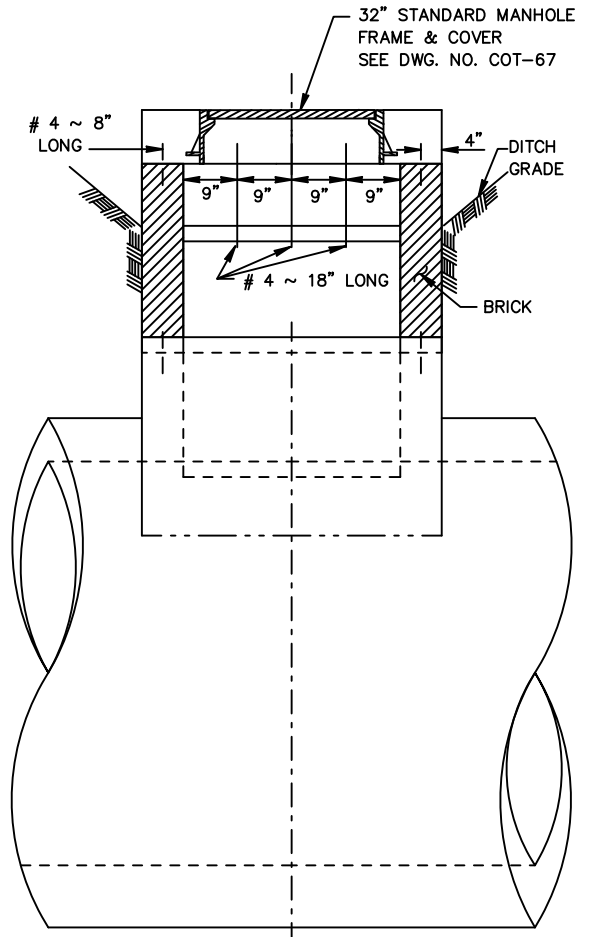
DWG. NO. COT-60

DIRECTOR OF PUBLIC WORKS

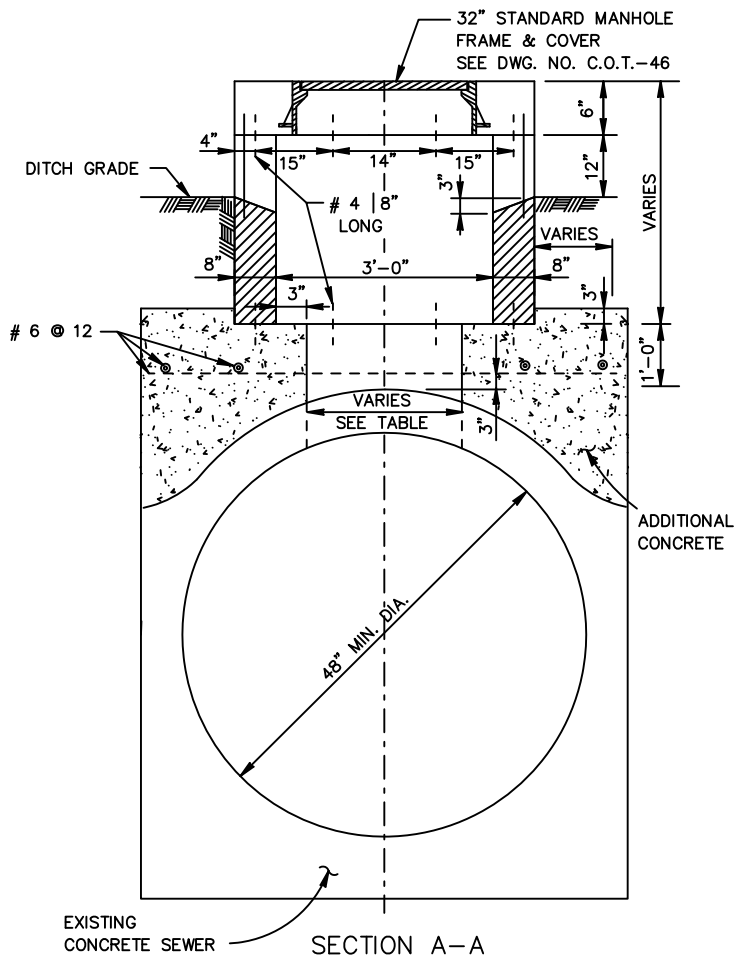
EFF. DATE: 07/25/94



PLAN OF TYPE "E"
(COVER NOT SHOWN)



SECTION B-B



SECTION A-A

SEWER SIZE	OPENING SIZE
48"	30"
54"	36"
60"	42"
66" AND GREATER	48"

CITY OF TOMBALL	
TYPE "E" INLET ON EXISTING MONOLITHIC CONCRETE STORM SEWERS OF 48" & GREATER DIAM. (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-61
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

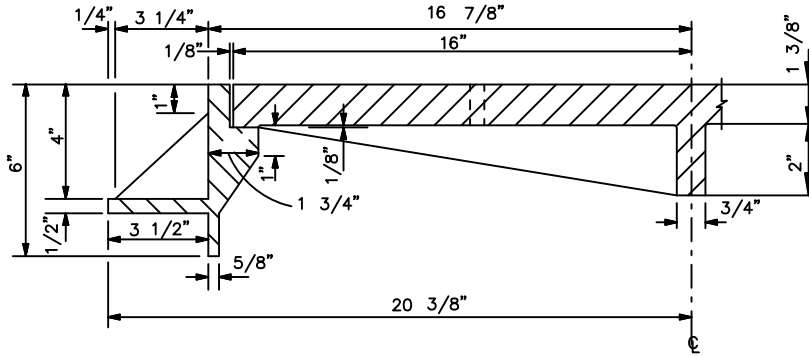
ALL LETTERS SHALL BE 2" HIGH AND SHALL BE RAISED 1/8" LINE WIDTH FOR LETTERS SHALL BE 1/4" WIDE.

1/2" x 2 1/2" RECESS (SEE SECTION OF COVER THRU RECESS)

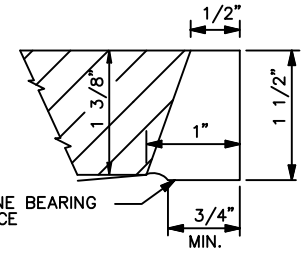
GROOVES 3/16" DIA X 3/32" DEEP APPROX. 3/4" TO 1" SPACES

3/4" HOLES

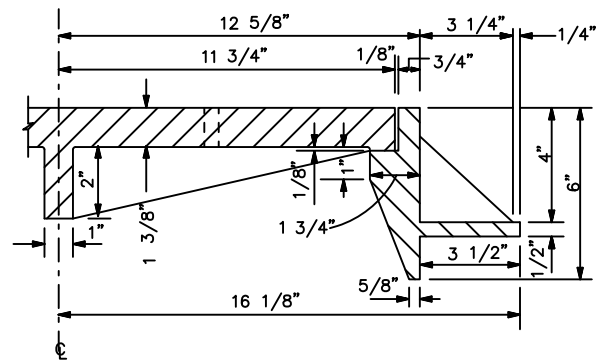
WORD "SEWER"



HALF SECTION
32" MANHOLE COVER WITH FRAME



SECTION OF COVER
THRU RECESS



HALF SECTION
23 1/2" MANHOLE COVER WITH FRAME

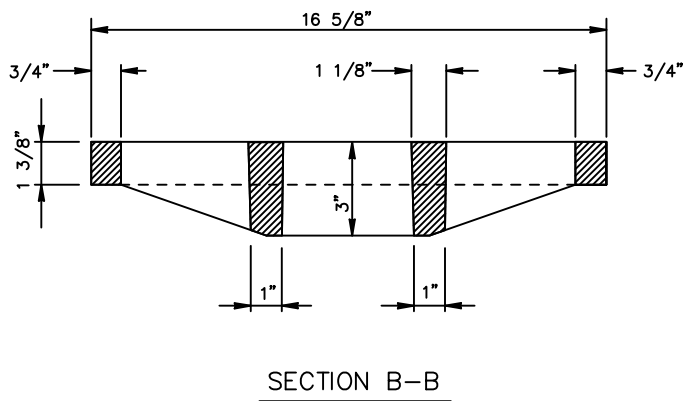
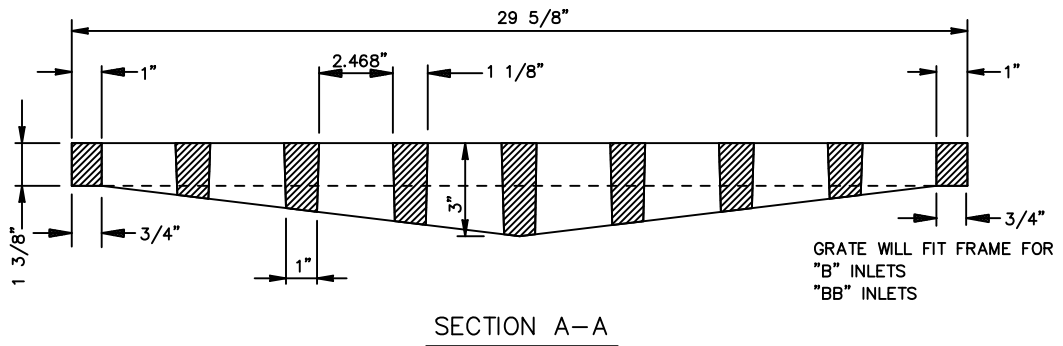
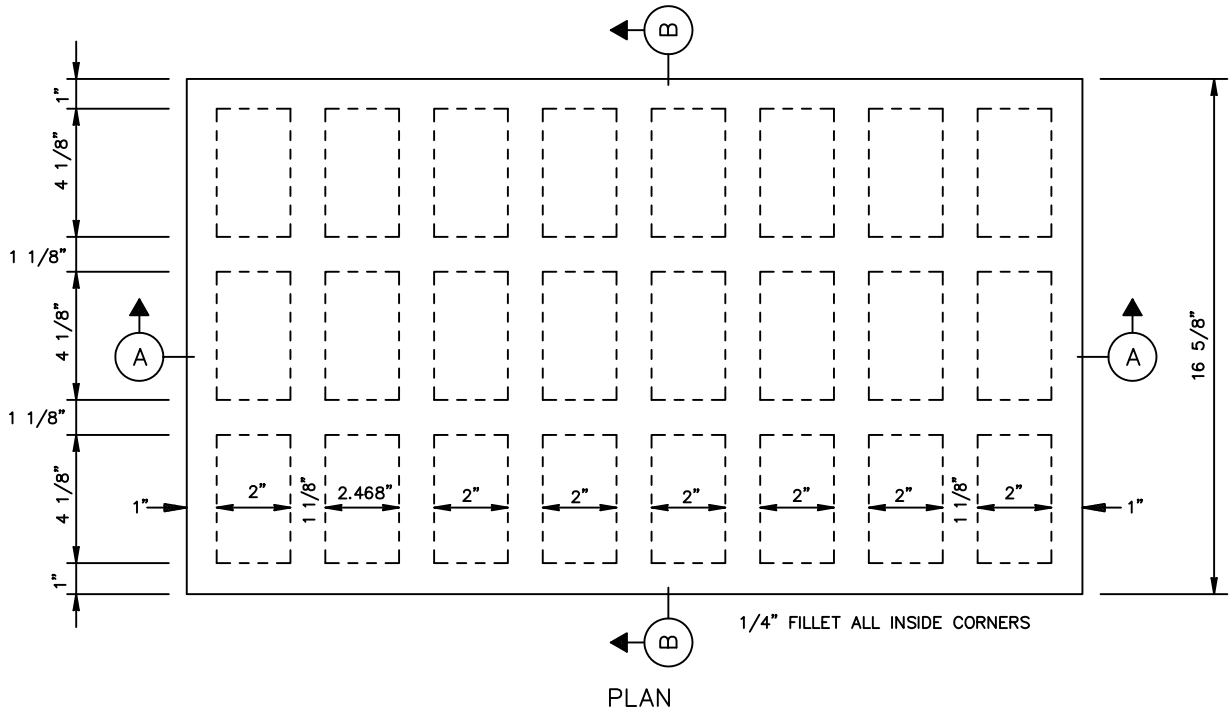
32" MANHOLE FRAME & COVER

FRAME: VULCAN MODEL V-1420
COVER: VULVAN MODEL V-1419

23 1/2" MANHOLE FRAME & COVER

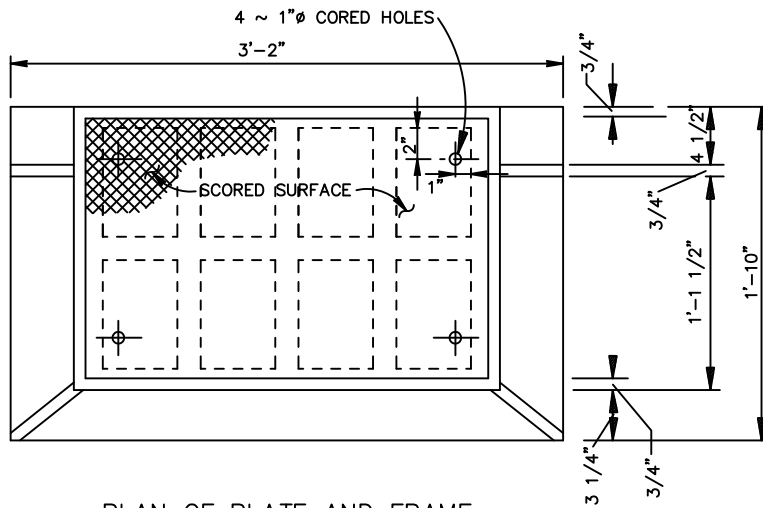
FRAME: VULCAN MODEL V-1418-2
COVER: VULCAN MODEL V-1418

CITY OF TOMBALL	
MANHOLE FRAME AND COVER (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-67
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

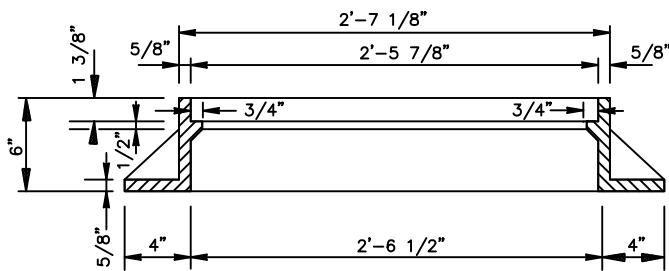


VULCAN MODEL V-4241-1

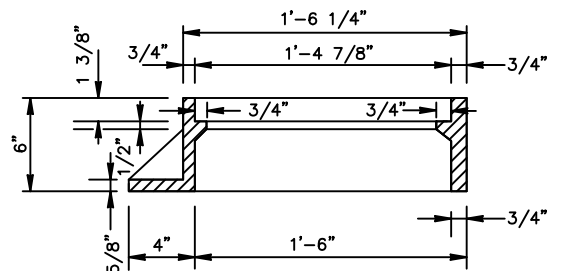
CITY OF TOMBALL		
CAST IRON INLET GRATE (NOT TO SCALE)		
APPROVED BY:	DWG. NO.	COT-68
DIRECTOR OF PUBLIC WORKS	EFF. DATE:	07/25/94



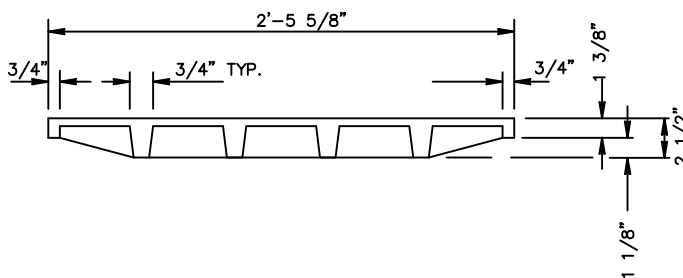
PLAN OF PLATE AND FRAME



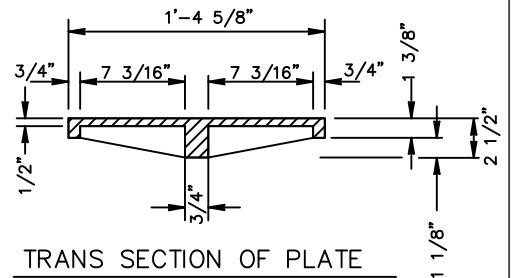
LONG SECTION OF FRAME



TRANS SECTION OF FRAME



LONG SECTION OF PLATE



TRANS SECTION OF PLATE

FRAME: VULCAN MODEL V-4241 (2 REQ'D)
PLATE: VULCAN MODEL V-4240-2 (2 REQ'D)

CITY OF TOMBALL

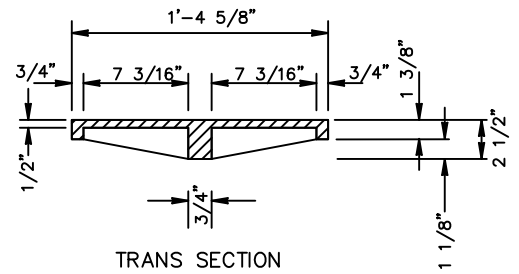
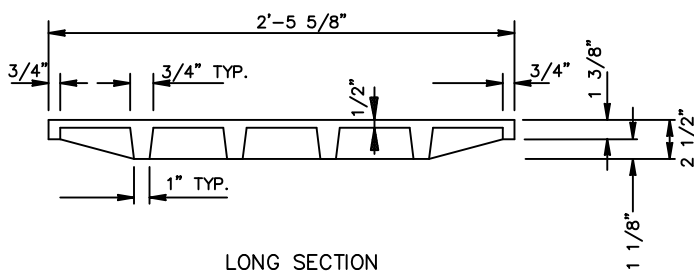
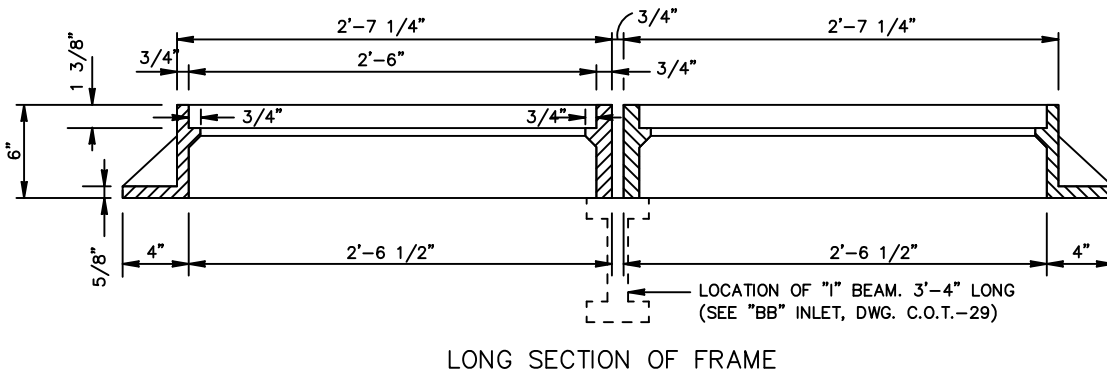
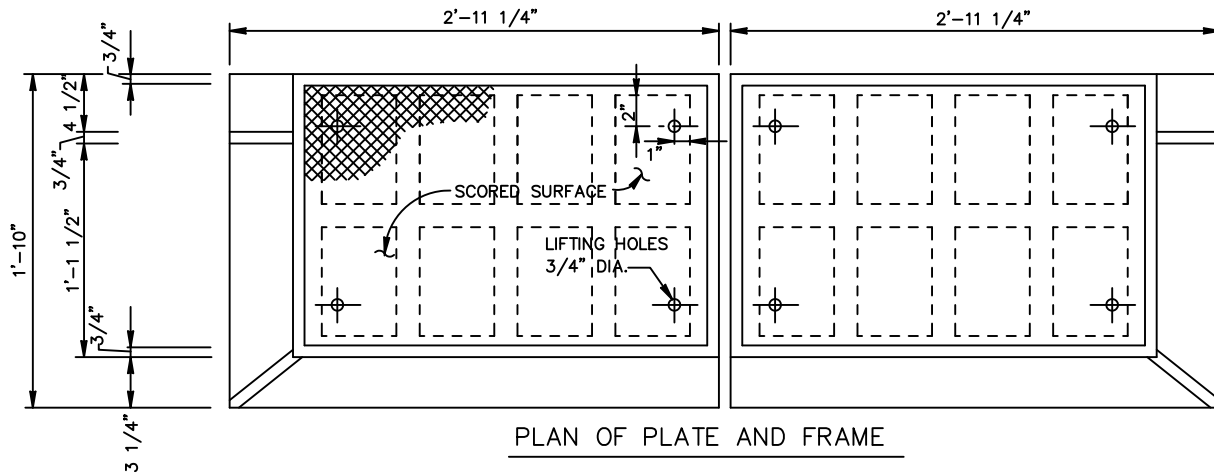
CAST IRON PLATE AND FRAME
FOR TYPE "B" INLETS
(NOT TO SCALE)

APPROVED BY:

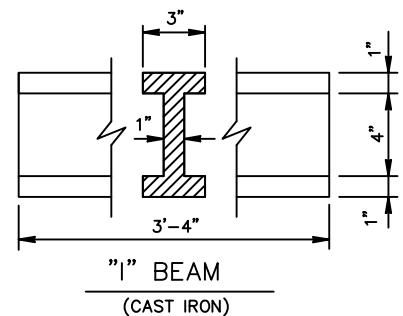
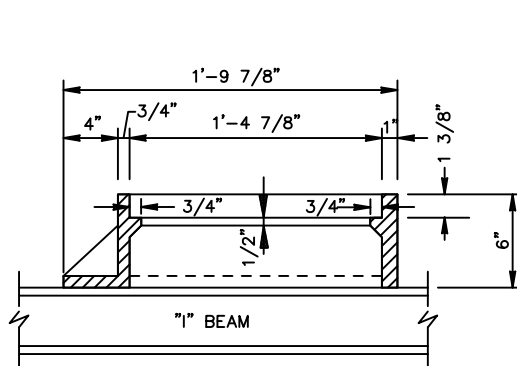
DWG. NO. COT-69

DIRECTOR OF PUBLIC WORKS

EFF. DATE: 07/25/94



PLATE

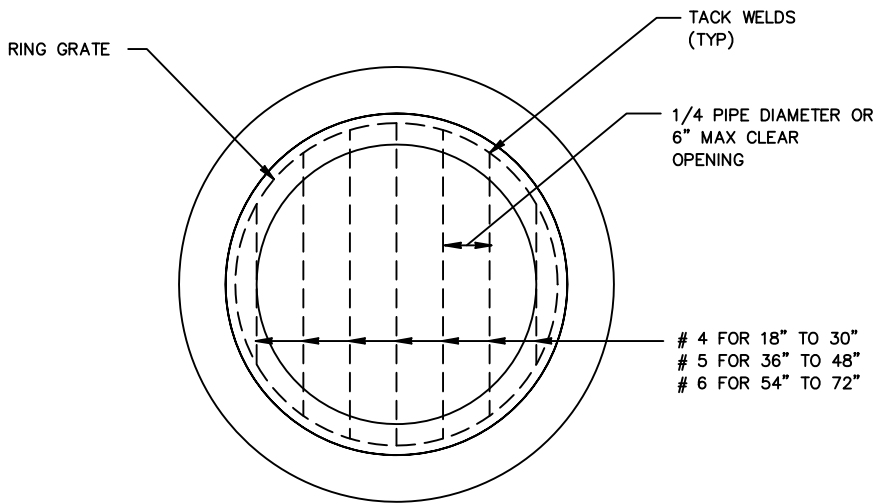


FRAME: VULCAN MODEL V-4242L & V-4242R
 PLATE: VULCAN MODEL V 4242-2
 I-BEAM: VULCAN MODEL V 4881

CITY OF TOMBALL

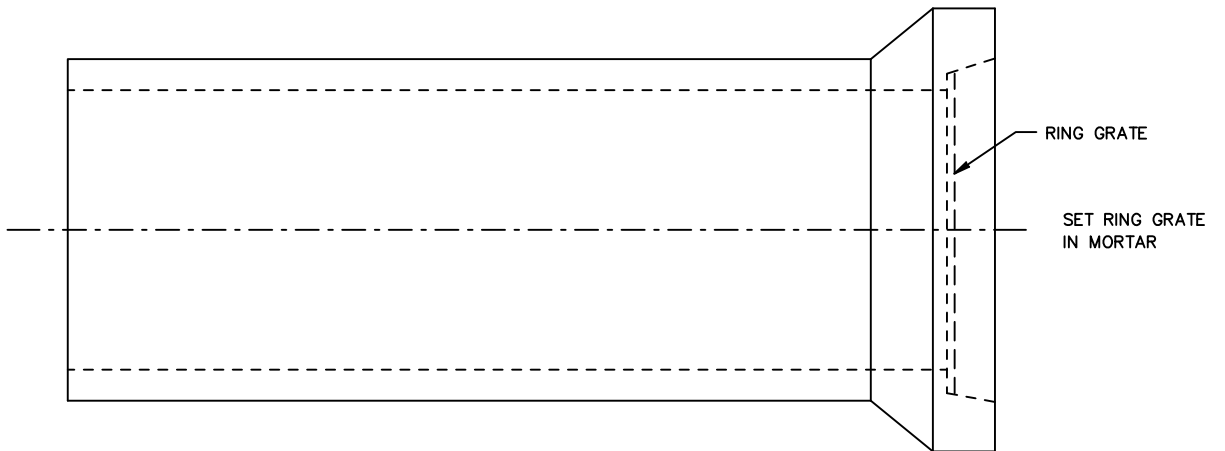
CAST IRON PLATE, FRAME, AND
 "1" BEAM FOR TYPE "B-B" INLET
 (NOT TO SCALE)

APPROVED BY:	DWG. NO. COT-70
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



END VIEW

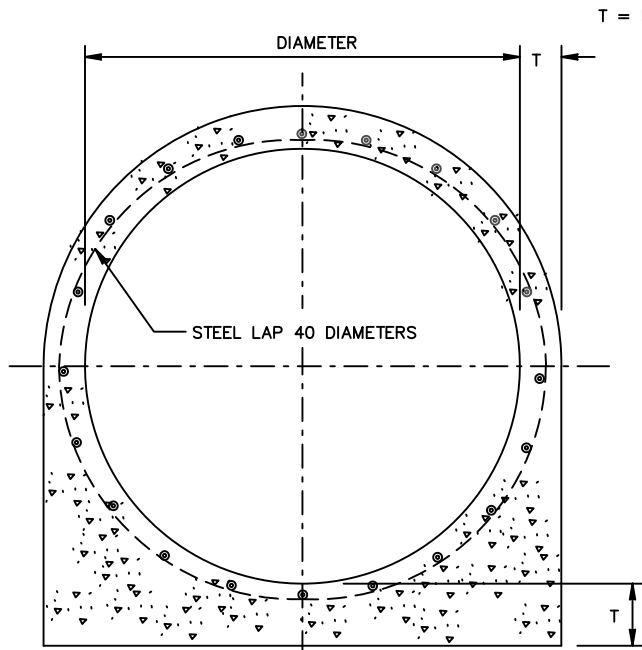
NOTE:
 BARS MAY BE VERTICAL OR
 HORIZONTAL AFTER INSTALLATION



SIDE VIEW

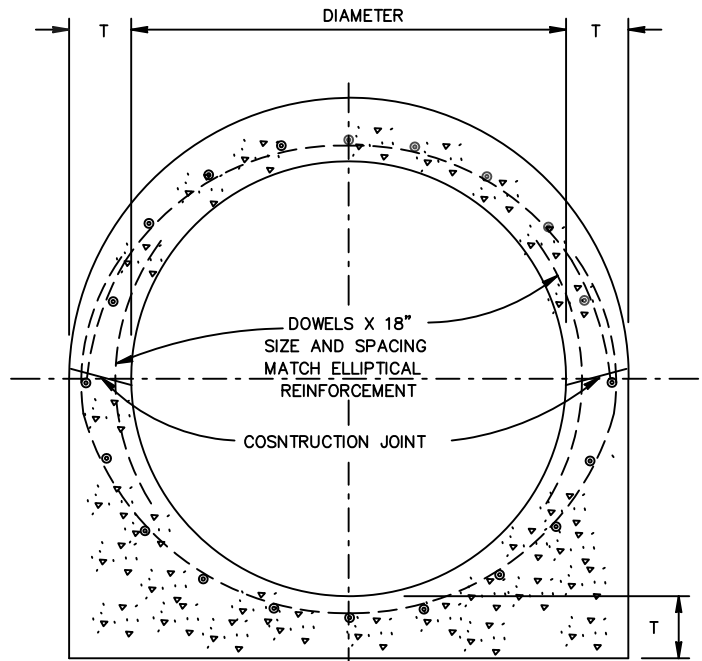
CITY OF TOMBALL	
RING GRATE FOR OPEN END OF 18" TO 72" STUBS TO DITCH (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-71
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

REINFORCED MONOLITHIC CONCRETE STORM SEWERS						
DIAMETER IN INCHES	MINIMUM THICKNESS (T) IN INCHES	ELLIPTICAL REINFORCEMENT		LONGITUDINAL REINFORCEMENT		CU. FT. OF CONCRETE PER FT. OF SEWER
		SIZE NO.	SPACING INCHES	SIZE NO.	NO. OF BARS	
36	5	4	9-1/2	4	12	6.05
42	5-1/2	4	9-1/2	4	12	7.80
48	5-1/2	4	8-1/2	4	16	9.01
54	6	4	8	4	16	11.10
60	7	4	9	4	16	14.31
66	7	4	9	4	20	15.92
72	7-1/2	4	8	5	20	18.64
78	7-1/2	4	6-1/2	5	20	20.44
84	7-1/2	5	9	5	24	22.27
90	8	5	8-1/2	5	24	25.47
96	8	5	7	5	28	27.50
102	8-1/2	5	6-1/2	5	28	31.05
108	8-1/2	5	6	5	32	33.24
114	9	6	8	5	32	37.13
120	9	6	7-1/2	5	36	39.52



TYPICAL SECTION
STANDARD DETAIL
MONOLITHIC REINFORCED
CONCRETE STORM SEWERS

T = MINIMUM THICKNESS



TYPICAL SECTION
REINFORCING STEEL DETAIL FOR
MONOLITHIC CONCRETE SEWERS
WHEN BUILT IN HALF SECTIONS

DESIGN DATA

DESIGN LOADING: AASHTO-H-20
MIN. DEPTH: 2.0' COVER ON 36"
TO 3.5' ON 54"
MAX. DEPTH: 24' TO FLOW LINE OF
60" TO 120"
REINFORCING COVER = 2"

CITY OF TOMBALL

REINFORCED MONOLITHIC
CONCRETE STORM SEWERS

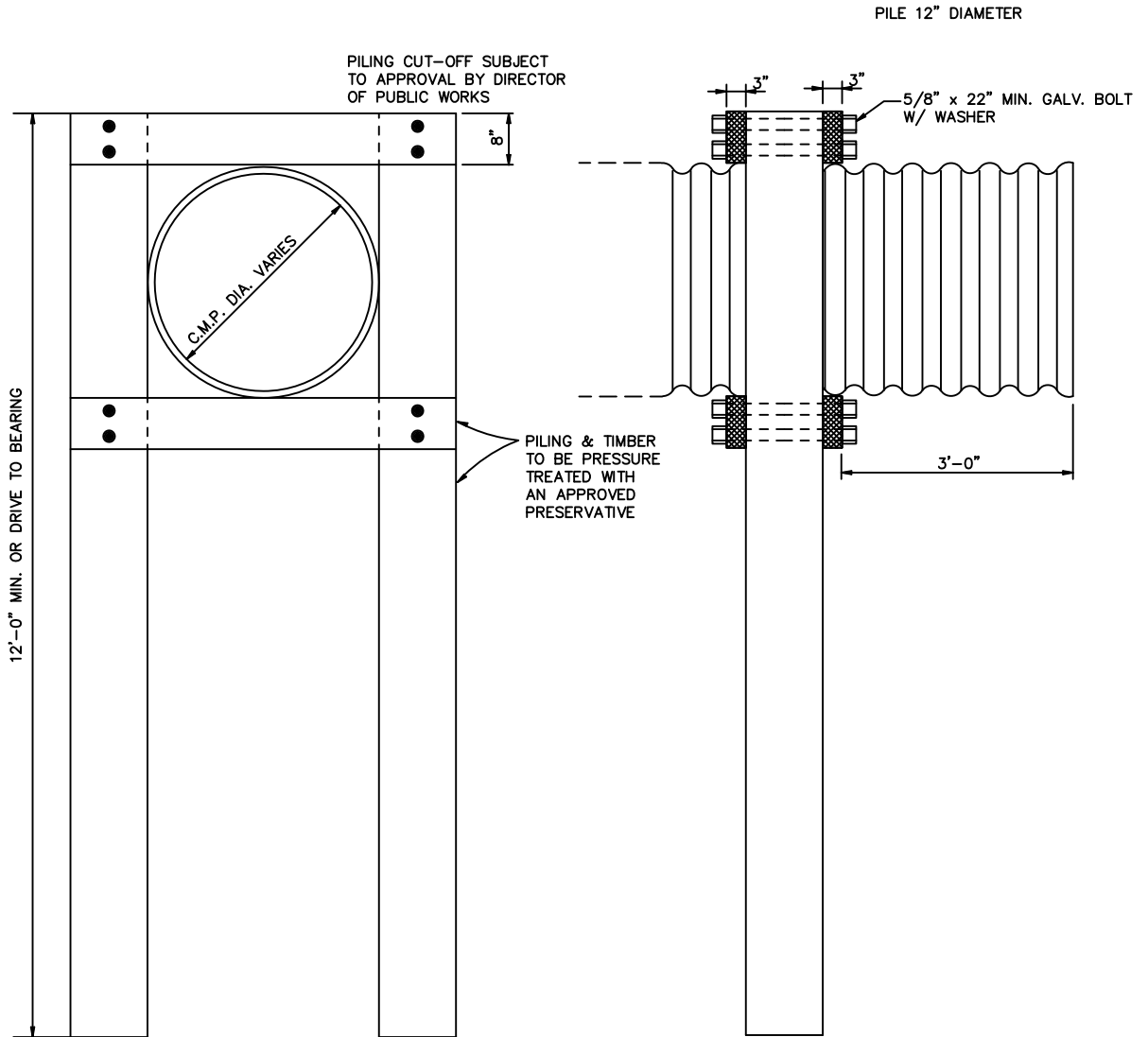
(NOT TO SCALE)

APPROVED BY:

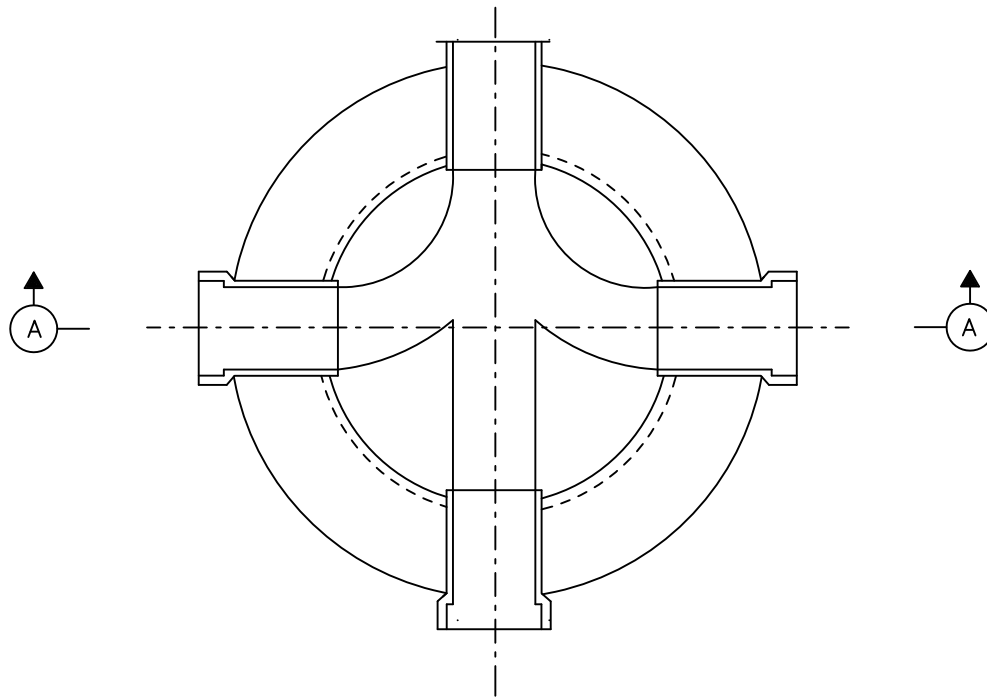
DWG. NO. COT-72

DIRECTOR OF PUBLIC WORKS

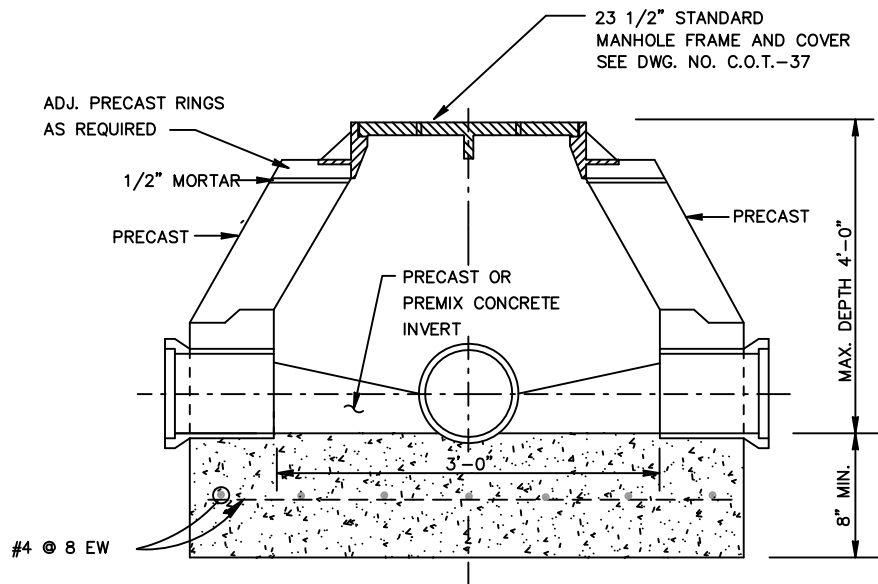
EFF. DATE: 07/25/94



CITY OF TOMBALL	
BENT FOR CORRUGATED METAL PIPE OUTFALL (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-74
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



PLAN



SECTION A-A

CITY OF TOMBALL

SANITARY SEWER
 MANHOLE TYPE 3
 (NOT TO SCALE)

APPROVED BY:

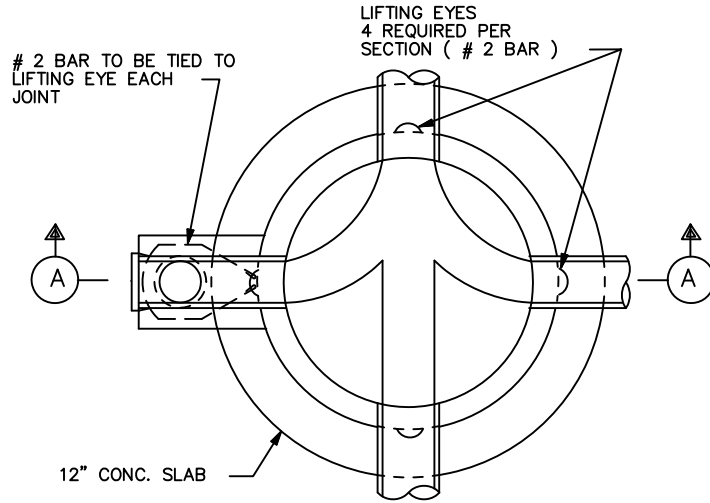
DWG. NO. COT-80

DIRECTOR OF PUBLIC WORKS

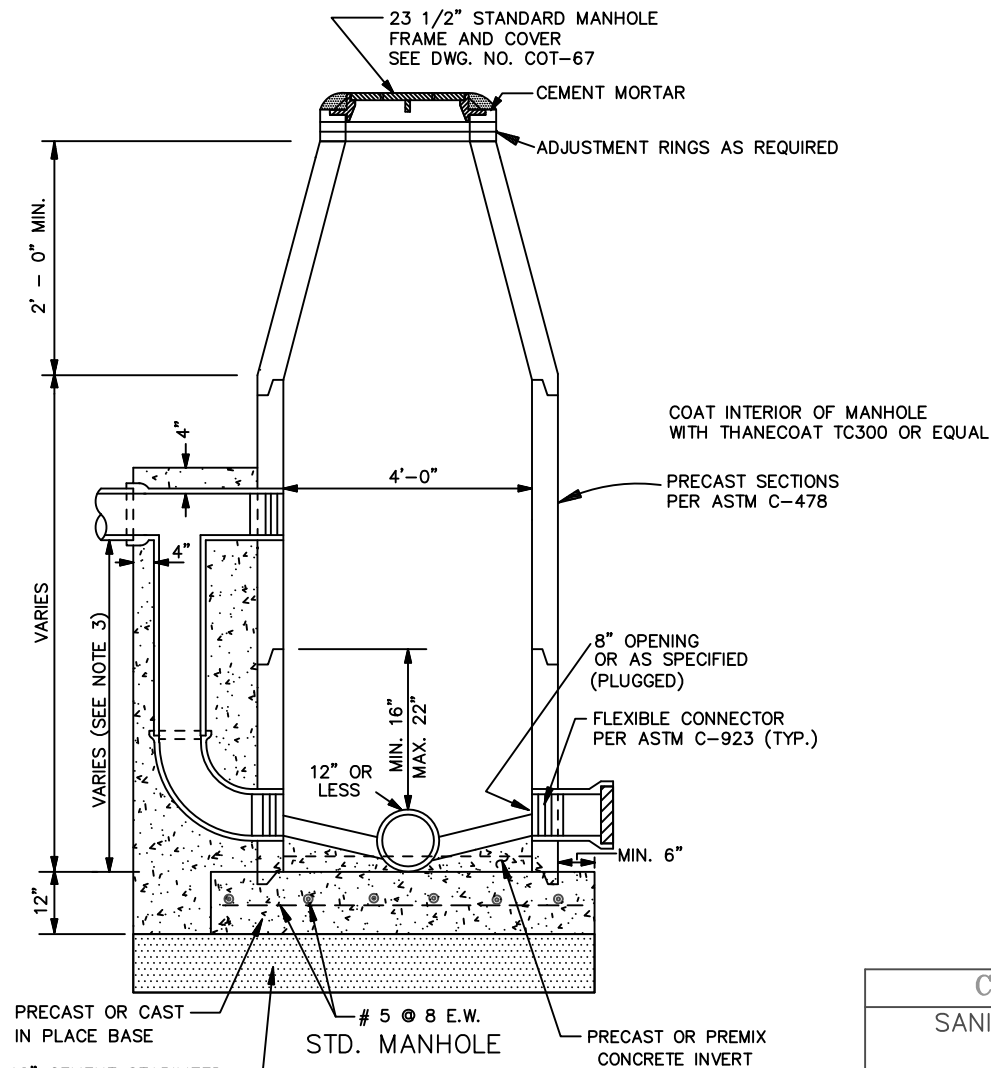
EFF. DATE: 07/25/94

NOTES:

1. LIFTING EYES (# 2 BARS) SHALL BE USED TO TIE STD. DROP TO MANHOLE.
2. DEPTH OF MANHOLE DETERMINES SECTIONS REQUIRED.
3. DROP REQUIRED WHERE FLOWLINE ELEVATION DIFFERENCE IS GREATER THAN 2'-0".

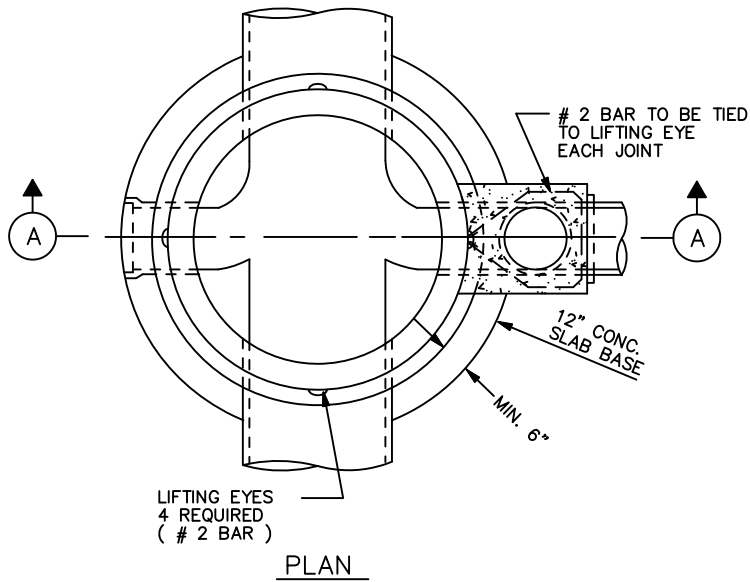


PLAN



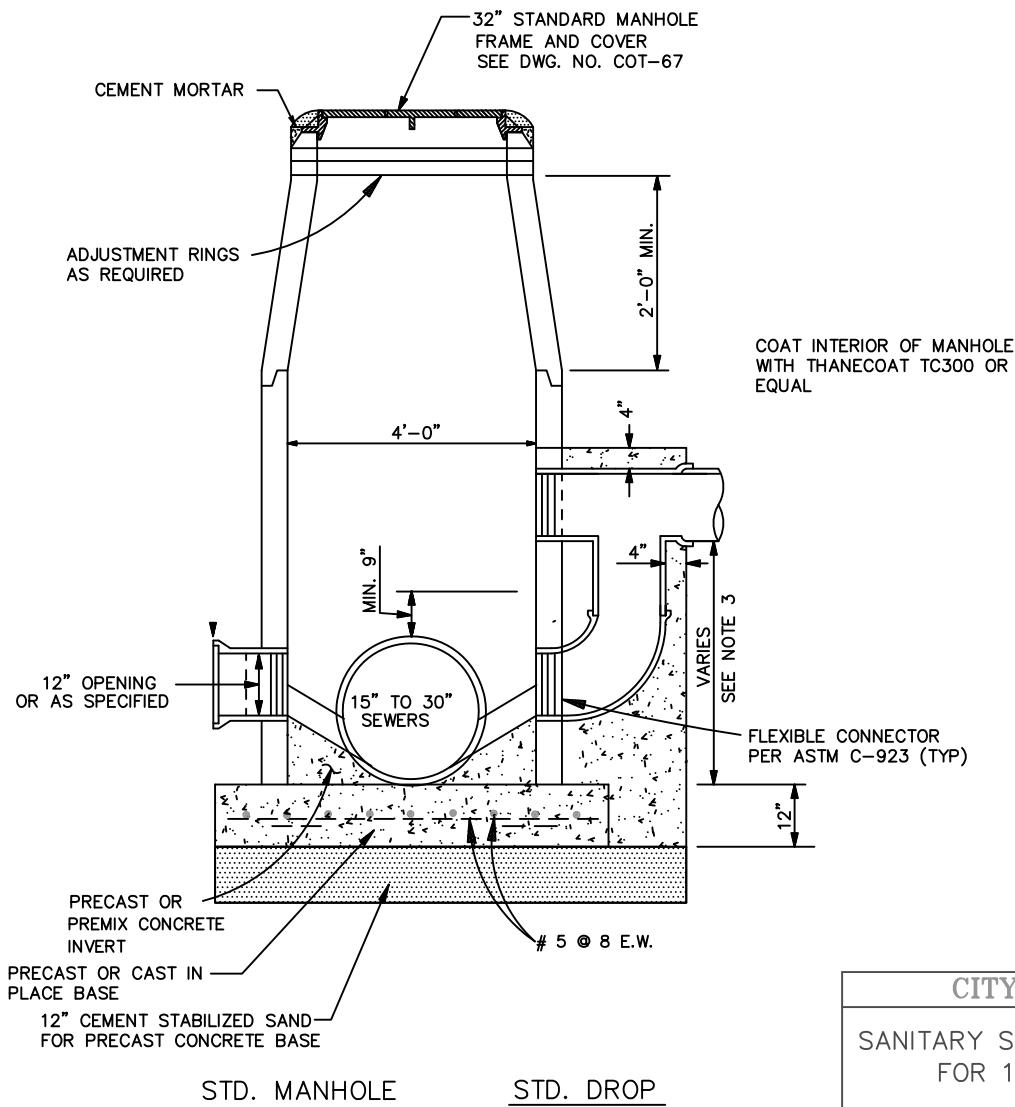
SECTION A-A

CITY OF TOMBALL	
SANITARY SEWER MANHOLE TYPE 4 FOR 6" TO 12" SEWERS (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-81
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



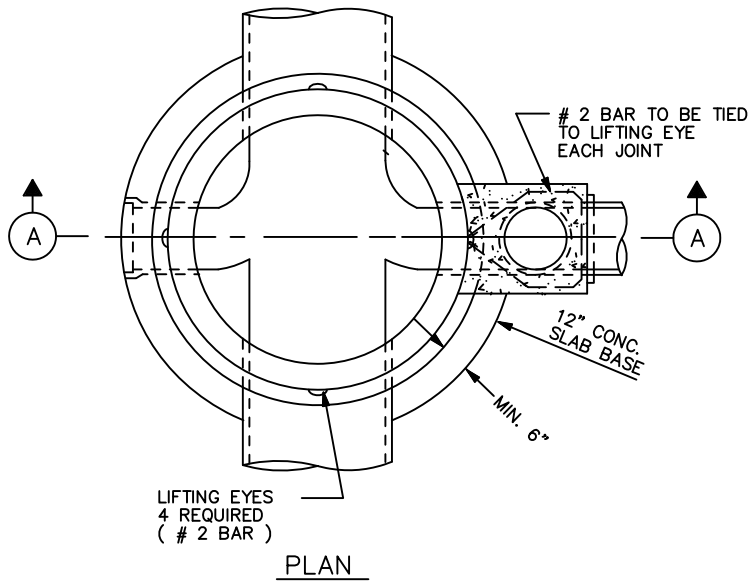
NOTES:

1. LIFTING EYES (# 2 BARS) SHALL BE USED TO TIE STANDARD DROP TO MANHOLE.
2. DEPTH OF MANHOLE DETERMINES SECTIONS REQUIRED.
3. DROP REQUIRED WHERE FLOWLINE ELEVATION DIFFERENCE IS GREATER THAN 2'-0".



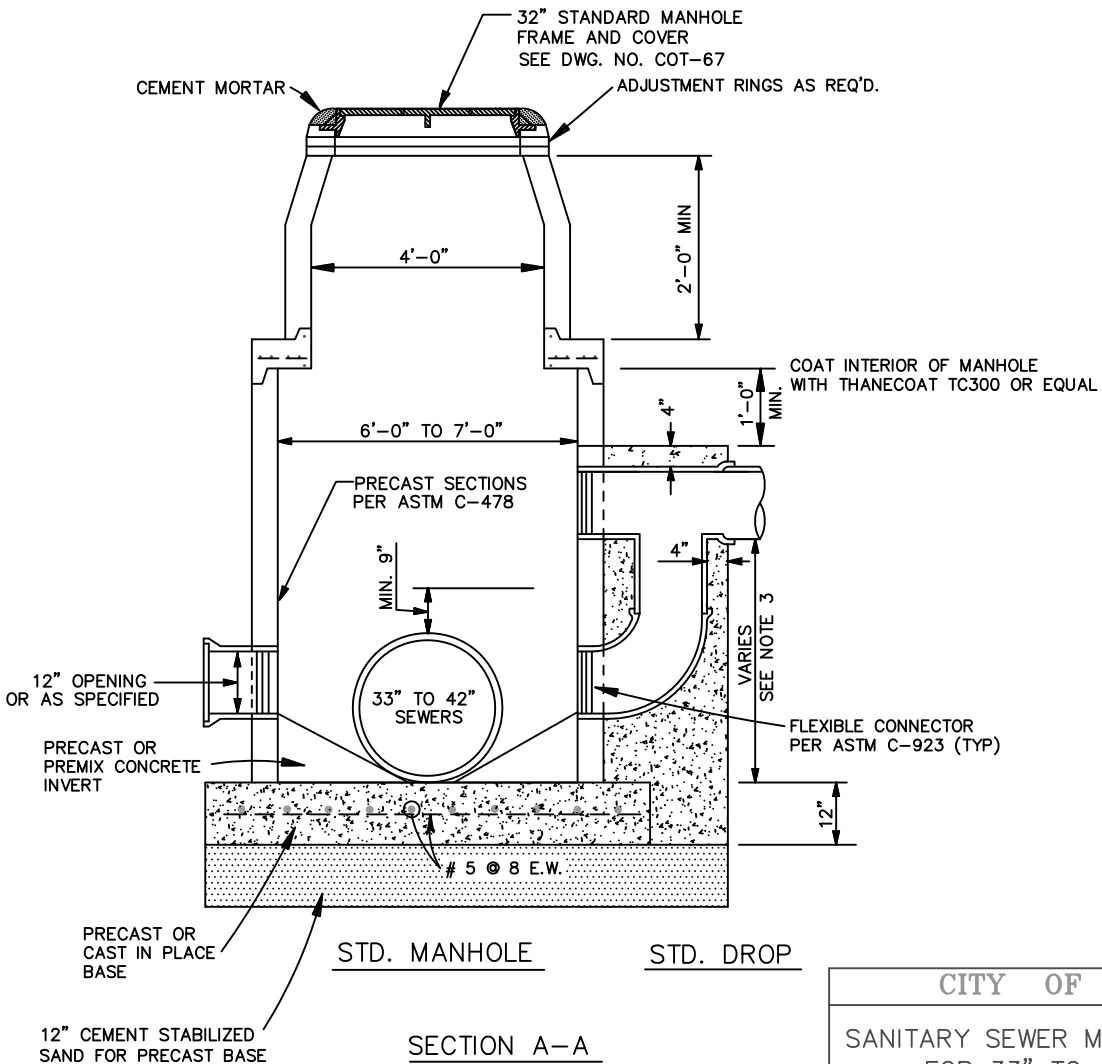
SECTION A-A

CITY OF TOMBALL	
SANITARY SEWER MANHOLE TYPE 5 FOR 15" TO 30" SEWERS (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-82
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



NOTES:

1. LIFTING EYES (# 2 BARS) SHALL BE USED TO TIE STANDARD DROP TO MANHOLE.
2. DEPTH OF MANHOLE DETERMINES SECTIONS REQUIRED.
3. DROP REQUIRED WHERE FLOWLINE ELEVATION DIFFERENCE IS GREATER THAN 2'-0".



CITY OF TOMBALL

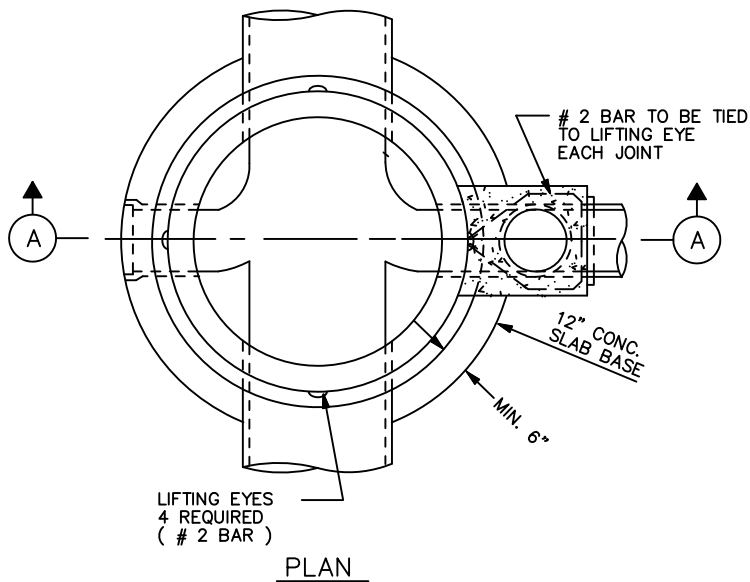
SANITARY SEWER MANHOLE TYPE 6
FOR 33" TO 42" SEWERS
(NOT TO SCALE)

APPROVED BY:

DWG. NO. COT-83

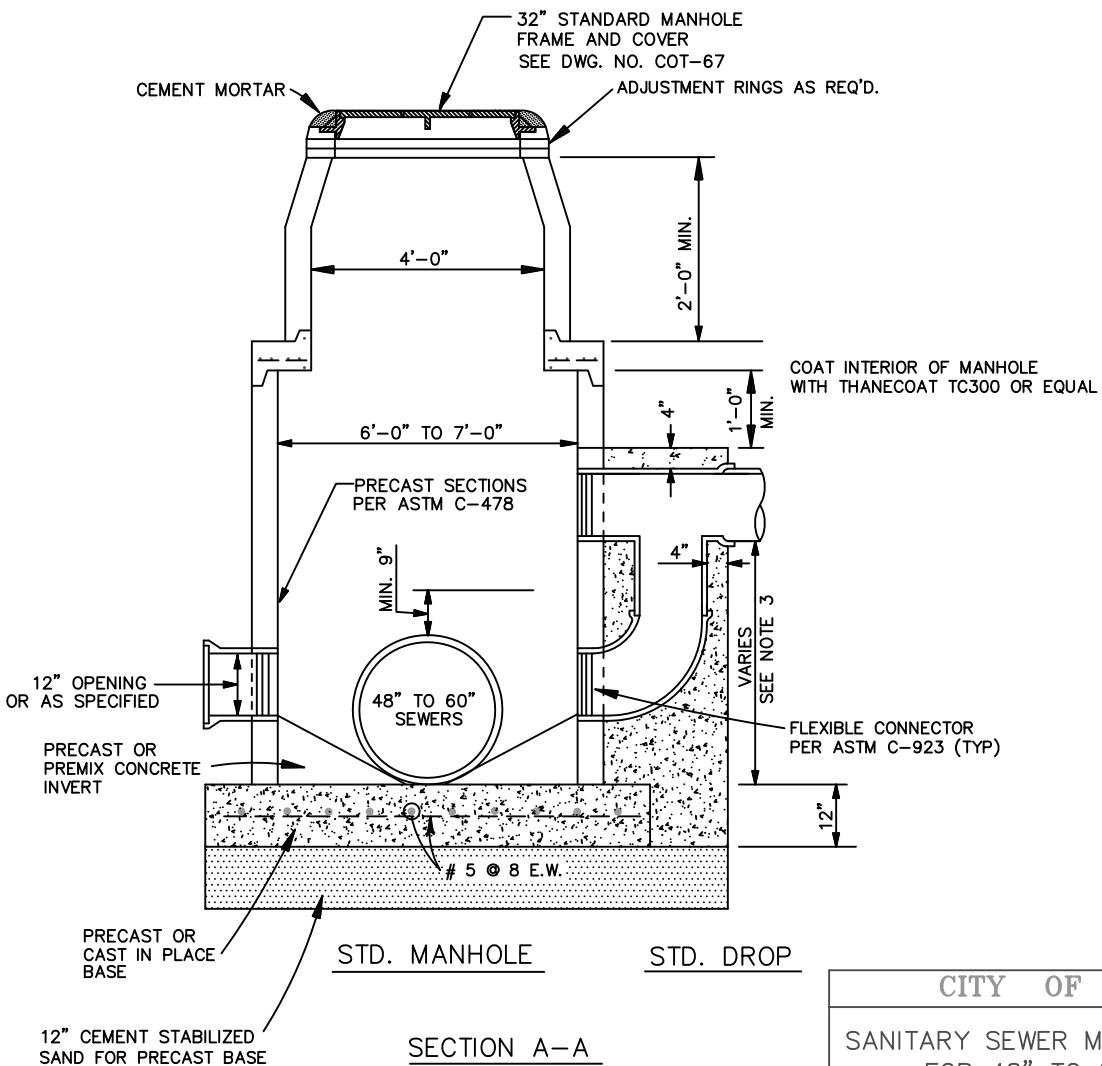
DIRECTOR OF PUBLIC WORKS

EFF. DATE: 07/25/94



NOTES:

1. LIFTING EYES (# 2 BARS) SHALL BE USED TO TIE STANDARD DROP TO MANHOLE.
2. DEPTH OF MANHOLE DETERMINES SECTIONS REQUIRED.
3. DROP REQUIRED WHERE FLOWLINE ELEVATION DIFFERENCE IS GREATER THAN 2'-0".



CITY OF TOMBALL

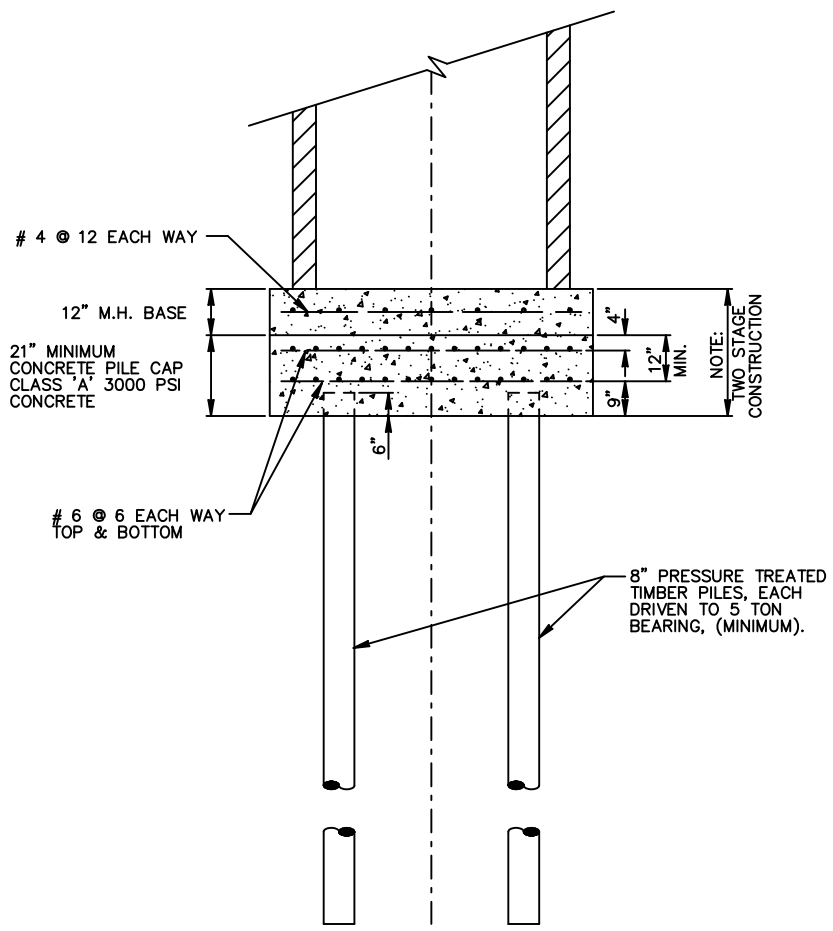
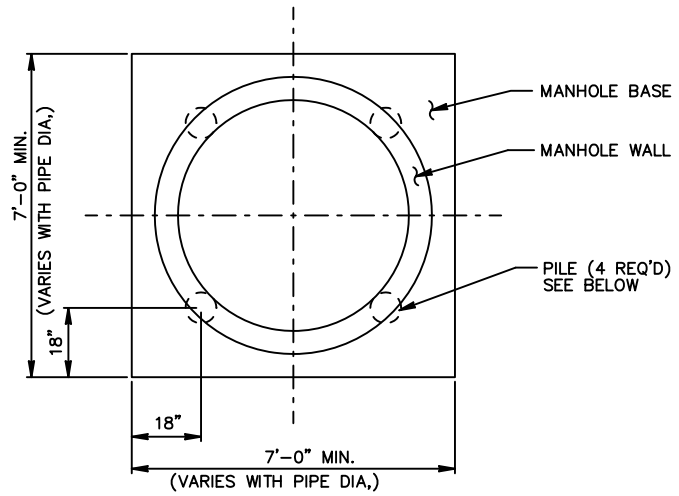
SANITARY SEWER MANHOLE TYPE 7
FOR 48" TO 60" SEWERS
(NOT TO SCALE)

APPROVED BY:

DWG. NO. COT-84

DIRECTOR OF PUBLIC WORKS

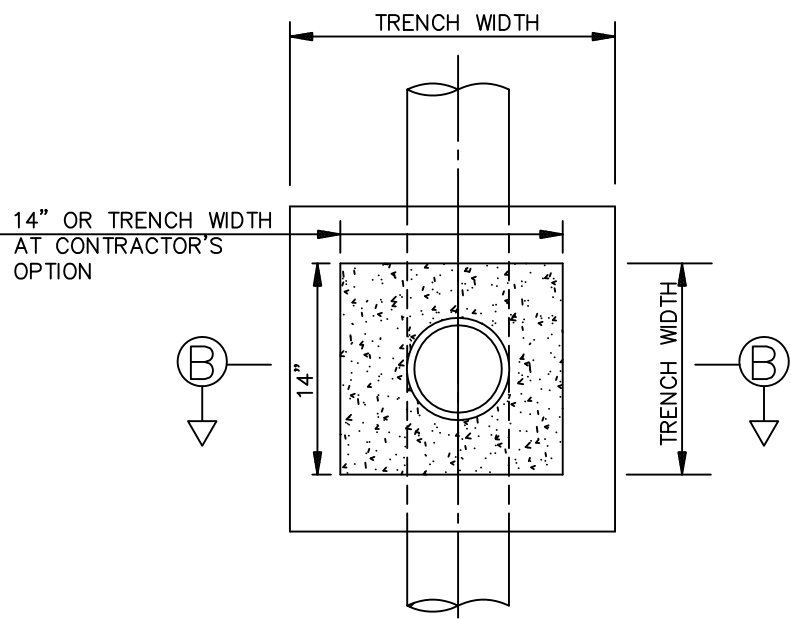
EFF. DATE: 07/25/94



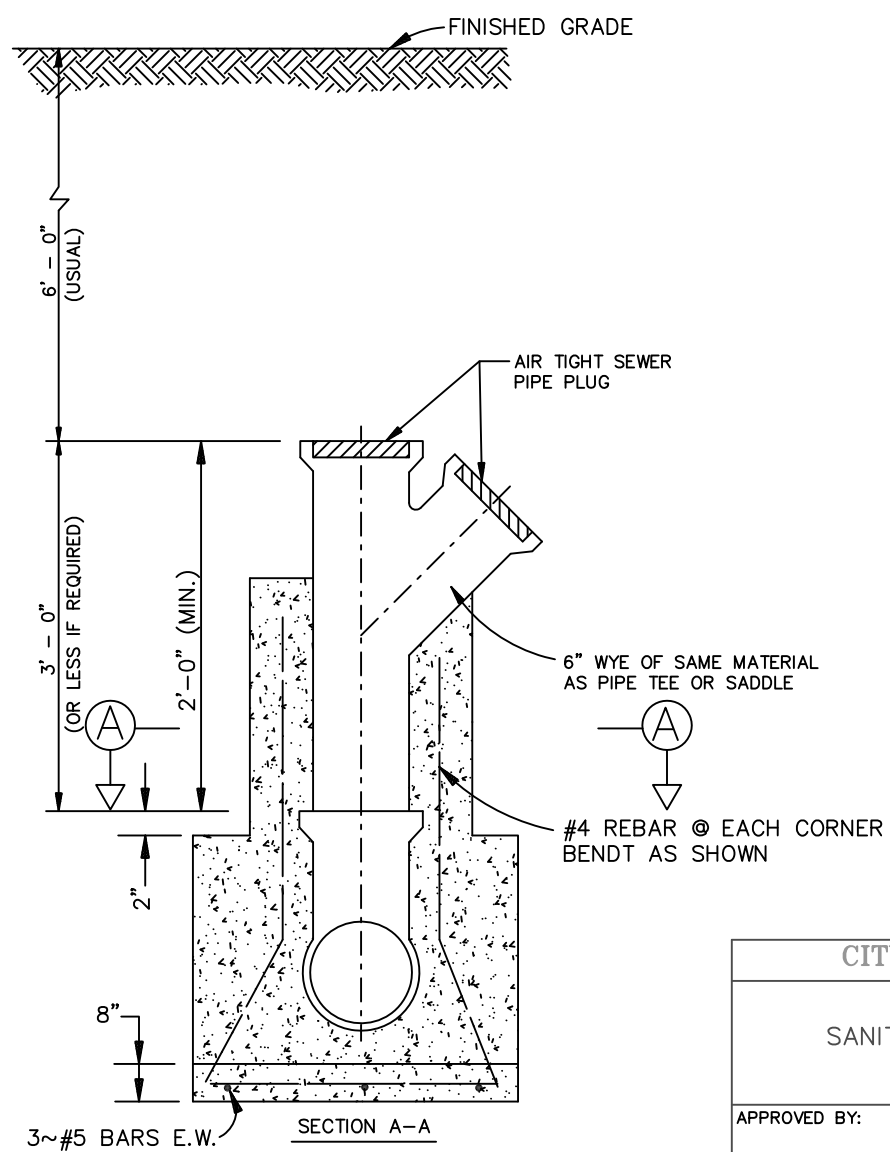
NOTES:

1. PILING SUPPORT SHALL BE INSTALLED ONLY AT LOCATIONS APPROVED BY THE ENGINEER.
2. THE TIMBER PILING & CONCRETE PILE CAP SHALL BE TREATED AS A SEPARATE BID ITEM & 12" M.H. BASE SHALL BE INCLUDED IN THE M.H. INSTALLATION BID ITEM.
3. THE ENGINEER MAY MODIFY CONCRETE PILE CAP SIZE IN FIELD.
4. BOTTOM OF PILE CAP SHALL BE LEVEL & DRY BEFORE CONCRETE PLACEMENT.

CITY OF TOMBALL	
WET SAND MANHOLE BASE DETAIL (TIMBER PILING SUPPORT) (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-85
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



SECTION A-A

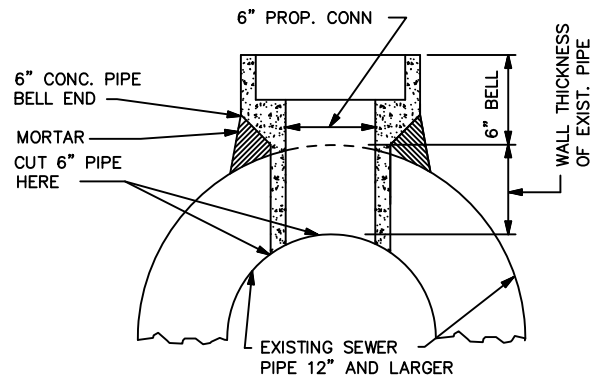
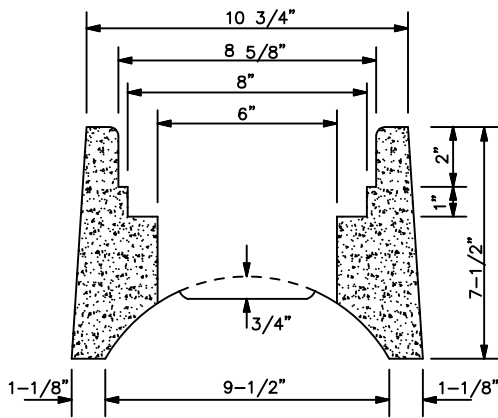
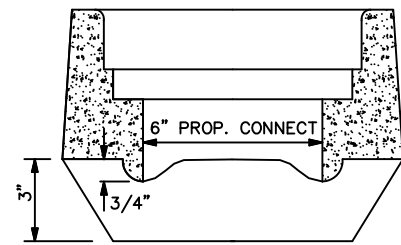
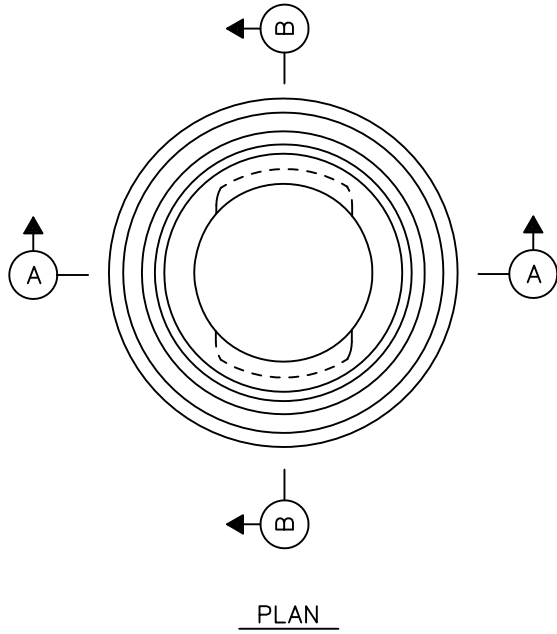


SECTION A-A

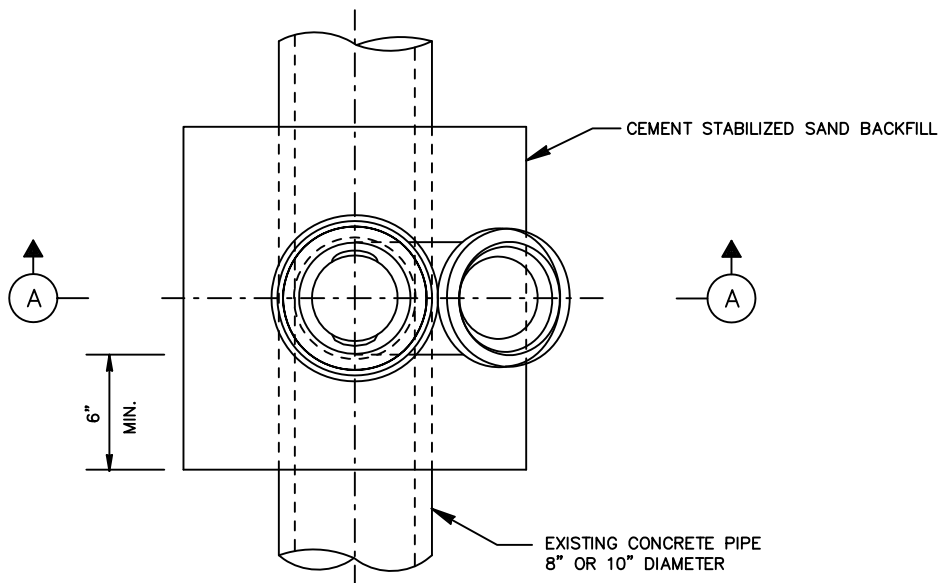
CITY OF TOMBALL	
SANITARY SEWER STACK	
(NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-86
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

NOTES:

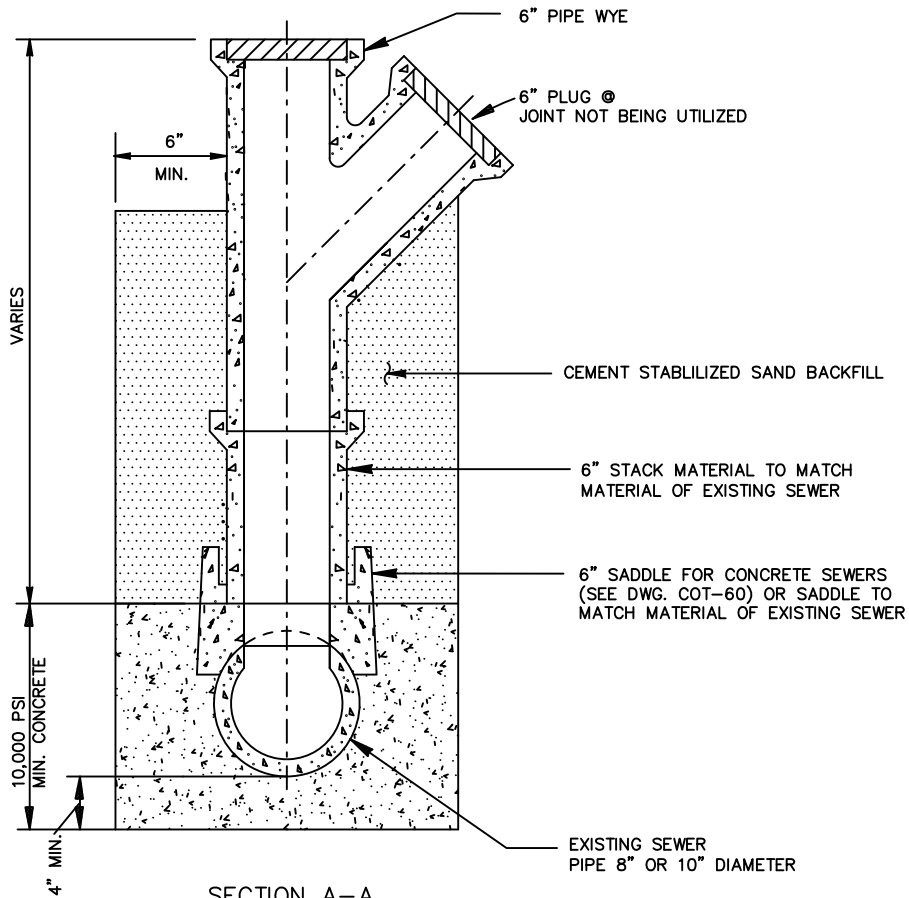
1. 6" CONCRETE SADDLE SHOWN (PLAN, SEC. A-A AND SEC. B-B) SHALL BE RED IN COLOR AND SHALL BE USED IN 6" CONNECTIONS TO EXISTING 8" AND 10" SANITARY SEWERS WHERE NO "Y" OR STACK IS FOUND WITHIN 5 FT. OF GIVEN LOCATION OF EXISTING Y'S OR STACKS.
2. CONNECTIONS TO EXISTING LARGER DIAMETER PIPES, A CUT-OFF PORTION OF 6" BELL END PIPE WILL BE PERMITTED AS PER ALT. SECTION.
3. CONCRETE SADDLE TO BE SET IN MORTAR ON EXISTING PIPE.
4. CEMENTING SADDLES TO EXISTING SEWER SHALL CONFORM TO SPECIFICATIONS.



CITY OF TOMBALL	
6" CONCRETE SADDLE FOR CONNECTION TO EXISTING SANITARY SEWERS (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-87
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



PLAN



SECTION A-A

CITY OF TOMBALL

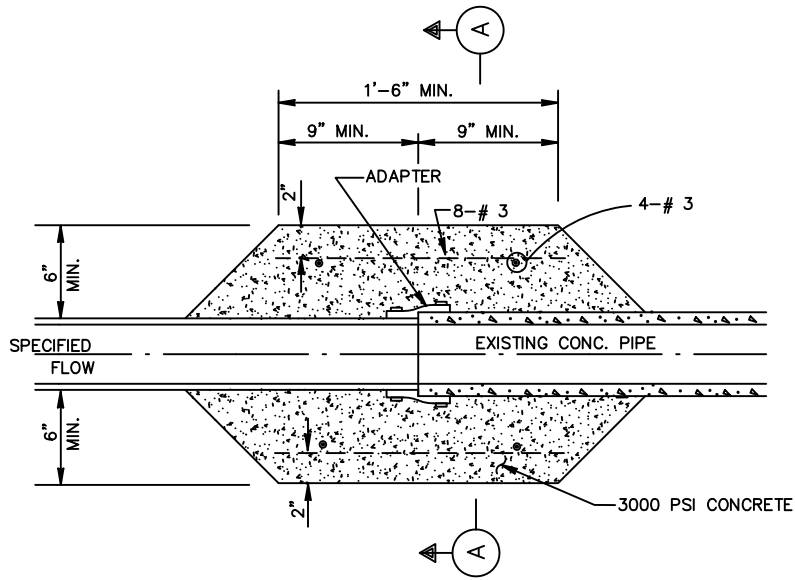
6" STACK & SADDLE FOR
EXISTING SANITARY SEWERS
8" OR 10" DIAMETER
(NOT TO SCALE)

APPROVED BY:

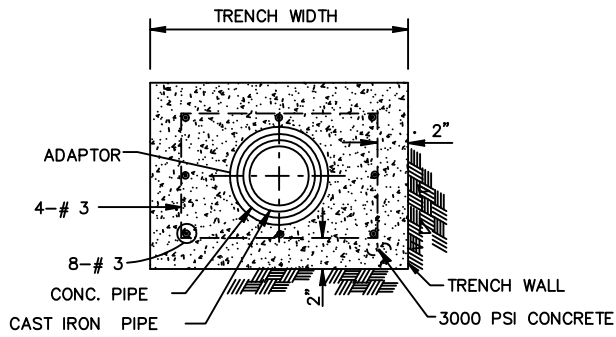
DWG. NO. COT-88

DIRECTOR OF PUBLIC WORKS

EFF. DATE: 07/25/94



LONG SECTION

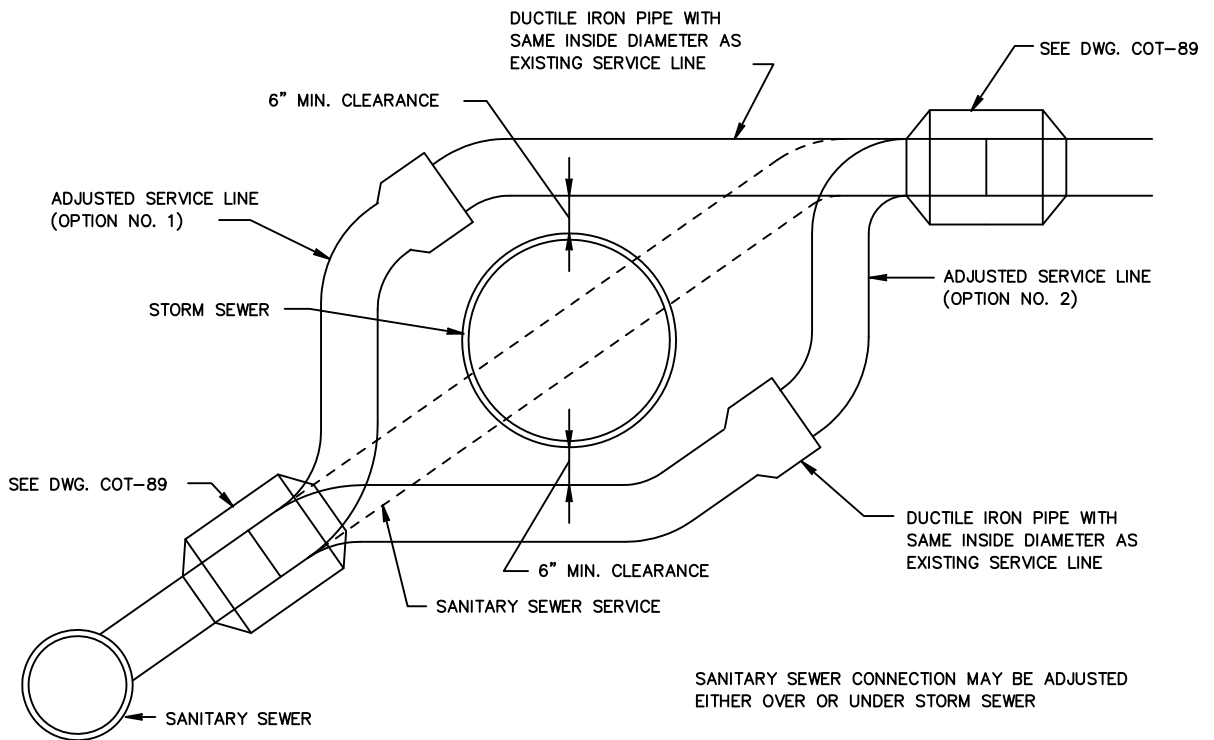


CROSS-SECTION A-A

NOTE:

REINFORCING BARS TO BE USED
ONLY ON WET SAND CONSTRUCTION.

CITY OF TOMBALL	
CONCRETE PIPE TO FLEXIBLE PIPE CONNECTION (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-89
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



CITY OF TOMBALL

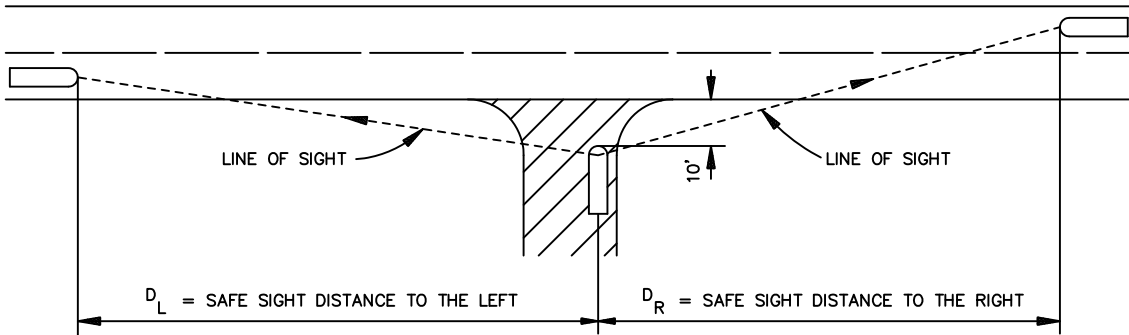
SANITARY SEWER
SERVICE LINE ADJUSTMENT
FOR STORM SEWER CONFLICTS
(NOT TO SCALE)

APPROVED BY:	DWG. NO. COT-90
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

FIGURE 9-6

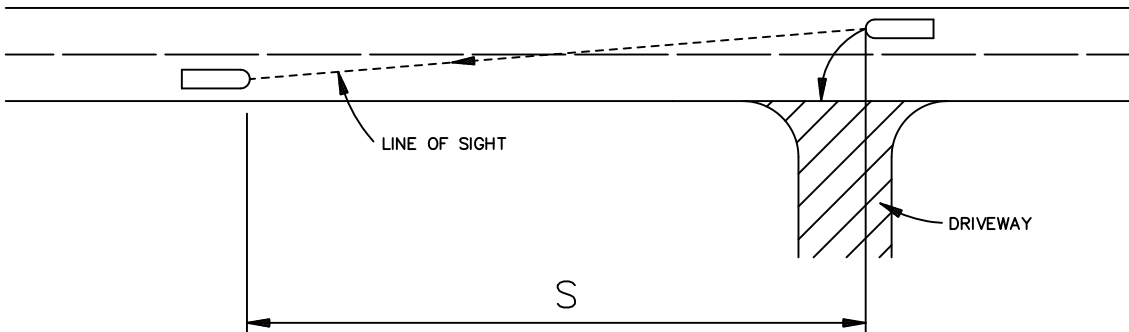
SIGHT DISTANCES AT ENTRANCES

	D = DISTANCE ALONG MAJOR ROAD FROM DRIVEWAY TO ALLOW VEHICLE TO ENTER SAFELY. FEET ₁															
	30 MPH				40 MPH				50 MPH				60MPH			
	2 LANE		4 OR 6 LANE		2 LANE		4 OR 6 LANE		2 LANE		4 OR 6 LANE		2 LANE		4 OR 6 LANE	
	D _L	D _R	D _L	D _R	D _L	D _R	D _L	D _R	D _L	D _R	D _L	D _R	D _L	D _R	D _L	D _R
PASSENGER CARS	350	250	220	260	530	440	360	440	740	700	620	700	950	1050	950	1050
TRUCKS	500	400	400	400	850	850	850	850	1600	1600	1600	1600	2500	2500	2500	2500



LEFT TURN SIGHT DISTANCES AT ENTRANCES

	S = DISTANCE ALONG MAJOR ROUTE VEHICLE TO SAFELY TURN LEFT ONTO DRIVEWAY. FEET ₁											
	30 MPH			40 MPH			50 MPH			60MPH		
	2 LANE	4 LANE	6 LANE	2 LANE	4 LANE	6 LANE	2 LANE	4 LANE	6 LANE	2 LANE	4 LANE	6 LANE
PASSENGER CARS	230	250	270	380	390	420	520	550	580	700	740	780
TRUCKS	400	440	480	570	620	670	810	800	850	1000	1100	1200



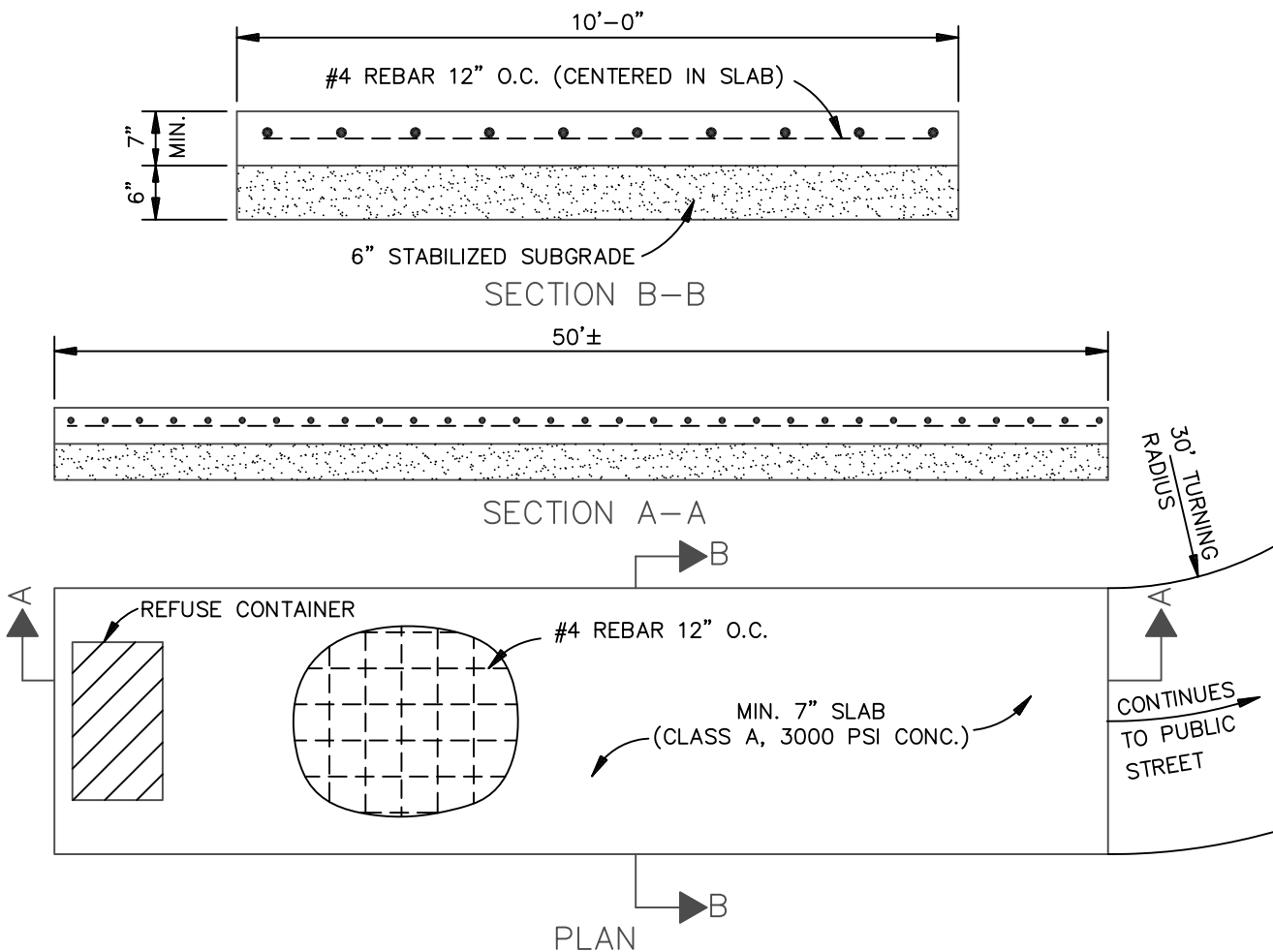
CITY OF TOMBALL	
SIGHT DISTANCES FOR DRIVEWAY DESIGN (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-9-6
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

FIGURE 9-7

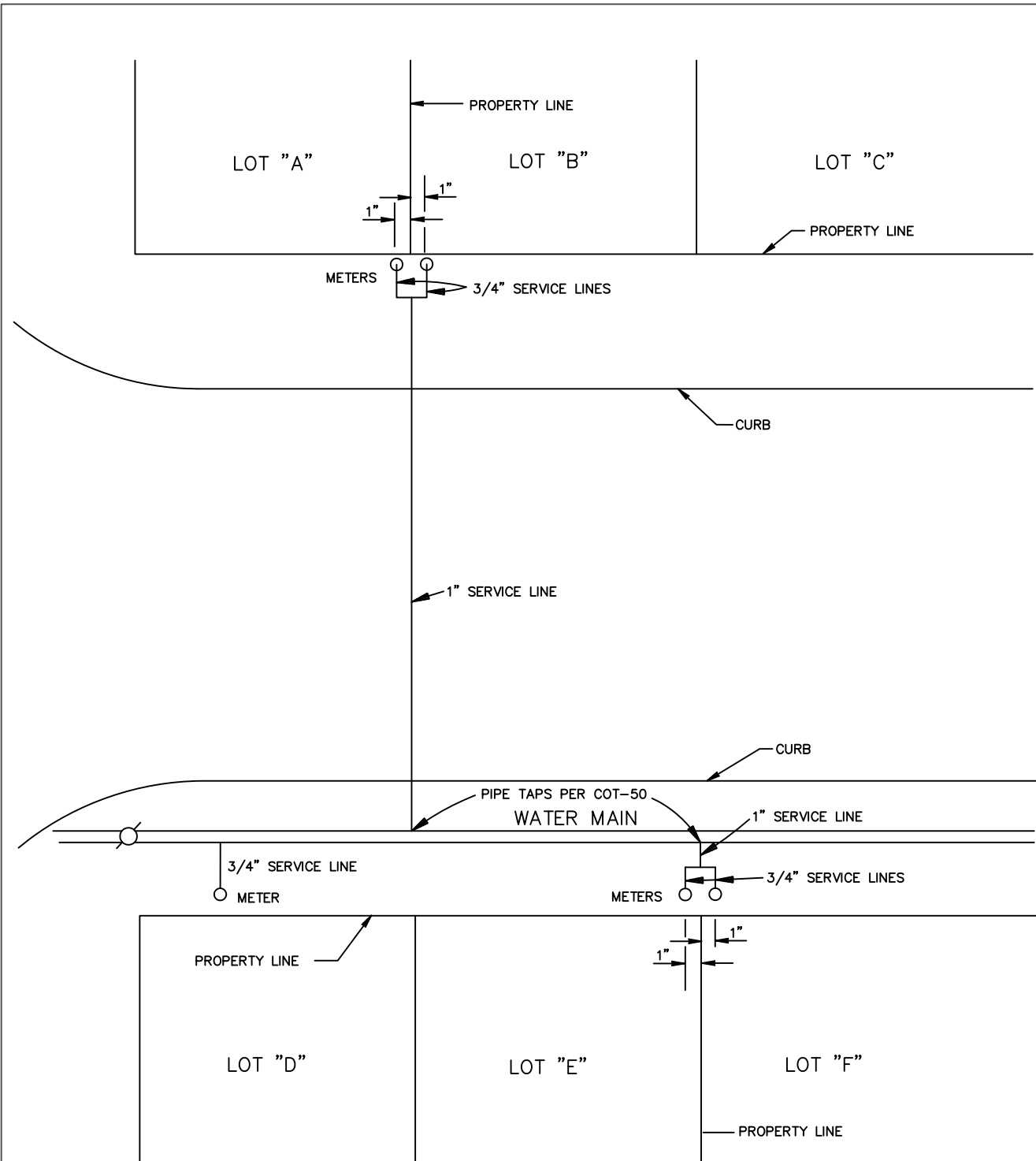
REQUIREMENTS FOR CONTAINER LOCATION & PADS

STOW PAD AND LOCATION FOR DUMPSTER CONTAINERS ON ALL PLANS FOR BUSINESSES, COMMERCIAL BUILDINGS, SERVICE STATIONS, APT'S, ETC...

1. OVERHEAD CLEARANCE OF 20 FEET REQUIRED.
a. NO OVERHEAD ELECTRICAL WIRES, OVERHANGS OR EAVES.
2. A MINIMUM 50 FOOT STRAIGHT APPROACH TO THE CONTAINER SHALL BE PROVIDED.
3. MINIMUM 3 FEET CLEAR SPACE EACH SIDE OF CONTAINER.
4. ADEQUATE TURN AROUND OR BACKING AREA SHALL BE OFF STREET R.O.W.
5. CONTAINER PAD AND CONTAINER CAN NOT BLOCK ROAD, STREET R.O.W., DRAINAGE DITCHES, TRAFFIC OR SIGHT TRIANGLE.
6. AREAS IN FRONT OF CONTAINER SHALL BE MARKED AS "NO PARKING ZONE" OR "TOW AWAY ZONE".
7. THE COLLECTION VEHICLE WEIGHS 64,000 LBS. THE DRIVEWAYS SHOULD BE CONSTRUCTED WITH THIS LOAD IN MIND. THE CITY IS NOT RESPONSIBLE FOR DAMAGE TO PRIVATE PARKING LOTS OR DRIVEWAYS.
8. DUMPSTER SHOULD BE LOCATED AT THE REAR OF THE BUILDING.



CITY OF TOMBALL		
REFUSE CONTAINER PADS		
(NOT TO SCALE)		
APPROVED BY:	DWG. NO.	COT-9-7
DIRECTOR OF PUBLIC WORKS	EFF. DATE:	07/25/94

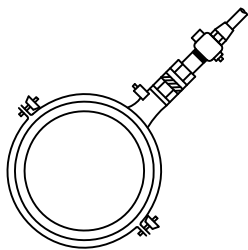


CITY OF TOMBALL	
TYPICAL 3/4" AND 1" SERVICE ARRANGEMENTS (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-100
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94

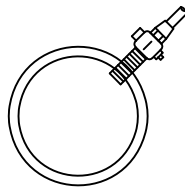
PIPE TAPPING SCHEDULE

PIPE DIAMETER	SERVICE SIZE			
	3/4"	1"	1-1/2"	2"
2" BOSS	TAPERED THREAD TAP	—————	—————	—————
2" THIN WALL	COMBINATION SADDLESTOP	—————	—————	—————
4" CAST IRON	TAPERED THREAD TAP	TAPERED THREAD TAP	—————	—————
4" ASBESTOS CEMENT	LICS	DSS	—————	—————
6" & 8" CAST IRON	TAPERED THREAD TAP	TAPERED THREAD TAP	TAPERED THREAD TAP	—————
6" & 8" ASBEST. CEMENT	LICS	LICS	DSS	—————
12" & UP CAST IRON	TAPERED THREAD TAP	TAPERED THREAD TAP	TAPERED THREAD TAP	TAPERED THREAD TAP
12" @ UP ASBEST. CEMENT	LICS	LICS	DSS	DSS
2" THRU 8" PVC	2PS	2PS	2PS	2PS
10" & 12" PVC	3PS	3PS	DSS	DSS

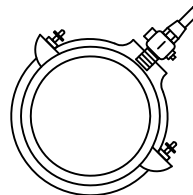
LICS - LOCKING INSERT CORPORATION STOP (HAYS 4200 STYLES)
 DSS - DUAL STRAP SADDLES
 2PS - TWO PIECE SADDLE
 3PS - THREE PIECE SADDLE



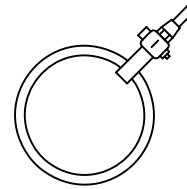
CAST IRON
2" THIN WALL



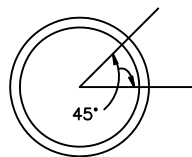
CAST IRON
4" AND LARGER



ASBESTOS CEMENT
DUAL STRAP SADDLE

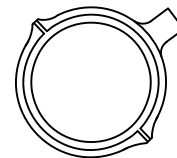


ASBESTOS CEMENT
LOCKING INSERT



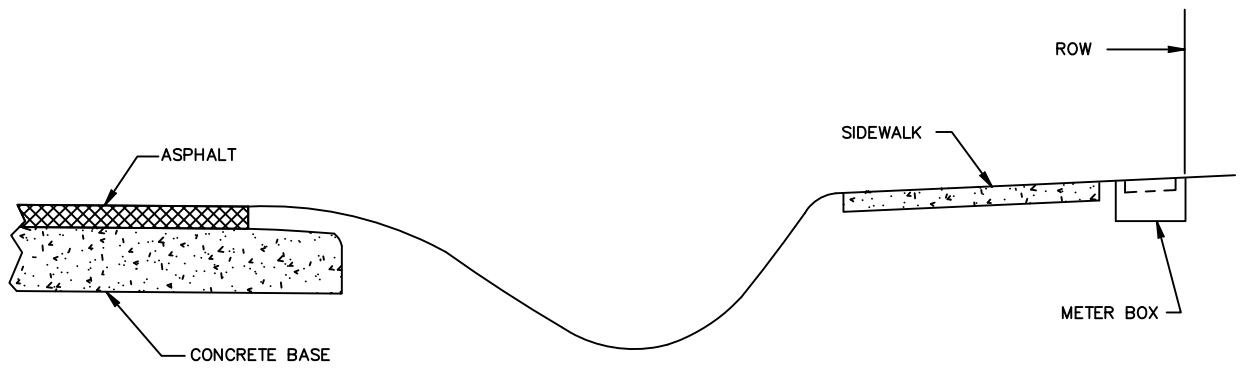
SERVICE TAPS TO BE
MADE IN THIS ZONE

BLOW-OFF & CHLORINATION
TAPS ARE MADE IN VERTICAL
POSITION

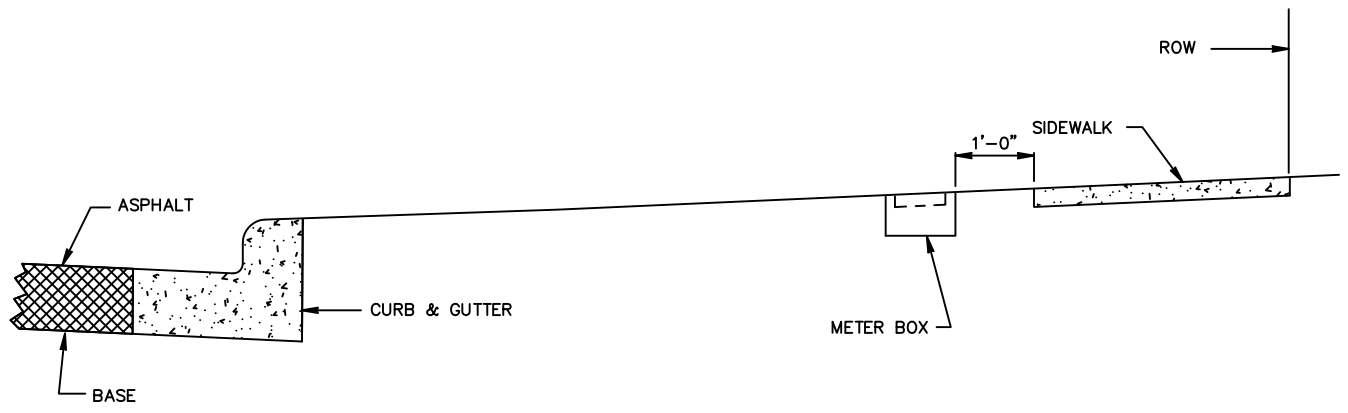


PVC SADDLE

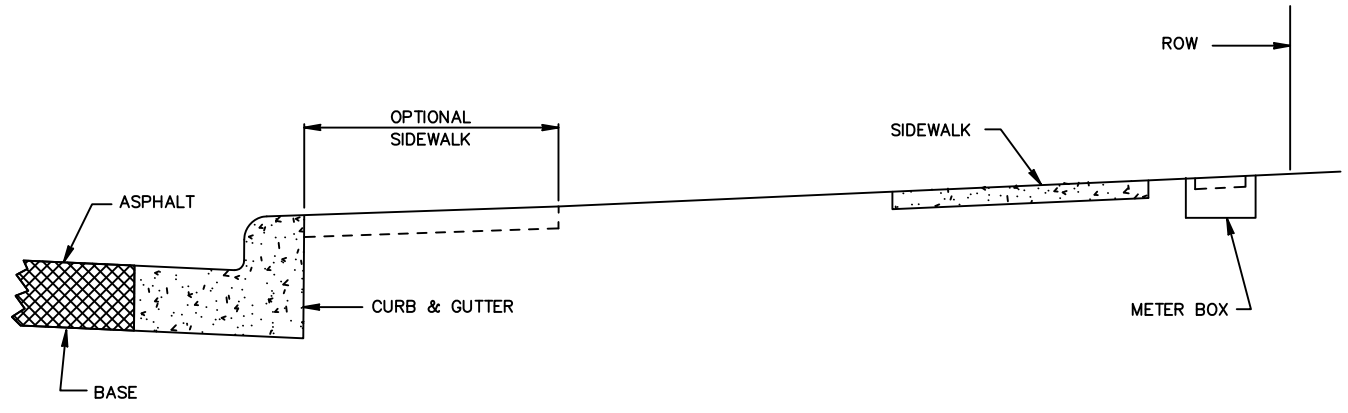
CITY OF TOMBALL	
SERVICE TAPS	
(NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-101
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



OPEN DITCH STREET

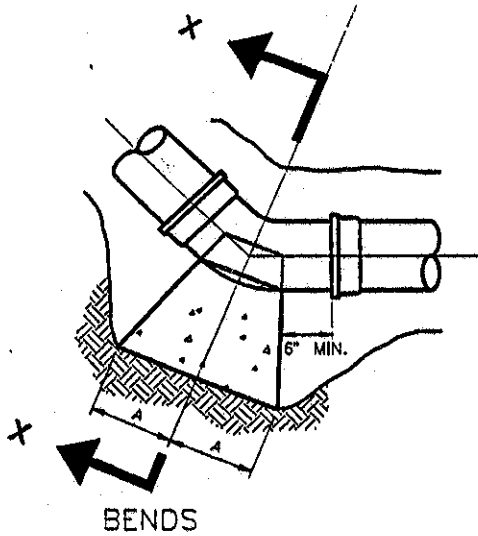


CURB STREET

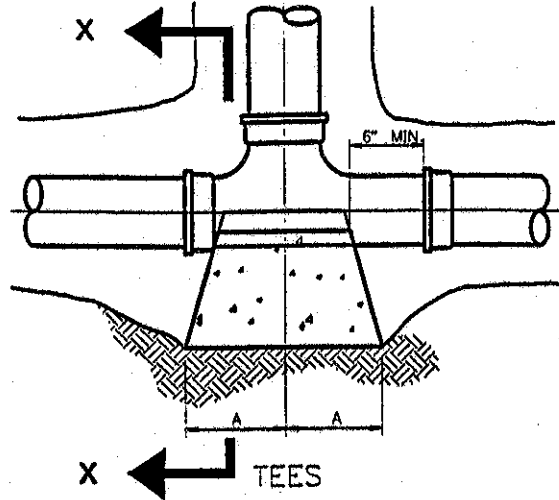


CURB STREET

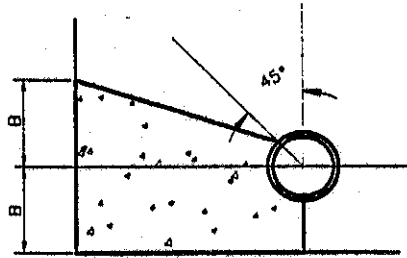
CITY OF TOMBALL	
LOCATION OF WATER METER BOX FOR 2" DIAMETER AND LESS (NOT TO SCALE)	
APPROVED BY:	DWG. NO. COT-102
DIRECTOR OF PUBLIC WORKS	EFF. DATE: 07/25/94



BENDS

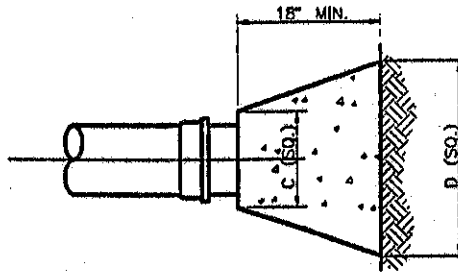


TEES



24" MIN. 12" AND LARGER PIPE.
16" MIN. 10" AND SMALLER PIPE.

SECTION X-X



PLUGS

SOIL TYPE	PIPE SIZE	90° BENDS		45° BENDS		22.5° BENDS		TEES		PLUGS	
		A	B	A	B	A	B	A	B	C	D
TYPE I 4000 PSF SOIL	6"	8"	10"	6"	8"	3"	8"	8"	8"	10"	15"
	8"	12"	12"	8"	10"	5"	9"	9"	12"	12"	20"
	10"	16"	14"	10"	12"	6"	10"	11"	14"	14"	25"
	12"	19"	16"	12"	14"	8"	11"	14"	16"	16"	30"
	14"	23"	18"	14"	16"	10"	12"	16"	18"	18"	34"
	16"	26"	20"	16"	18"	11"	13"	18"	20"	20"	38"
TYPE II 2000 PSF SOIL	6"	16"	10"	9"	10"	6"	8"	10"	12"	10"	21"
	8"	22"	13"	12"	13"	8"	10"	13"	16"	12"	29"
	10"	26"	17"	14"	17"	10"	13"	16"	20"	14"	36"
	12"	29"	21"	16"	21"	11"	16"	18"	24"	16"	41"
	14"	35"	24"	19"	24"	12"	20"	22"	27"	18"	48"
	16"	38"	27"	21"	27"	12"	24"	24"	30"	20"	54"

NOTE: BASED ON 100 P.S.I. STATIC PRESSURE PLUS A.W.W.A. HAMMER.
ALL BEARING SURFACES TO BE CARRIED TO UNDISTURBED GROUND.

CITY OF TOMBALL

THRUST BLOCK DETAIL

(Not to Scale)

APPROVED BY:	EFF DATE: JAN-31-95
DIRECTOR OF PUB. WORKS	DWG NO: COT-105

Ball

2" Gate Valve with Threaded Plug

City of Tomball approved Water Meter Box w/Cover

2" Galvanized Pipe

12"x2" Tapped Plug AWWA C 153

ELSON CLAMP

3/4" STAINLESS STEEL ALL THREAD TIE ROD

CITY OF TOMBALL

BLOW OFF DETAIL

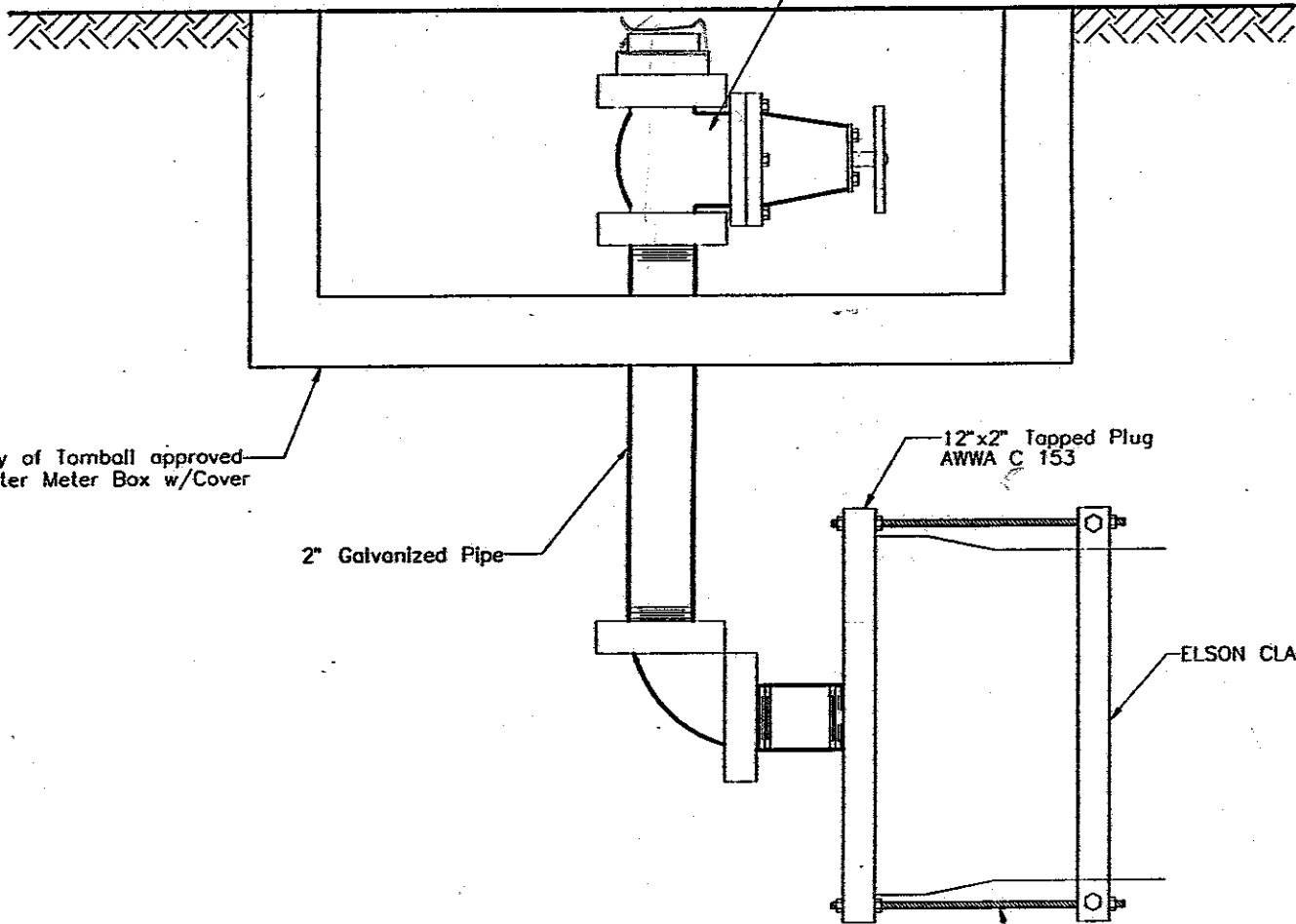
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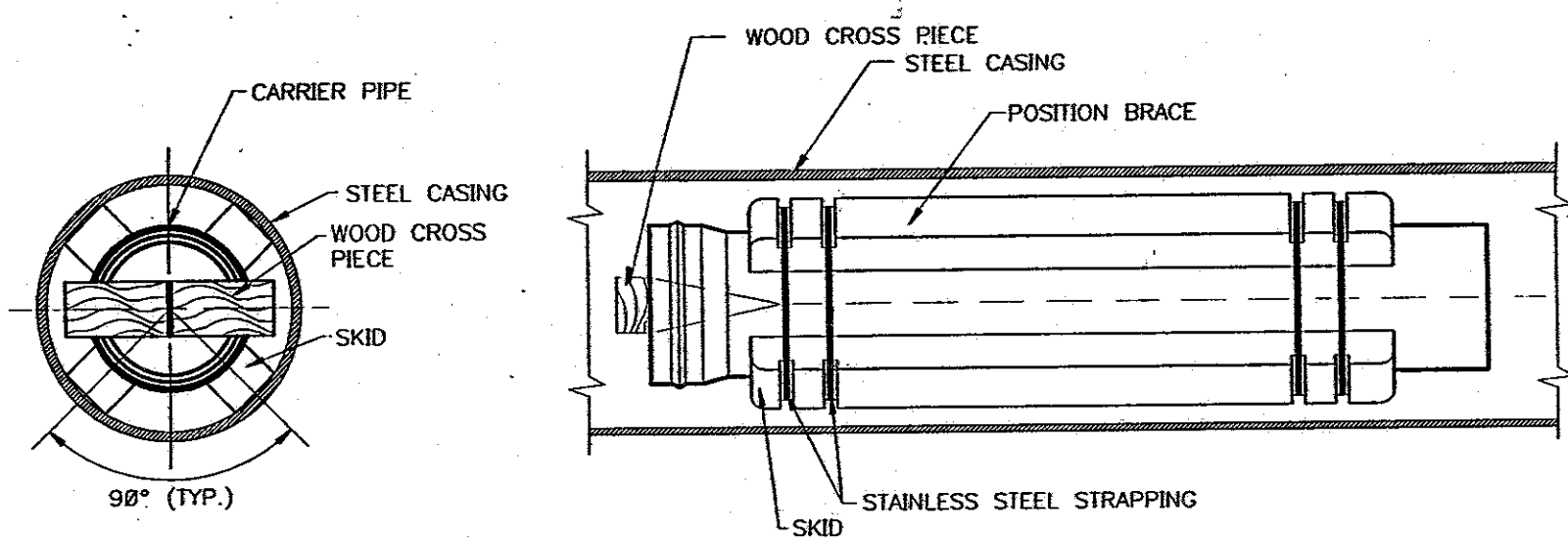
APPROVED BY:

EFF DATE: JAN 31 95

DIRECTOR OF PUBLIC WORKS

DWG NO: COT-106





SKIDS AND POSITION BRACES TO BE CONSTRUCTED OF TREATED WOOD, ALL LEADING EDGES TO BE ROUNDED.

SKIDS AND POSITION BRACES MAY EXTEND FOR THE FULL LENGTH OF THE PIPE, WITH THE EXCEPTION OF BELL AND SPIGOT, OR MAY BE SPACED AT 4.5' ON CENTER WITH EACH SKID AND POSITION BRACE A MINIMUM OF 12" IN LENGTH.

USE FLAX SOAP OR DRILLING MUD AS LUBRICANT. DO NOT USE PETROLEUM PRODUCTS. (i.e. OIL OR GREASE)

SKID AND POSITION BRACE HEIGHT SHOULD BE EQUAL DIMENSION AS TO CENTER THE CARRIER PIPE IN STEEL CASING.

SEAL EACH END OF CASING WITH THE USE OF LINK SEAL.

CARRIER PIPE SIZE (IN.)	CASING PIPE SIZE (IN.)
4	10
6	12
8	16
10	18
12	20
15	24

CITY OF TOMBALL

STEEL CASING DETAIL

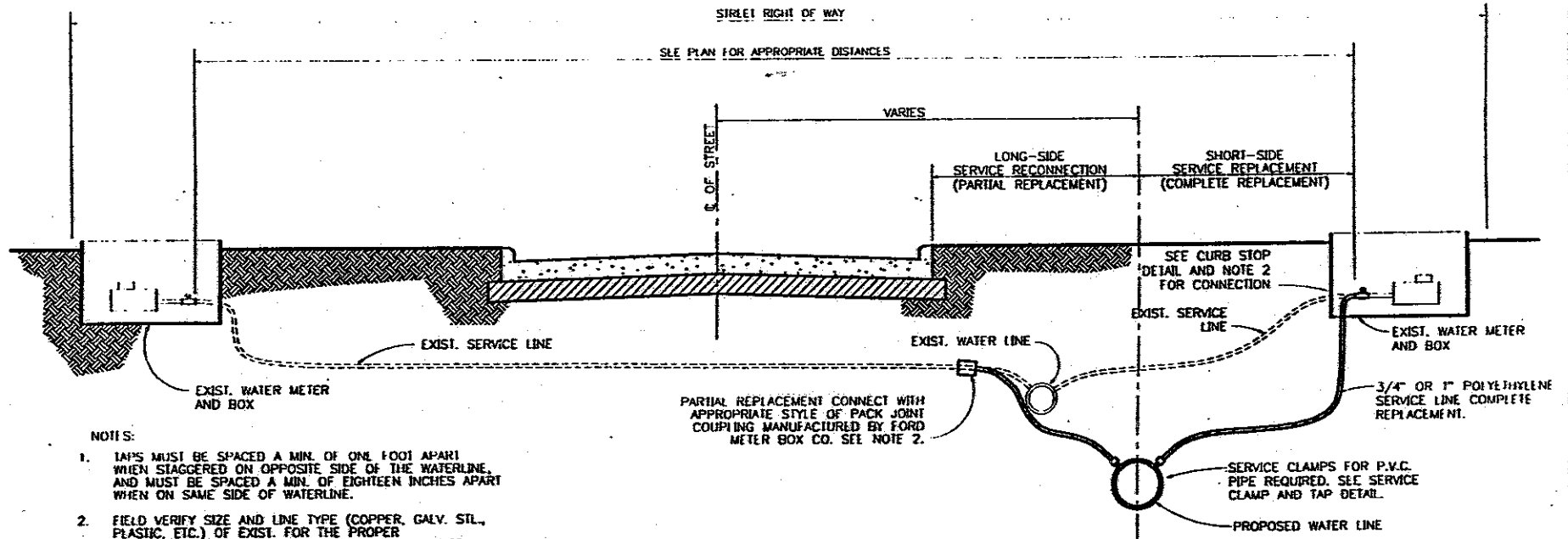
(Not to Scale)

APPROVED BY:

DATE: JAN 31 95

DIRECTOR OF PUBLIC WORKS

DWG NO. COT-107



NOTES:

1. TAPS MUST BE SPACED A MIN. OF ONE FOOT APART WHEN STAGGERED ON OPPOSITE SIDE OF THE WATERLINE, AND MUST BE SPACED A MIN. OF EIGHTEEN INCHES APART WHEN ON SAME SIDE OF WATERLINE.
2. FIELD VERIFY SIZE AND LINE TYPE (COPPER, GALV. STL., PLASTIC, ETC.) OF EXIST. FOR THE PROPER CONNECTION TO CURB STOPS AND FOR APPROPRIATE PACK JOINT COUPLING IF APPLICABLE.
3. INSTALL ALL SERVICE LINE RECONNECTS OR NEW SERVICE PERPENDICULAR TO PROPOSED MAINLINE.
4. FOR 1.5" - 2" SERVICE, USE MUELLER INSTA-TITE CONNECTORS.

PARTIAL REPLACEMENT CONNECT WITH APPROPRIATE STYLE OF PACK JOINT COUPLING MANUFACTURED BY FORD METER BOX CO. SEE NOTE 2.

CITY OF TOMBALL

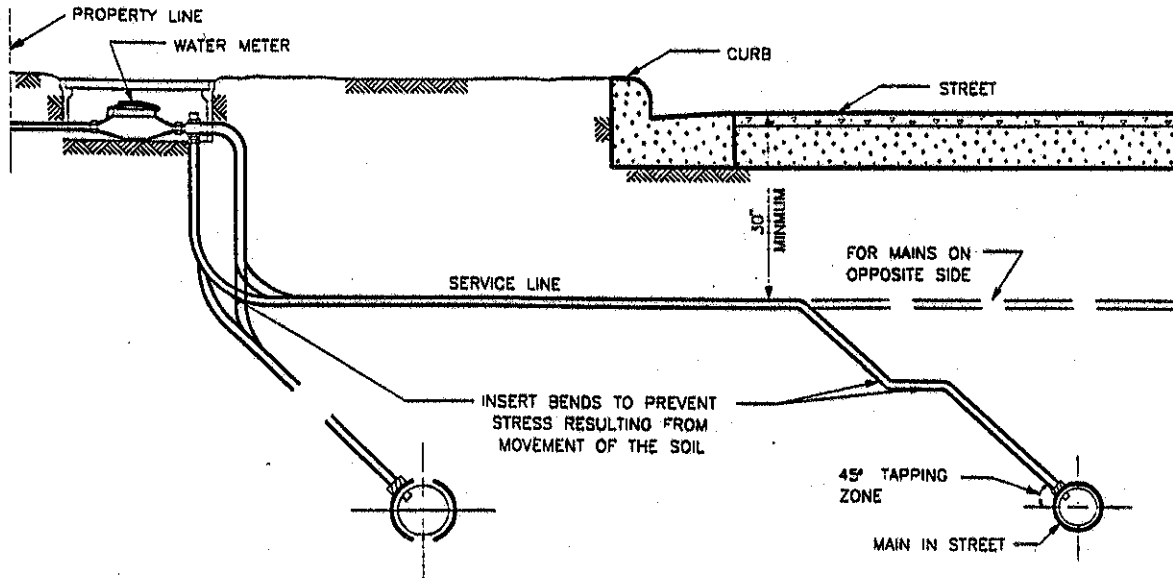
WATER RECONNECTION DETAIL

(Not to Scale)

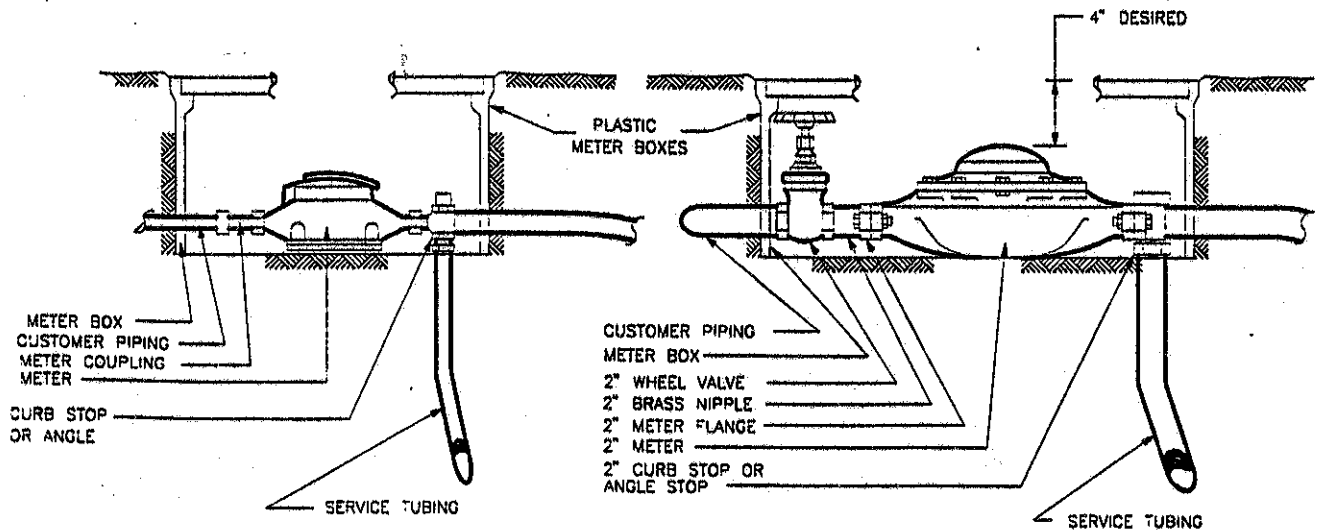
APPROVED BY: _____	EFF DATE: JAN 31 95
DIRECTOR OF PUBLIC WORKS	DWG NO: COT-108

NOTE:

1/2" METER SET IS SAME AS 2" EXCEPT WHEEL VALVE IS NOT REQUIRED.



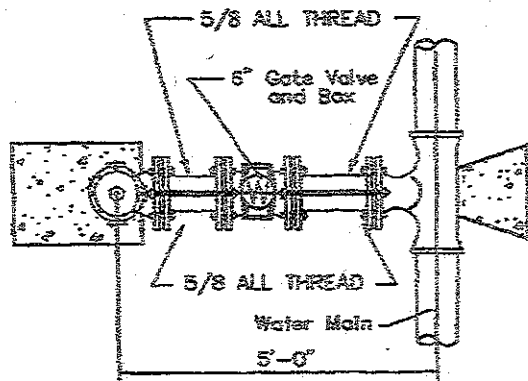
TYPICAL SECTION SERVICE LINE



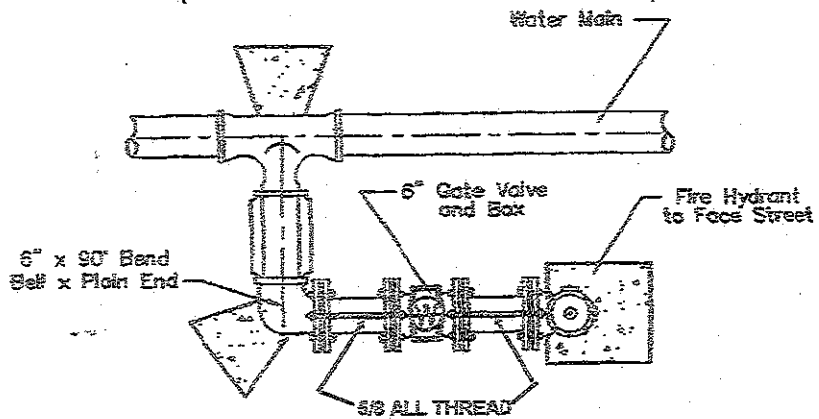
3/4" X 5/8" AND 1" METER SET

2" METER SET

CITY OF TOMBALL	
TYPICAL METER SETTINGS	
(NOT TO SCALE)	
APPROVED BY:	EFF DATE: JAN-31-95
DIRECTOR OF PUBLIC WORKS	DWG NO: COT-109



PLAN



ALTERNATE PLAN

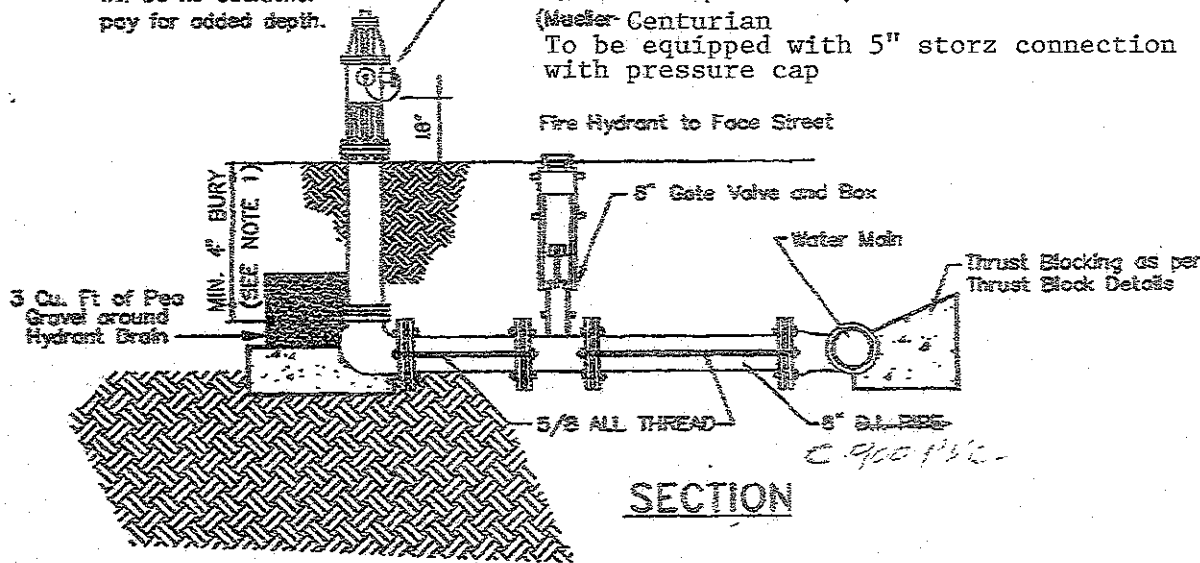
NOTE:

Depth may vary, but there will be no additional pay for added depth.

Furnish Fire Hydrant w/ Slip-On Joint Inlet. Hose & Pumper Nozzle Threads to conform to the City of Tomball Fire Department Requirements.

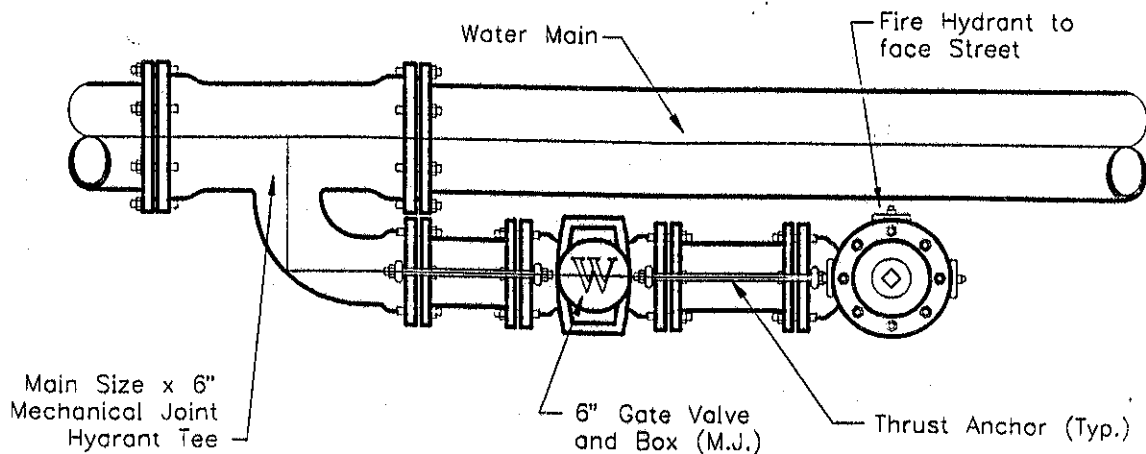
(Wuerl Centurian To be equipped with 5" storz connection with pressure cap

Note: 5/8 all thread between tee valve & valve & valve & fire hydrant

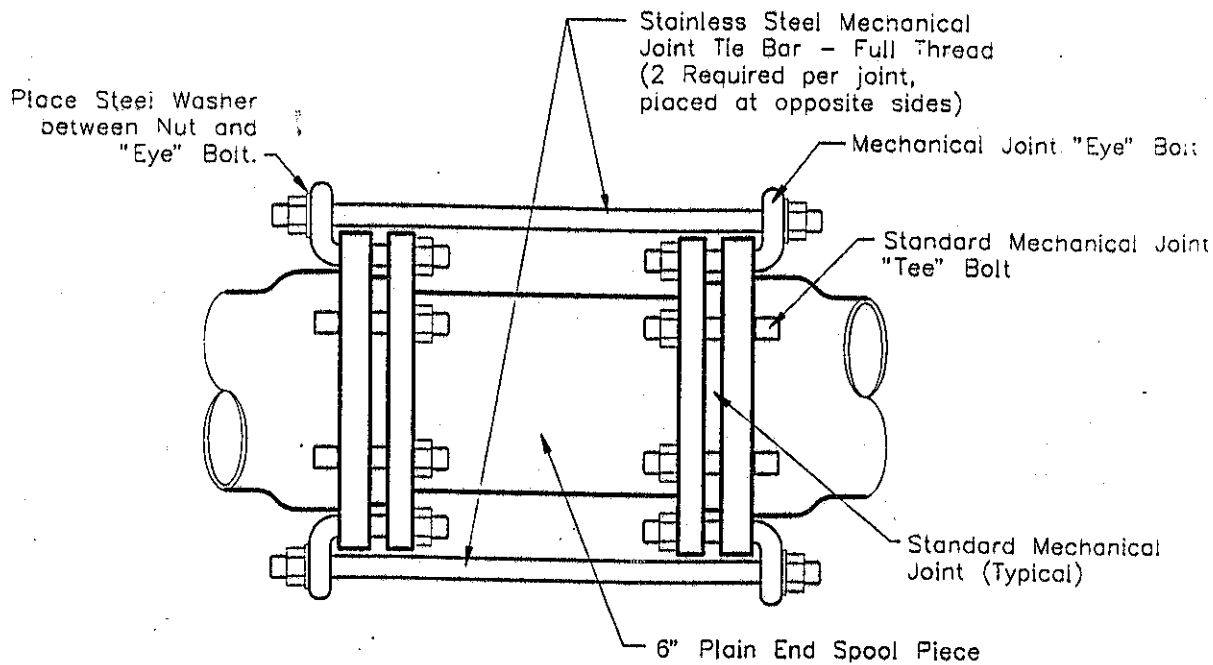


SECTION

CITY OF TOMBALL	
FIRE HYDRANT DETAIL	
(NOT TO SCALE)	
APPROVED BY:	DWG NO: COT 116
DIRECTOR OF PUBLIC	EFF DATE: FEB-20-97

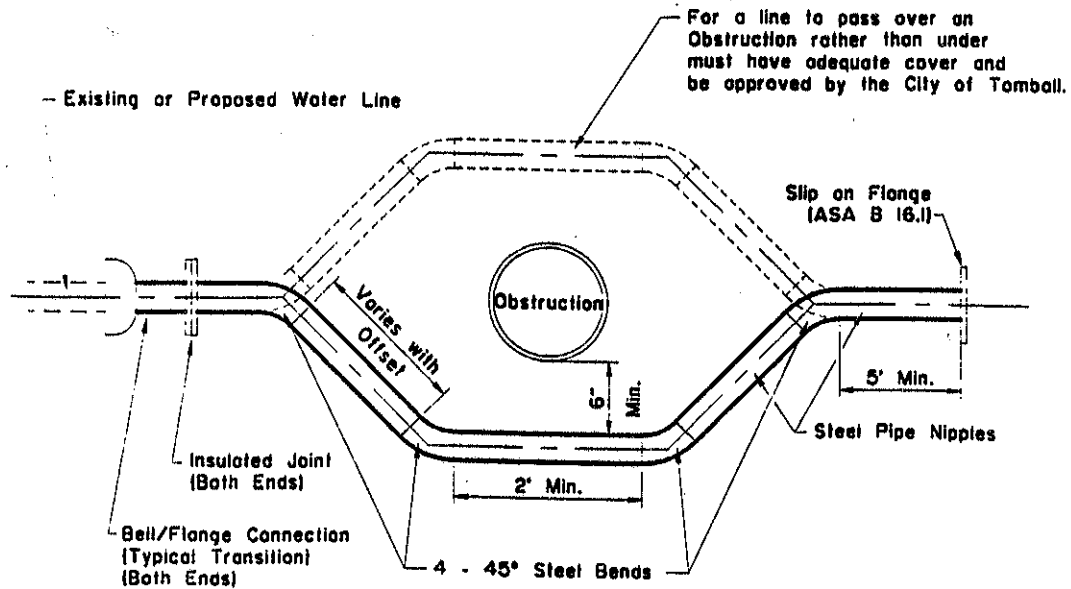


Alternate Fire Hydrant Plan



Thrust Anchor Detail

CITY OF TOMBALL	
ALTERNATE FIRE HYDRANT PLAN (Not to Scale)	
APPROVED BY:	EFF DATE: JAN - 19
DIRECTOR OF PUBLIC WORKS	DWG NO: COT-111



MIN. WALL THICKNESS PIPE and FITTINGS	
4"	0.250"
6"	0.280"
8"	0.322"
12" and Larger	0.375"

All Materials and Coatings to be in accordance with the City of Tomball Specifications.

Insulated joint to be made up using Insulating Gaskets, Plastic Ball Sleeves and Washers or Insulating Gaskets material backed with Cad-Plated Washers, or other methods approved by the City of Tomball.

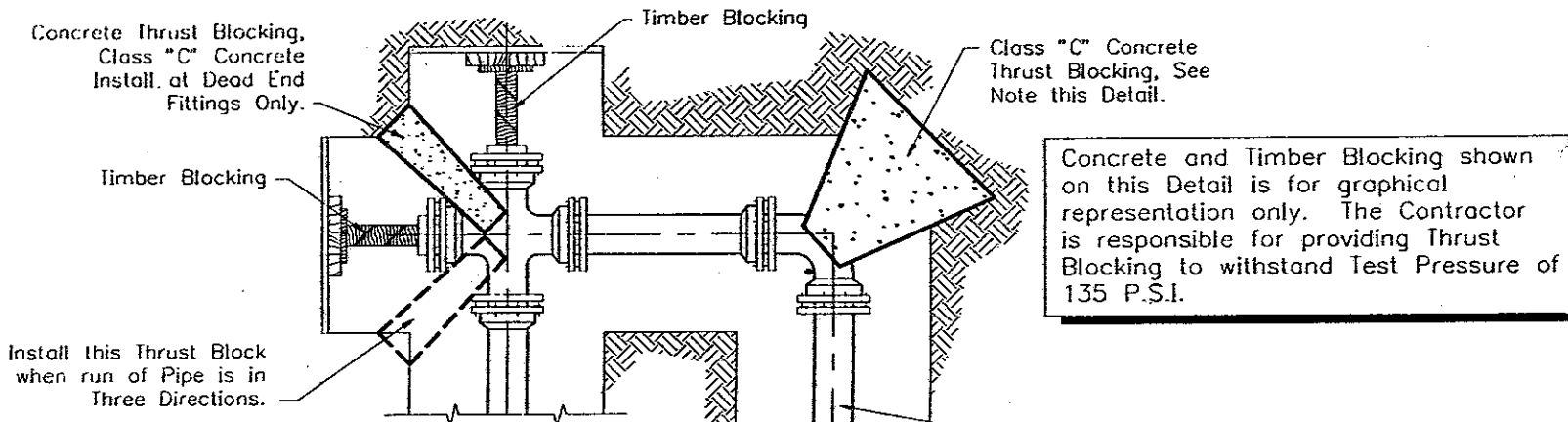
CITY OF TOMBALL

**TYPICAL STEEL PIPE
OFFSET DETAIL**

(Not to Scale)

APPROVED BY: _____ EFF. DATE: JAN-17

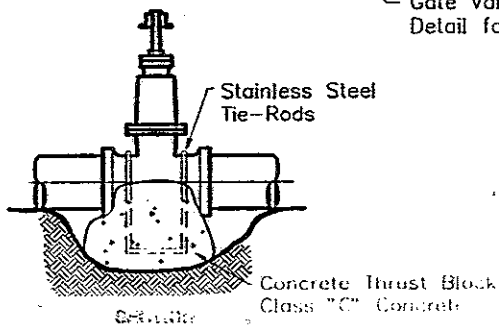
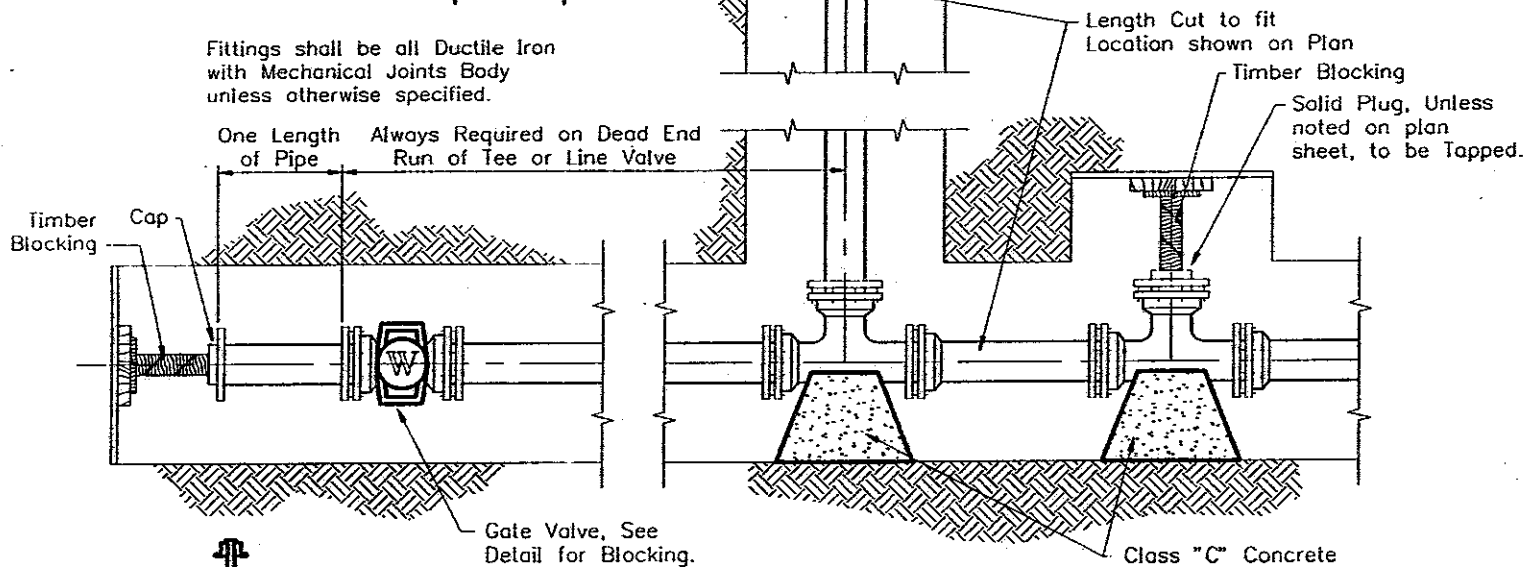
DIRECTOR OF PUBLIC WORKS DWG NO: **COT-112**



Concrete and Timber Blocking shown on this Detail is for graphical representation only. The Contractor is responsible for providing Thrust Blocking to withstand Test Pressure of 135 P.S.I.

Fittings shall be all Ductile Iron with Mechanical Joints Body unless otherwise specified.

One Length Always Required on Dead End of Pipe Run of Tee or Line Valve



CITY OF TOMBALL

FITTING ASSEMBLY AND THRUST BLOCK DETAIL

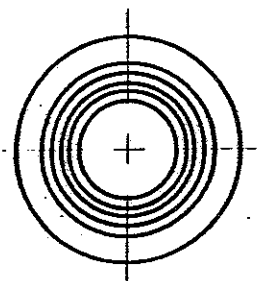
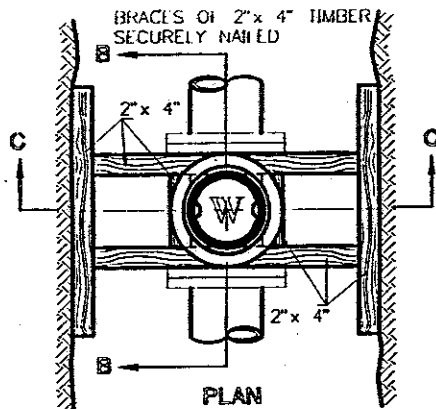
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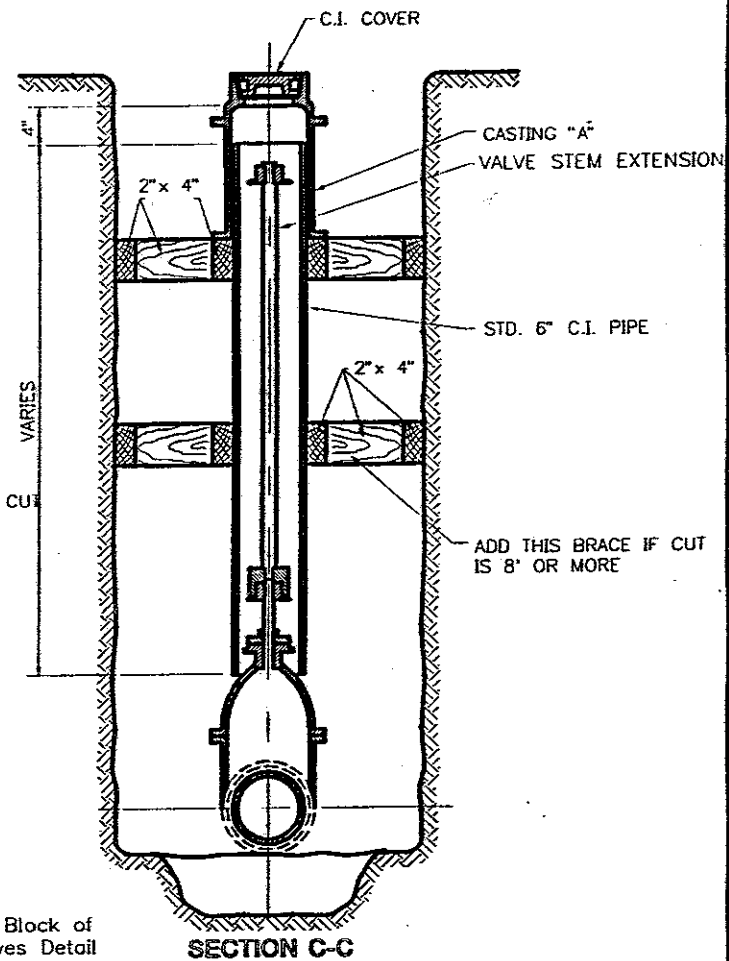
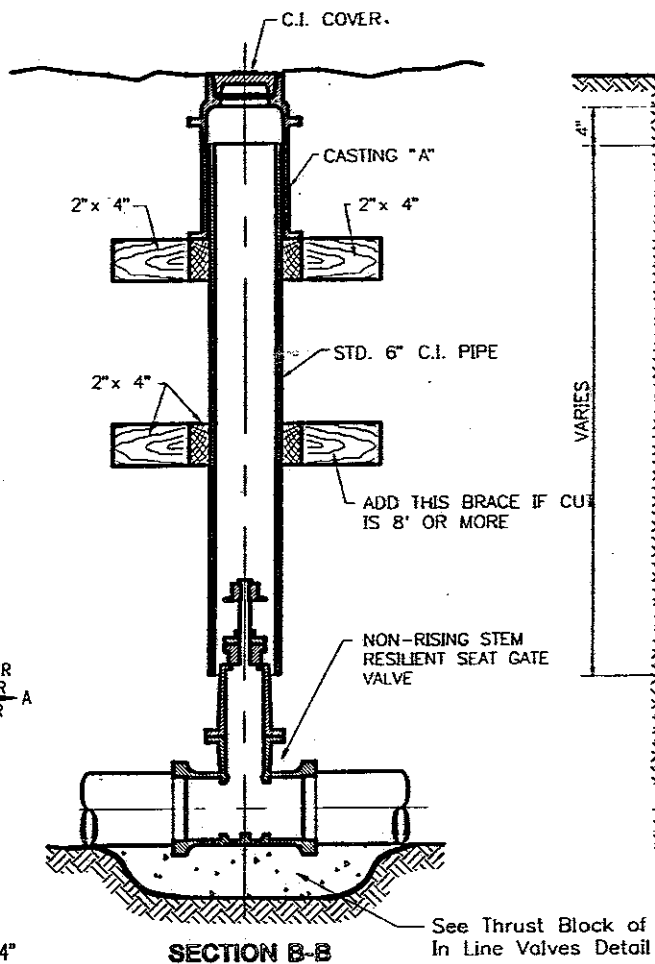
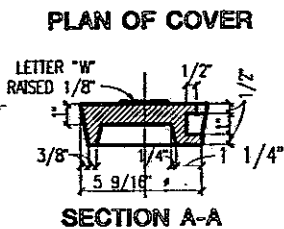
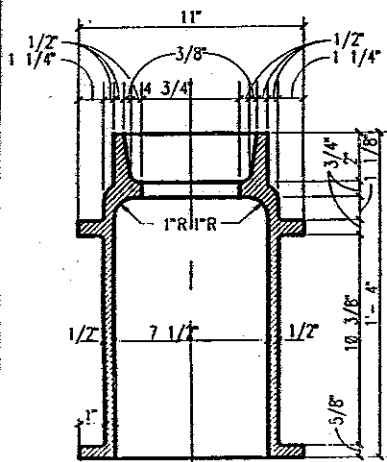
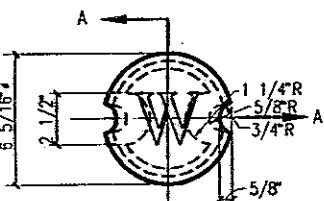
EFF DATE: JAN-31-95

DATE OF ISSUE: 01/31/95

DWG NO COT-113



NOTE:
MATERIAL - GRAY CAST IRON
PAINT - DIP IN COAL TAR
PITCH VARNISH.



CITY OF TOMBALL

VALVE BOX DETAIL

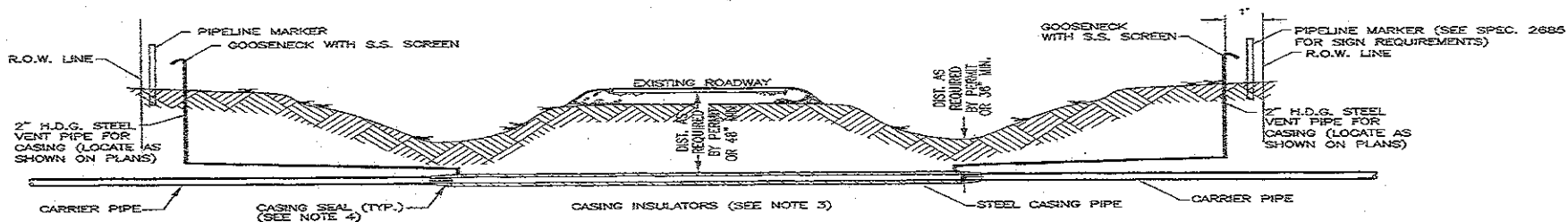
(Not to Scale)

APPROVED BY:

EFF DATE: JAN-31-95

ENGINEER OR PLANT WORKS

DWG. NO. COT-114



1. MINIMUM COVER ON ALL CASING PIPE AND CARRIER PIPE WITHIN ALL ROAD RIGHT-OF-WAYS SHALL BE A MINIMUM OF 36" AT THE LOWEST POINT OF THE CROSSING (TYPICALLY AT CENTERLINE OF ROADSIDE DITCH).
2. LENGTH OF BORES VARY FOR EACH ROADWAY CROSSING AND SHALL BE IN ACCORDANCE WITH THE APPLICABLE PLAN SHEETS.
3. PROVIDE AND INSTALL CASING SPACERS/INSULATORS ON ALL CARRIER PIPE INSIDE CASING. THE CASING INSULATORS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS SHOWN IN SPECIFICATION SECTION C2224.
4. PROVIDE AND INSTALL CASING END SEAL ON ALL CASING PIPE THAT IS INSTALLED BY BORE OR OPEN CUT. CASING END SEALS SHALL BE PIPELINE SEAL AND INSULATOR, INC. MODEL NO. C OR PRE-APPROVED EQUAL AND SHALL BE INSTALLED IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER.
5. VENT PIPES SHALL BE 2" DIAMETER, SCHEDULE 40 HOT DIPPED GALVANIZED STEEL PIPE. PROVIDE AND INSTALL A 2" GOOSENECK WITH STAINLESS STEEL SCREEN ON VENT PIPES.

TYPICAL PIPELINE INSTALLED IN CASING (BY BORE OR OPEN CUT)
N.T.S.