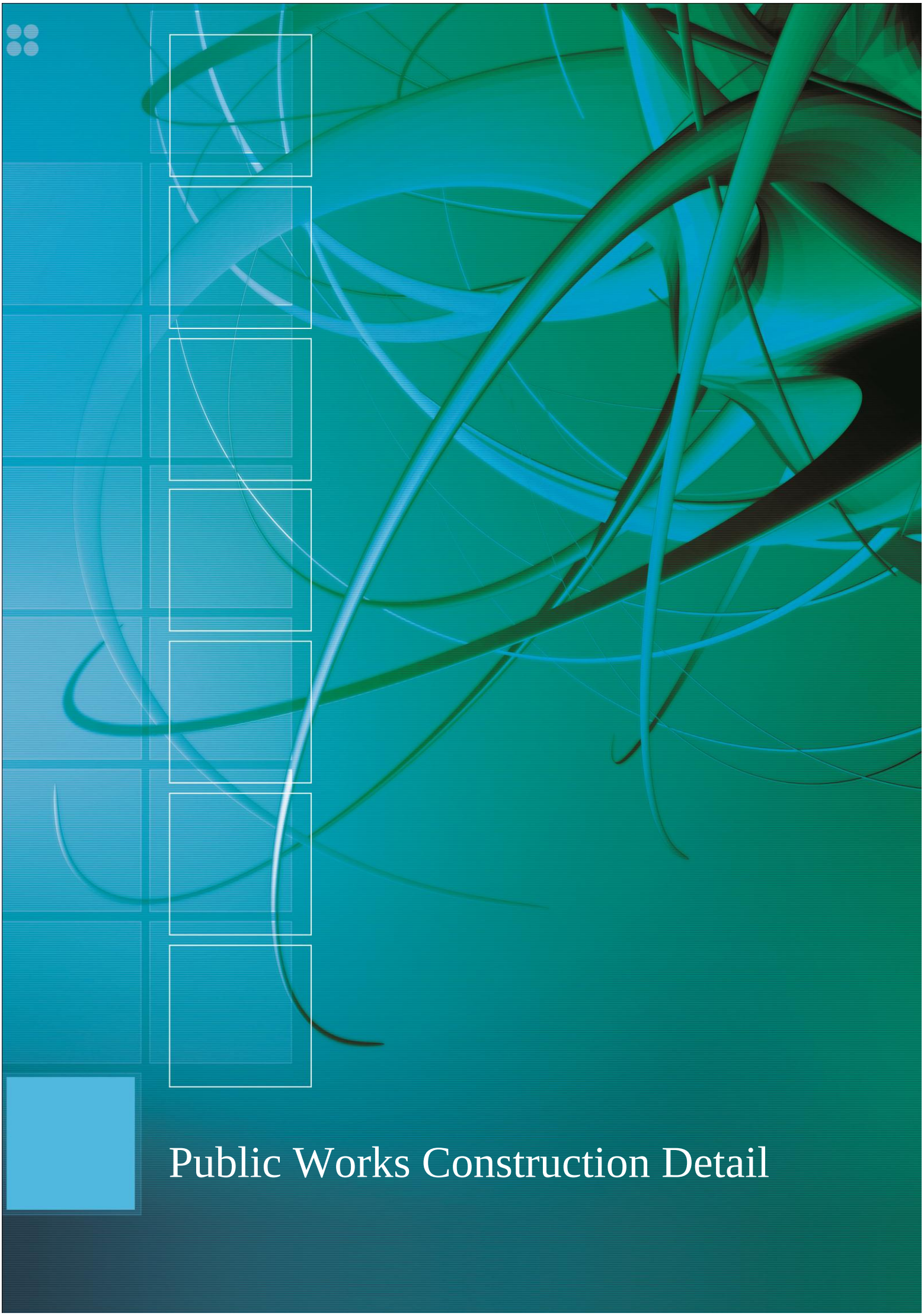

Public Works Construction Detail

Table or Contents

Miscellaneous

1M-1	General Notes, Sht. 1 of 3
1M-2	General Notes, Sht. 2 of 3
1M-3	General Notes, Sht. 3 of 3
2M	NRH Project Sign
3M	Trench Embedment and Backfill Details

Paving

1P	Residential Streets Hot Mix Asphalt Concrete Pavement
2P	Residential Streets Reinforced Concrete Pavement
3P	Collector Streets Hot Mix Asphalt Concrete Pavement
4P	Collector Streets Reinforced Concrete Pavement
5P	Arterial & Industrial Streets Hot Mix Asphalt Concrete Pavement
6P	Arterial & Industrial Streets Reinforced Concrete Pavement
7P	Pavement Marking Details
8P	Typical Left Turn Lanes
9P	Concrete Valley Details
10P-1	Curb Ramp Details I
10P-2	Curb Ramp Details II
10P-3	Curb Ramp Details III
10P-4	Curb Ramp Details IV
10P-5	Curb Ramp Details V
10P-6	Curb Ramp Details VI
11P-1	Residential Drive Details
11P-2	Residential Drive Details
12P	Commercial Drive Details
13P	Drive with Culvert Details
14P-1	Combination Rail Type C301
14P-2	Combination Rail Type C301
14P-3	Combination Rail Type C301
15P-1	Permanent Asphalt Pavement Replacement
15P-2	Temporary Asphalt Patch
16P	Pavers in Public ROW

Drainage

1D	Channel Liners
2D	Storm Drain Flood Limits
3D	Reinforced Concrete Channel Liner Details
4D	Concrete Pilot Channel
5D	Concrete Flume
6D	Concrete Channel Apron for S.D. with Vertical Headwall
7D	Concrete Channel Apron for S.D. with Sloping Headwall
8D	Concrete Collar Details

9D	Storm Drain Tap Detail
10D	Concrete Plug Details
11D	Standard Drop Inlet
12D-1	Standard 4' Square Storm Drain Manhole/Vault, Sht. 1 of 2
12D-2	Standard 4' Square Storm Drain Manhole/Vault, Sht. 2 of 2
13D-1	Standard 5' Square Storm Drain Manhole/Vault, Sht. 1 of 2
13D-2	Standard 5' Square Storm Drain Manhole/Vault, Sht. 2 of 2
14D-1	Standard 6' Square Storm Drain Manhole/Vault, Sht. 1 of 2
14D-2	Standard 6' Square Storm Drain Manhole/Vault, Sht. 2 of 2
15D	Angled Storm Drain Manhole/Vault Detail
16D-1	Standard Curb Inlet, Detail No. 1
16D-2	Standard Curb Inlet, Detail No. 2
16D-3	Standard Curb Inlet, Detail No. 3
17D	Inlet Protection Block and Gravel
18D-1	Channel Access Ramp, Sht. 1 of 2
18D-2	Channel Access Ramp, Sht. 2 of 2

Water

1W	Valve and Thrust Block Details
2W	Detail of Valve Locations at Street Intersections
3W-1	Fire Hydrant Details
3W-2	Fire Hydrant and Water Meters
4W	Water Service Connection Details Single and Double
5W	2" Water Service
6W	Domestic 4" Meter Installation
7W	Irrigation 4" Meter Installation
8W	Detector Check Installation Details
9W	Blow-Off Hydrant

Sewer

1S	Sanitary Sewer Manhole Details
2S	Precast Concrete Manhole Details
3S	Sanitary Sewer Drop Manhole Details
4S	Sewer Service Connection Details

Miscellaneous

1M-1	General Notes, Sht. 1 of 3
1M-2	General Notes, Sht. 2 of 3
1M-3	General Notes, Sht. 3 of 3
2M	NRH Project Sign
3M	Trench Embedment and Backfill Details

CITY OF NORTH RICHLAND HILLS
GENERAL NOTES

1. ALL CONSTRUCTION TO BE IN ACCORDANCE WITH THE CITY OF NORTH RICHLAND HILLS' STANDARDS AND SPECIFICATIONS.
2. UTILITY CONTRACTOR AND STREET CONTRACTOR ARE TO NOTIFY A CITY TECHNICAL CONSTRUCTION INSPECTOR AT (817) 427-6440, AT LEAST 48HOURS PRIOR TO BEGINNING CONSTRUCTION.
3. ALL CONSTRUCTION BARRICADING TO BE IN ACCORDANCE WITH CURRENT "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" GUIDELINES.
4. DEVELOPER / CONTRACTOR IS RESPONSIBLE FOR COORDINATING PERMISSION FROM TXDOT FOR ANY WORK IN STATE ROW.
5. ALL MANHOLE LIDS SHALL BE PAINTED BLACK.
6. PRIOR TO FINAL ACCEPTANCE OF A DEVELOPMENT, THE CITY MAY REQUIRE A FIELD SURVEY PROVIDED BY A REGISTERED PROFESSIONAL SURVEYOR TO VERIFY THAT THE AS-BUILT COORDINATES MATCH THE APPROVED DESIGN.

WATER:

7. ALL WATER MAINS SHALL BE PVC AWWA-C900, DR18, CLASS 150.
8. GATE VALVES SHALL CONFORM TO ANSI/AWWA C509-87J.
9. CITY ORDINANCE PROHIBITS ANYONE (OTHER THAN CITY EMPLOYEES) FROM OPENING OR CLOSING A WATER VALVE WHICH IS PART OF THE ACTIVE SYSTEM.
10. ALL FITTINGS SHALL BE RESTRAINED WITH ANCHORING COUPLINGS OR RESTRAINING HARNESSES.
11. ALL FITTINGS SHALL BE WRAPPED WITH 8 MIL POLYVINYL PLASTIC.
12. WATER SERVICES SHALL NOT BE DIRECTLY CONNECTED TO WATER MAINS SIXTEEN (16") INCHES IN DIAMETER OR GREATER.
13. THE MINIMUM HORIZONTAL SEPARATION BETWEEN ANY WATER MAIN AND A STORM DRAIN FACILITY SHALL BE EQUAL TO 2.5 FEET OR HALF THE DEPTH OF THE WATER LINE, WHICHEVER IS GREATER.
14. ROUTE WATER LINES AROUND STORM DRAIN INLETS WITH A MINIMUM OF 12" CLEARANCE OUT-TO-OUT.
15. MINIMUM DEPTH OF COVER OVER ALL WATER MAINS SMALLER THAN TEN (10") INCHES IN DIAMETER SHALL BE THREE (3) FEET. MINIMUM DEPTH OF COVER FOR WATER MAINS TEN (10") INCHES AND LARGER SHALL BE THREE AND ONE-HALF (3.5') FEET.
16. DETECTOR CHECK ASSEMBLY SHALL BE LOCATED IN AN UNDERGROUND VAULT WITHIN A WATER LINE EASEMENT. DETECTOR CHECK EQUIPMENT SHALL NOT BE LOCATED WITHIN BUILDINGS.
17. A BILCO LID K-5 (3.5' x 3.5') OR APPROVED EQUAL IS REQUIRED ON DETECTOR CHECK VAULTS. A TRAFFIC-RATED LID (CERTIFIED AS TRAFFIC-RATED BY THE MANUFACTURER) IS REQUIRED WHEN VAULT IS LOCATED IN AN AREA SUBJECT TO VEHICULAR TRAFFIC.
18. ALL PORTIONS (EXCLUDING CHAINS) OF FIRE HYDRANT ABOVE GRADE SHALL BE PAINTED WITH TNEMEC SERIES 02H HI-BUILD TNEME-GLOSS. COLOR: CHILEAN RED.
19. BLOW-OFF HYDRANTS ARE TO BE SURROUNDED WITH HIGH-VISIBILITY CONSTRUCTION FENCING FOR THE DURATION OF CONSTRUCTION ACTIVITY.

CITY OF NORTH RICHLAND HILLS
GENERAL NOTES

SANITARY SEWER:

20. ALL SANITARY SEWER PIPE SHALL BE SDR 35 PVC (ASTM D-3034), UNLESS THE LINE IS DEEPER THAN 10 FEET, THEN SDR 26 PVC SHALL BE USED.
21. ALL SANITARY SEWER LINES ARE TO HAVE ONE JOINT CENTERED BELOW WATER MAIN CROSSINGS.
22. WHEN PLACING A NEW SANITARY SEWER MANHOLE OVER EXISTING VITREOUS CLAY PIPE, INSTALL NEW PVC PIPE ACROSS THE MANHOLE AT A LENGTH TO BE DETERMINED BY THE CITY REPRESENTATIVE.
23. SEWER MAINS WHICH REQUIRE MORE THAN AN EIGHTEEN (18") INCH DIFFERENCE IN FLOW LINES MUST BE ACCOMODATED WITH A FIVE (5') FOOT DIAMETER MANHOLE WITH AN INTERNAL DROP.
24. ALL SANITARY SEWER MAINS SHALL END IN A MANHOLE. CLEANOUTS WILL NOT BE ALLOWED.
25. THE MINIMUM HORITZONTAL SEPARATION BETWEEN ANY SANITARY SEWER MAIN AND A STORM DRAIN FACILITY SHALL BE EQUAL TO 2.5 FEET OR HALF THE DEPTH OF THE SANITARY SEWER, WHICHEVER IS GREATER.
26. THE MAXIMUM DEPTH FOR ALL SEWER SERVICE SHALL BE 10 FEET.
27. INDIVIDUAL 4" SANITARY SEWER SERVICES WILL NOT BE PERMITTED IN MANHOLES WITHOUT THE EXPRESS PERMISSION OF THE PUBLIC WORKS DEPARTMENT.
28. A MANHOLE MUST BE PROVIDED AT THE MAIN FOR ALL 6" AND LARGER SANITARY SEWER SERVICES.
29. SERVICES WHICH ARE CONNECTED TO MANHOLES SHALL BE INSTALLED A MINIMUM OF 8 INCHES ABOVE THE MAIN FLOWLINE.

DRAINAGE:

30. ALL STORM DRAINAGE PIPE SHALL BE ASTM C-76, CLASS III REINFORCED CONCRETE, UNLESS NOTED OTHERWISE.
31. ROCK RIP RAP RUBBLE SHALL USE 12" (MINIMUM) ROCKS AND BE GROUTED SO THAT 6" OF THE ROCKS ARE EXPOSED.
32. NO PRECAST INLETS ARE PERMITTED FOR PUBLIC DRAINAGE SYSTEMS.

STREETSCAPE:

33. ALL STREET FEATURES (TRAFFIC SIGNALS, POLES, STREET LIGHTS, STREET SIGNS, ETC.) MUST BE DESIGNED IN ACCORDANCE WITH CURRENT ADOPTED STANDARDS. CONTRACTOR SHALL CONTACT THE PUBLIC WORKS DEPARTMENT AT (817)-427-6400 FOR A CURRENT LIST OF APPROVED STREETSCAPE MATERIALS.

PAVING:

34. ALL PAVEMENT FOR PUBLIC STREETS MUST BE CONSTRUCTED USING A PAVING MACHINE.
35. "CURB RAMPS" ARE TO BE CONSTRUCTED ON ALL PERMENANT CURB RETURNS AT INTERSECTIONS OF ALL STREETS OR AS DIRECTED BY THE PUBLIC WORKS DEPARTMENT.

NRH

CITY OF NORTH RICHLAND HILLS
GENERAL NOTES

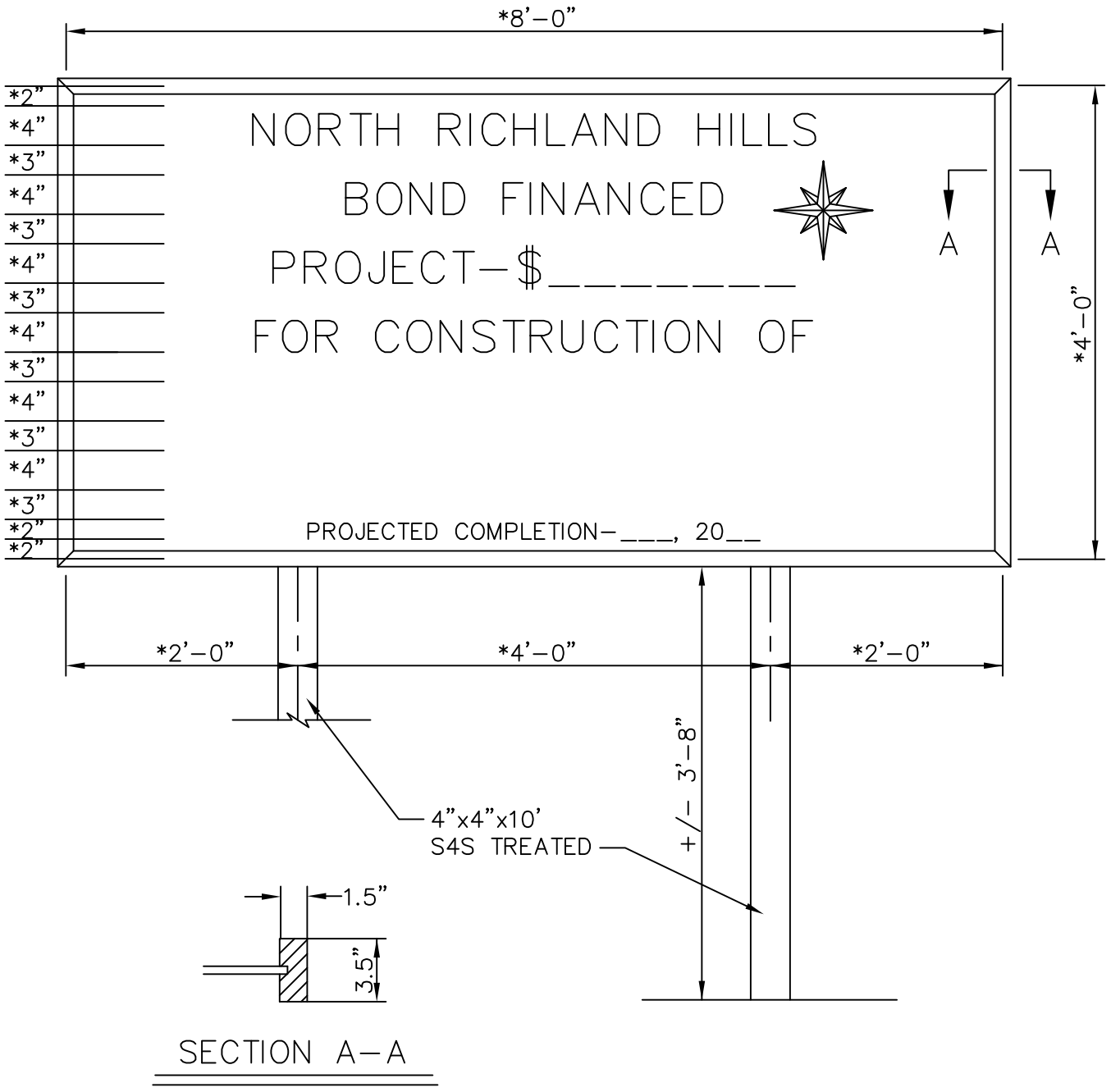
PAVING (CONTINUED):

36. ALL CONCRETE SHALL BE CLASS "C" CONCRETE AND SHALL HAVE 4.5 LB/IN OF CEMENT/SY, MAXIMUM SLUMP OF 5 INCHES, AND A 3600 PSI COMPRESSIVE STRENGTH AT 28 DAYS, UNLESS SPECIFIES OTHERWISE. CONCRETE SHALL BE PLACED WHEN TEMPERATURE IS 35°F AND RISING, IF THE TEMPERATURE IS 40°F AND FALLING THEN PLACEMENT SHALL BE STOPPED. NO FLYASH SHALL BE ALLOWED IN THE CONCRETE MIX.
37. OPEN CUTTING PAVEMENT TO INSTALL NEW UTILITIES IS NOT ALLOWED. THE CONTRACTOR MUST BORE THE UTILITY UNDER THE EXISTING STREET AND USE ⅜–INCH STEEL ENCASEMENT PIPE THAT IS AT A MINIMUM CLASS 51 STEEL. SPACERS SHALL BE USED TO CENTER THE UTILITY PIPE IN THE ENCASEMENT PIPE AND THE ENCASEMENT PIPE SHALL BE GROUTED AT THE ENDS.
38. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING TEMPORARY STREET PATCHES INSTALLED ON PUBLIC STEEETS WITH PERMENANT REPAIRS WITHIN 21 CALENDAR DAYS OF OPEN CUTTING THE STREET, OR AS DIRECTED BY THE ASSISTANT PUBLIC WORKS DIRECTOR.
39. TRAFFIC LANE MARKINGS SHALL BE INSTALLED WITH APPROVED RAISED MARKINGS (TRAFFIC BUTTONS TYPE 1C, 1A, ETC.) UNLESS OTHERWISE APPROVED BY THE PUBLIC WORKS DEPARTMENT. ALL PAVEMENT MARKINGS "LEGENDS" SHALL BE INSTALLED WITH APPROVED THERMOPLASTIC MARKINGS.

GRADING/EARTHWORK/EROSION CONTROL:

40. ALL AREAS DISTURBED DURING CONSTRUCTION, INCLUDING AREAS OUTSIDE THE CONSTRUCTION BOUNDARY, ARE TO BE SEEDED, HYDROMULCHED, OR SODDED TO RE–ESTABLISH VEGETATION (AT LEAST 70%) PRIOR TO FINAL ACCEPTANCE. A CUMULATIVE APPROACH WHERE A PORTION OF THE DISTURBED AREA IS 100% VEGETATED AND OTHER AREAS ARE LEFT BARE IS NOT ACCEPTABLE.
41. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COST OF A MAXIMUM NUMBER OF PASSING FIELD DENSITY TESTS ON LIME STABILIZED SUBGRADE EQUAL TO THE RATIO OF 1 PER 100 LINEAR FEET OF STREET AND ALL FALING DENSITY TESTS AND REQUIRED MOISTURE–DENSITY CURVES.
42. ALL FILL SHALL BE COMPACTED TO 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR METHOD (ASTM–698).
43. STOCKPILING OF EXCESS FILLS WILL NOT BE ALLOWED WITHIN CITY LIMITS WITHOUT OBTAINING A FILL/EXCAVATION PERMIT.
44. PARKWAY GRADING SHALL NOT RESULT IN SLOPES GREATER THAN 4' HORITZONTAL TO 1' VERTICAL (4:1).
45. ALL PARKWAY GRADING SHALL BE COMPLETE IN ACCORDANCE WITH THE APPROVED PLANS PRIOR TO THE CITY ACCEPTING THE PROJECT.
46. A ROW OF CURLEX MATTING (OR APPROVED EQUAL) OR SOLID SOD SHALL BE PLACED BEHIND THE BACK CURB IN PARKWAYS.
47. SLOPES CRETED BY EXCAVATION OR FILL SHALL NOT EXCEED 3' HORITZONTAL TO 1' VERTICAL (3:1) FOR A PERIOD MORE THAN 120 DAYS. IF LONGER THAN 120 DAYS THE SLOPE SHALL NOT EXCEED 4' HORIZONTAL TO 1' VERTICAL (4:1).
48. ALL STATE AND LOCAL REQUIREMENTS MUST BE MET PERMITTING TO STORM WATER POLLUTION PREVENTION PLANS (SWPPP).

3.2.26 PROJECT SIGN: SUBSIDIARY TO BID ITEMS.
THE CONTRACTOR SHALL FURNISH AND MAINTAIN ALL-WEATHER PROJECT SIGN AS ILLUSTRATED BELOW. THE SIGN SHALL HAVE A BLUE BACKGROUND WITH WHITE FRAME AND LETTERING. IT SHALL BE LOCATED AT THE PROJECT SITE AS DIRECTED BY THE OWNER'S PROJECT REPRESENTATIVE.



SECTION A-A

* SIGNS TO BE USED IN RESIDENTIAL AREAS SHALL BE HALF OF THE DIMENSIONS SHOWN.

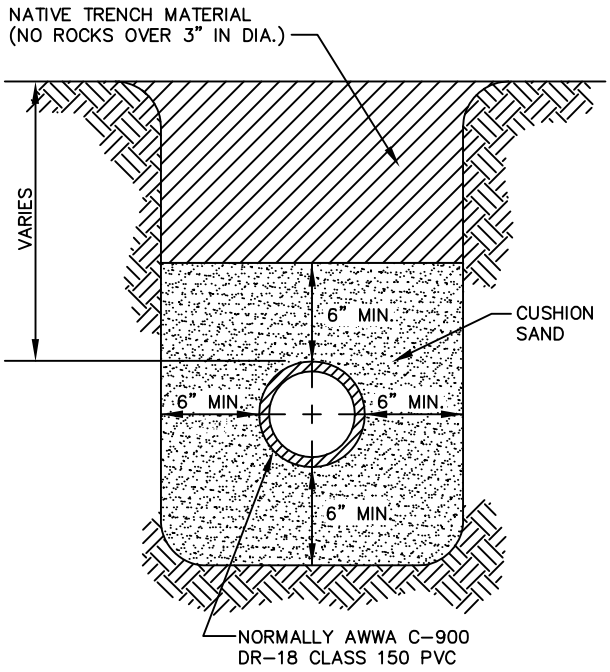
* NRH PROJECT SIGN *

NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 2M

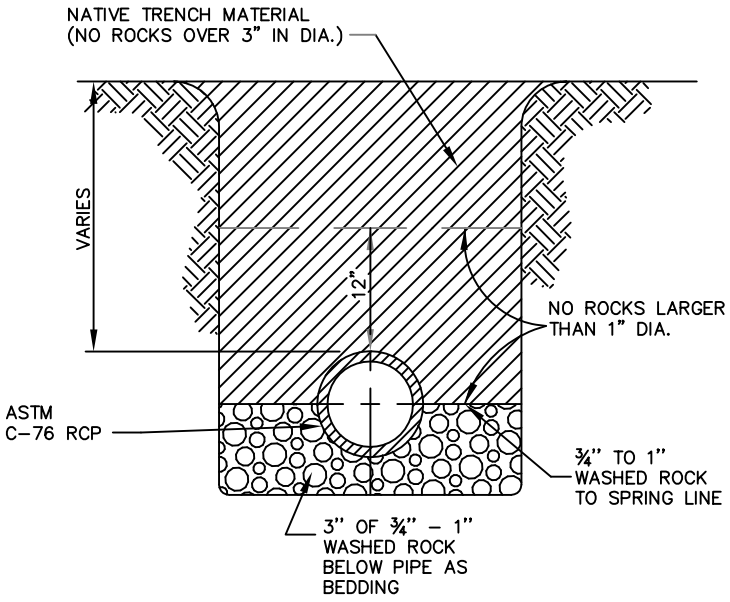
MISCELLANEOUS TRENCH EMBEDMENT AND BACKFILL DETAILS

NOT TO SCALE

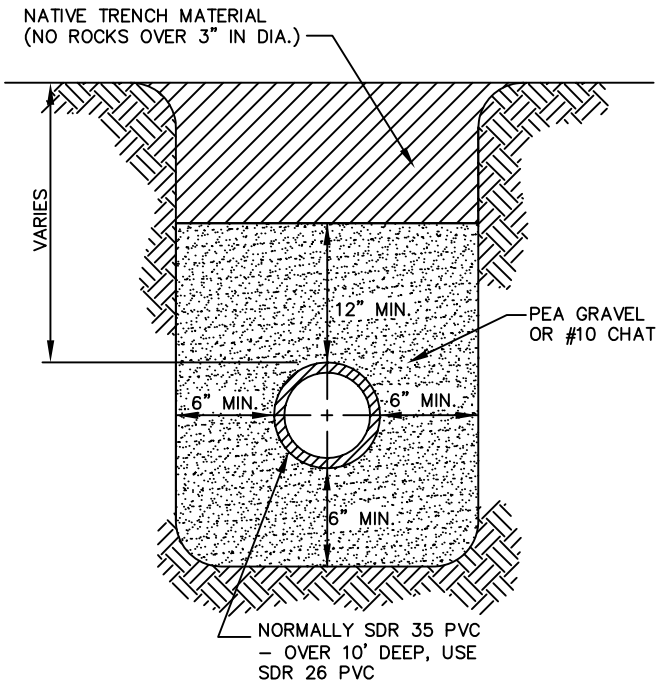


WATER

INSTALL TRACING WIRE ON NEW TRUNK LINES



STORM DRAIN



SANITARY SEWER

GENERAL NOTES:

1. ALL TRENCH BACKFILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR DRY DENSITY (ASTM D-698).
2. MECHANICALLY COMPACTED TRENCH BACKFILL SHALL BE PLACED IN NO GREATER THAN 6" LIFTS. TESTING SHALL BE AT THE RATE OF ONE TEST PER LIFT PER 500 FEET OF TRENCH, AND WHERE CITY'S REPRESENTATIVE REQUIRES ADDITIONAL TESTS.
3. IF A DIFFERENT TYPE OF STORM DRAIN PIPE IS APPROVED BY PUBLIC WORKS A SPECIFIC EMBEDMENT & BACKFILL DETAIL WILL NEED TO BE SUBMITTED AND APPROVED BY THE CITY.
4. EMBEDMENT TO BE IN COMPLIANCE WITH CURRENT TCEQ REQUIREMENTS.

TRENCH EMBEDMENT & BACKFILL DETAILS

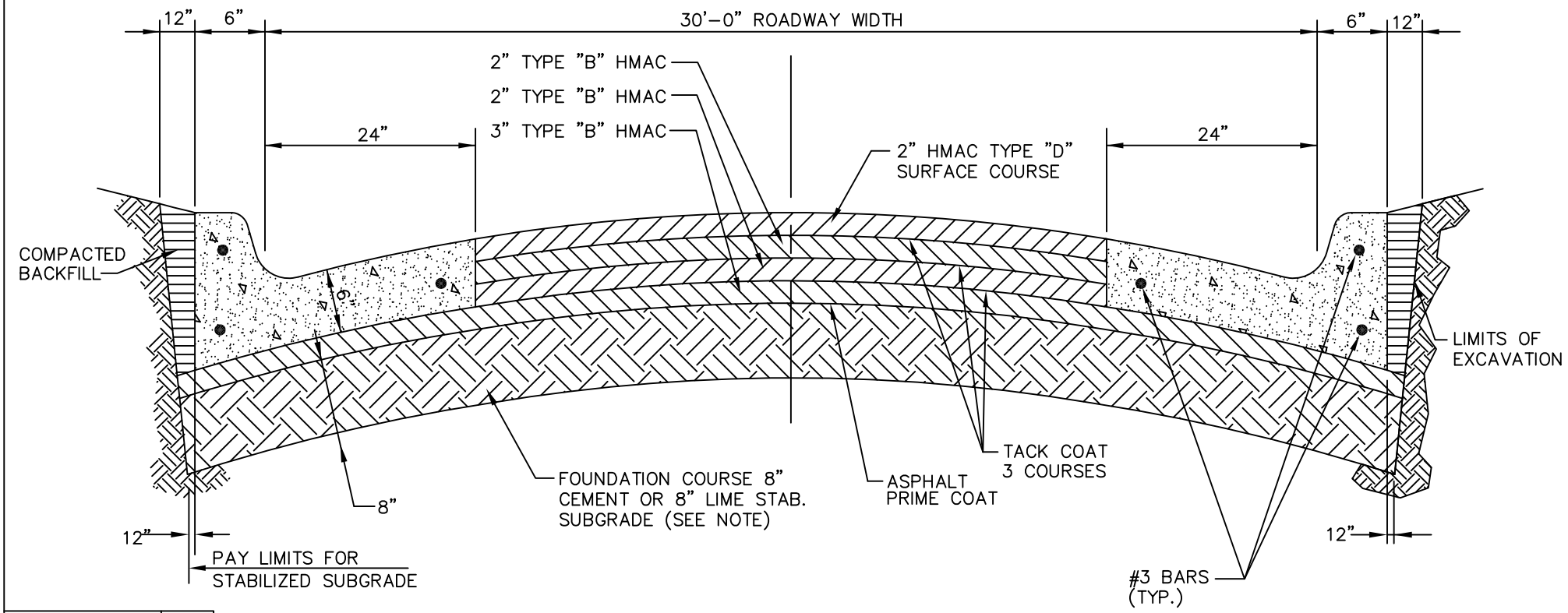
NORTH RICHLAND HILLS

R 07-01-2009

FIGURE 3M

Paving

1P	Residential Streets Hot Mix Asphalt Concrete Pavement
2P	Residential Streets Reinforced Concrete Pavement
3P	Collector Streets Hot Mix Asphalt Concrete Pavement
4P	Collector Streets Reinforced Concrete Pavement
5P	Arterial & Industrial Streets Hot Mix Asphalt Concrete Pavement
6P	Arterial & Industrial Streets Reinforced Concrete Pavement
7P	Pavement Marking Details
8P	Typical Left Turn Lanes
9P	Concrete Valley Details
10P-1	Curb Ramp Details I
10P-2	Curb Ramp Details II
10P-3	Curb Ramp Details III
10P-4	Curb Ramp Details IV
10P-5	Curb Ramp Details V
10P-6	Curb Ramp Details VI
11P-1	Residential Drive Details
11P-2	Residential Drive Details
12P	Commercial Drive Details
13P	Drive with Culvert Details
14P-1	Combination Rail Type C301
14P-2	Combination Rail Type C301
14P-3	Combination Rail Type C301
15P-1	Permanent Asphalt Pavement Replacement
15P-2	Temporary Asphalt Patch
16P	Pavers in Public ROW



FOUNDATION COURSE --

CEMENT OR LIME TREATED SUBGRADE (8") – IF THE NATURAL SUBGRADE HAS A P.I. LESS THAN 20, THE ENGINEER MAY SPECIFY CEMENT OR LIME TREATED SUBGRADE AFTER CONSIDERING LINEAR SHRINKAGE, SOIL CLASSIFICATION, SEEPAGE, AND OTHER FACTORS. IF THE NATURAL SUBGRADE HAS A P.I. GREATER THAN 20, LIME TREATED SUBGRADE SHALL BE USED. IF SUFFICIENT DEPTH OF SUITABLE SUBGRADE MATERIAL IS NOT AVAILABLE, IT SHALL BE REMOVED AND REPLACED WITH SUITABLE MATERIAL.

NOTE: MINIMUM OF 6 LBS/IN/S.Y. LIME WILL BE REQUIRED FOR SUBGRADE STABILIZATION.

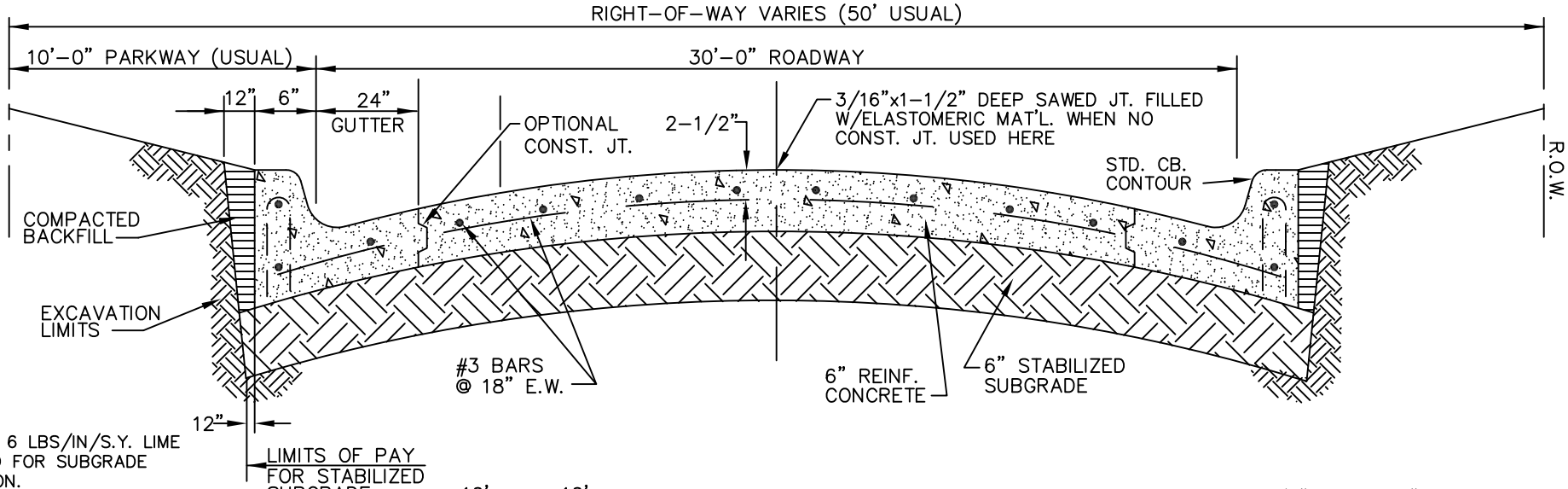
NOTE: PRIME COAT SHALL BE APPLIED AT THE RATE OF 0.15–0.20 GALLONS PER SQUARE YARD. TACK COAT SHALL BE APPLIED AT THE RATE OF 0.05–0.10 GALLONS PER SQUARE YARD.

NORTH RICHLAND HILLS

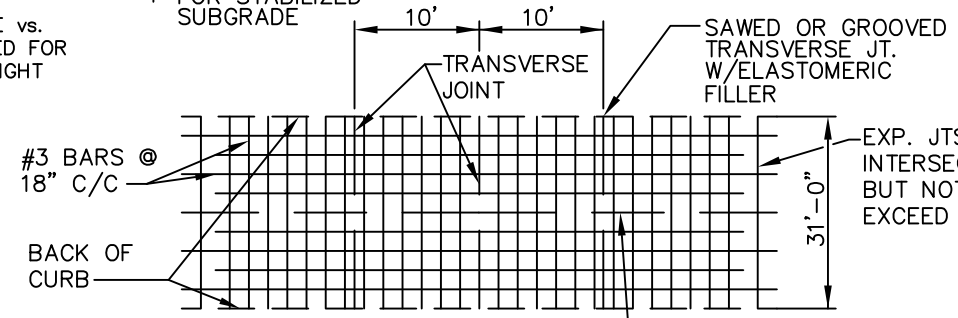
R 07-01-2009

FIGURE 1P

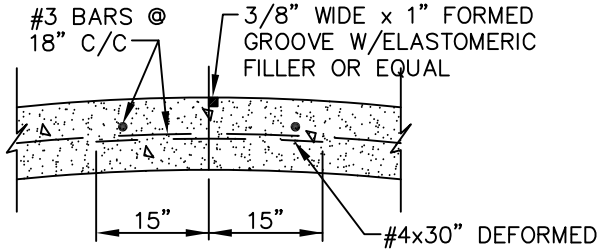
RESIDENTIAL STREETS HOT MIX ASPHALT CONCRETE PAVEMENT



NOTES:
1. MINIMUM OF 6 LBS/IN/S.Y. LIME IS REQUIRED FOR SUBGRADE STABILIZATION.
2. STRAIGHT CROWN (GABLE vs. PARABOLIC) MAY BE USED FOR CONCRETE STREETS. HEIGHT OF CROWN SHALL BE 6".

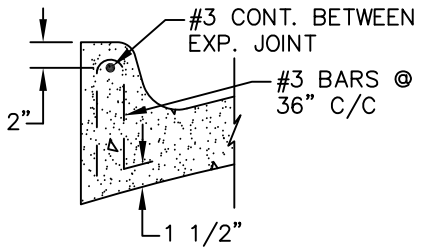


STEEL LAYOUT PLAN

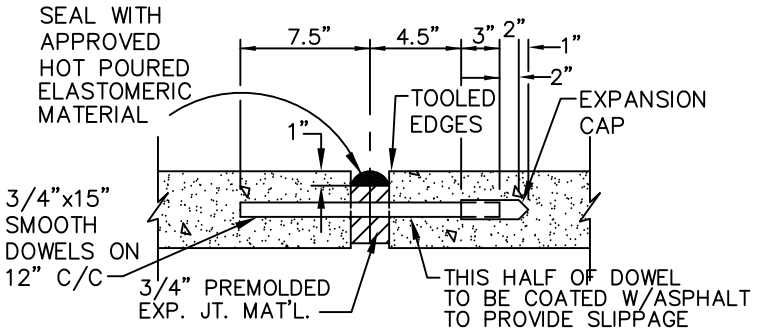


LONGITUDINAL CONST. JT. DETAIL

3. STEEL CHAIRS APPROVED BY THE OWNER'S REPRESENTATIVE TO SUPPORT REINFORCING STEEL SHALL BE PLACED AT THE INTERSECTION OF LONGITUDINAL AND TRANSVERSE BARS.
4. PROVIDE CONTINUOUS WELDED DOWEL BAR CHAIR CONSISTING OF 2 NO. 6 GAGE WIRE CHAIR AND DOWEL HOLDER AT EACH DOWEL AND 2-⅜" DIA STEEL BARS WELDED AT EACH INTERSECTION. ALL DOWEL BARS ACROSS JOINTS SHALL HAVE ONE END FULLY COATED WITH ASPHALT (AS AC-10) TO PREVENT BOND WITH CONCRETE OR APPROVED EQUAL. DOWEL BARS SHALL BE PROVIDED WITH EXP. CAPS.
5) CLASS "C", 3600 PSI COMPRESSIVE STRENGTH CONCRETE SHALL BE USED.



CURB REINFORCING



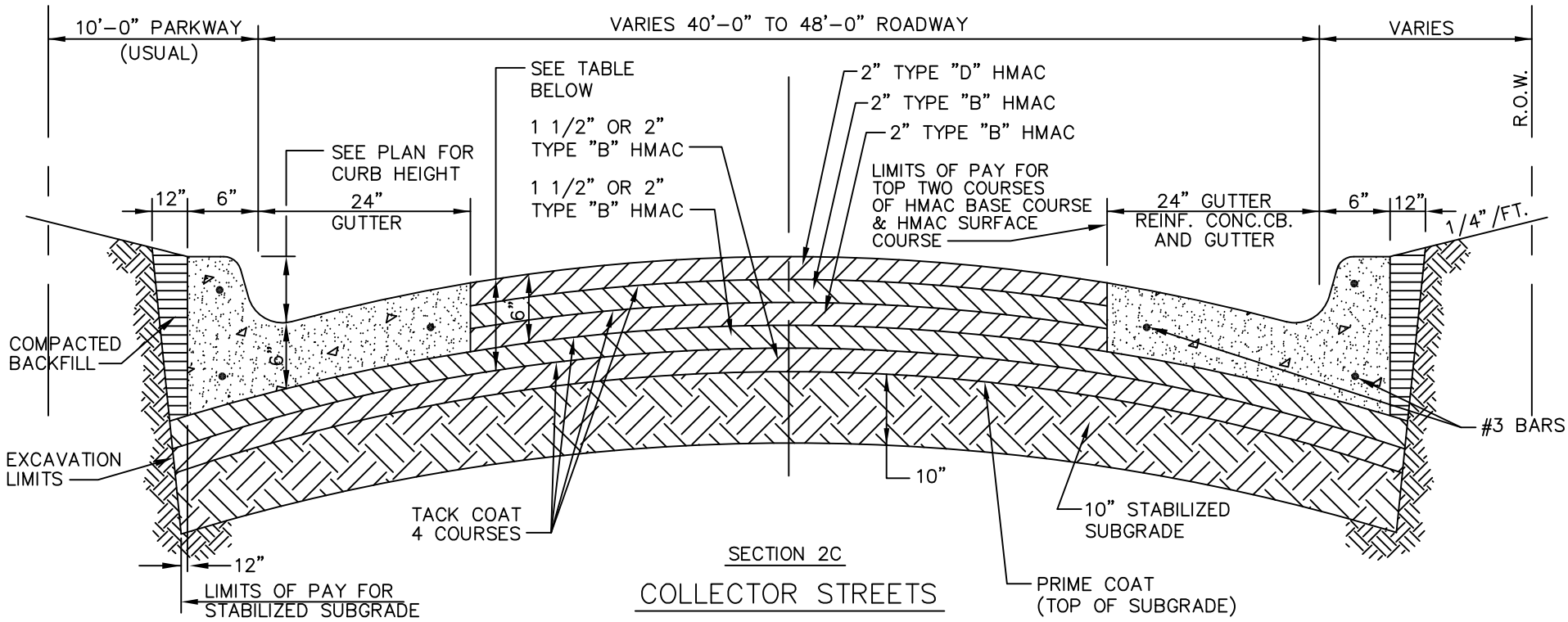
EXPANSION JT. DETAIL

NORTH RICHLAND HILLS

RESIDENTIAL STREETS
REINFORCED CONCRETE PAVEMENT

R 11-02-2009

FIGURE 2P



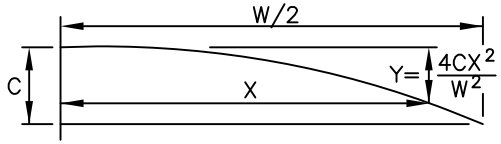
SECTION 2C

COLLECTOR STREETS

MINIMUM PAVING THICKNESS		
ROADWAY WIDTH	40'	48'
MIN. HMAC THICKNESS	9"	10"

GENERAL NOTES:

1. COAT WITH ASPHALT THE SIDES OF GUTTERS WHICH ARE IN CONTACT WITH HMAC PAVEMENT.
2. FOUNDATION COURSE-CEMENT OR LIME TREATED SUBGRADE (10")-IF THE NATURAL SUBGRADE HAS A P.I. LESS THAN 20, THE ENGINEER MAY SPECIFY CEMENT OR LIME TREATED SUBGRADE AFTER CONSIDERING LINEAR SHRINKAGE, SOIL CLASSIFICATION, SEEPAGE, AND OTHER FACTORS. IF THE NATURAL SUBGRADE HAS A P.I. GREATER THAN 20, LIME TREATED SUBGRADE SHALL BE USED. IF SUFFICIENT DEPTH OF SUITABLE SUBGRADE MATERIAL IS NOT AVAILABLE. IT SHALL BE REMOVED AND REPLACED WITH SUITABLE MATERIAL. AND ALTERNATE STABILIZING AGENT MAY BE USED IF APPROVED BY THE ENGINEER.
3. MINIMUM OF 6 LBS/IN/S.Y. LIME WILL BE REQUIRED FOR SUBGRADE STABILIZATION.
4. PRIME COAT SHALL BE APPLIED AT THE RATE OF 0.15-0.20 GALLONS PER S.Y.. TACK COAT SHALL BE APPLIED AT THE RATE OF 0.05-0.10 GALLONS PER S.Y..



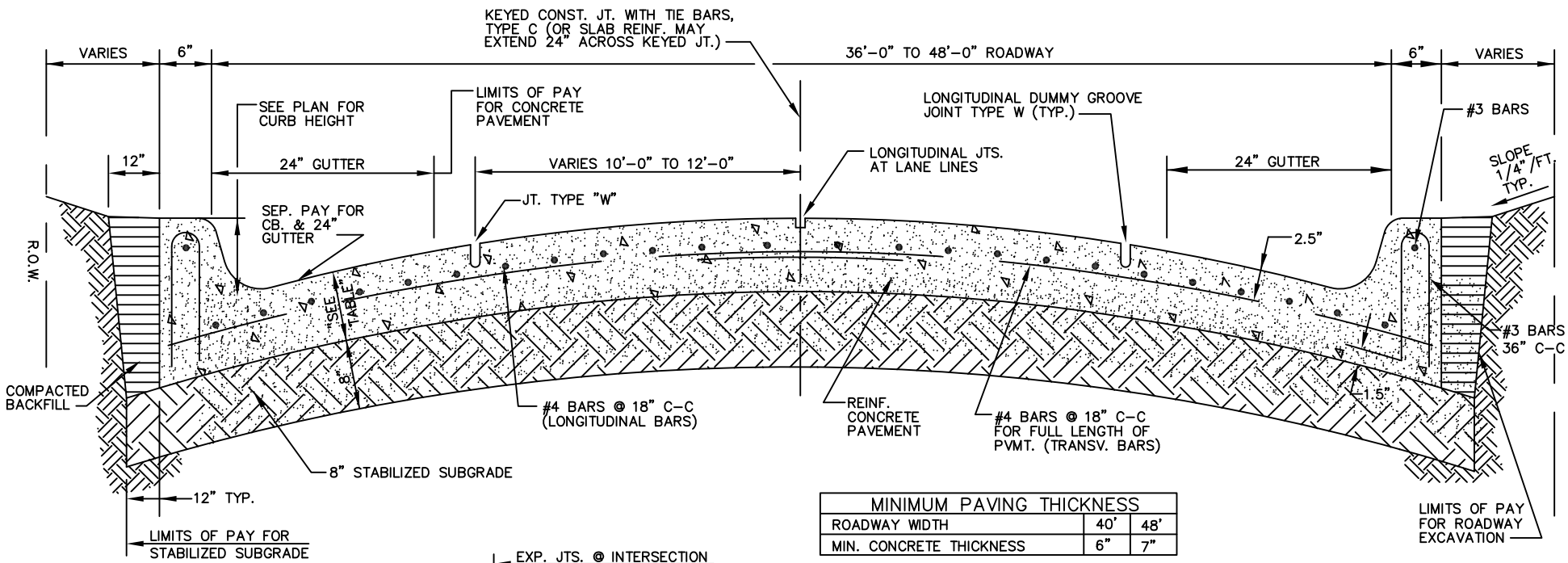
ORDINATES FOR PARABOLIC STREET CROWNS IN FEET				
RDWY.	30'	40'	48'	60'
CROWN	6"	7"	8"	8"
SEC.	R	R/C	C	A
DIST. OUT				
℄	0.000	0.000	0.000	0.000
5'	0.054	0.036	0.028	0.019
10'	0.217	0.143	0.113	0.074
15'	0.500	0.322	0.255	0.167
18'		0.464	0.367	0.240
20'		0.583	0.453	0.296
22'			0.548	0.359
24'			0.667	0.427
26'				0.501
28'				0.581

NORTH RICHLAND HILLS

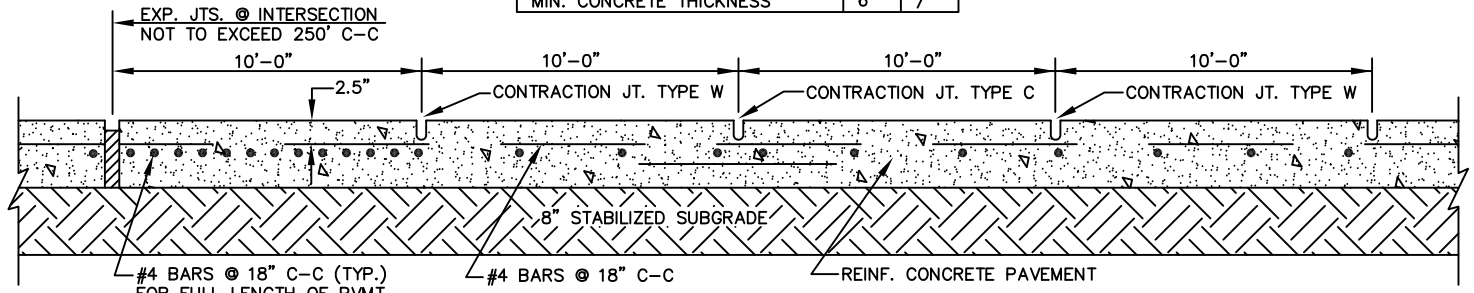
COLLECTOR STREETS
HOT MIX ASPHALT CONCRETE PAVEMENT

R 07-01-2009

FIGURE 3P



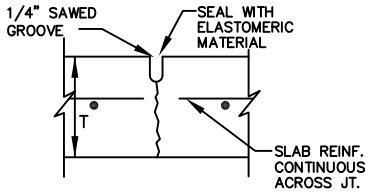
MINIMUM PAVING THICKNESS		
ROADWAY WIDTH	40'	48'
MIN. CONCRETE THICKNESS	6"	7"



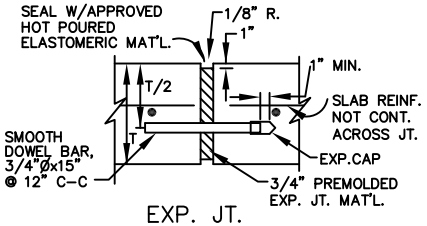
LONGITUDINAL SECTION

GENERAL NOTES:

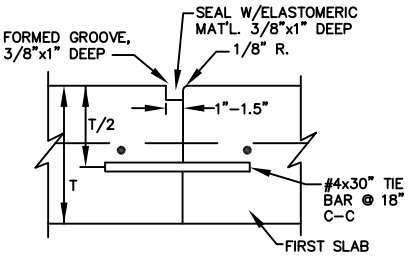
1. STEEL CHAIRS APPROVED BY THE OWNER'S PROJECT REPRESENTATIVE TO SUPPORT REINFORCING STEEL SHALL BE PLACED AT THE INTERSECTION OF LONGITUDINAL AND TRANSVERSE BARS.
2. PROVIDE CONTINUOUS WELDED DOWEL BAR CHAIR CONSISTING OF 2 NO. 6 GAGE WIRE CHAIR & DOWEL HOLDER AT EACH DOWEL & 2-3/8" DIA. STEEL BARS WELDED AT EACH INTERSECTION. ALL DOWEL BARS ACROSS JOINTS SHALL HAVE ONE END FULLY COATED WITH ASPHALT (AS AC-10) TO PREVENT BOND WITH CONCRETE OR APPROVED EQUAL. DOWEL BARS SHALL BE PROVIDED WITH EXPANSION CAPS.
3. PAVEMENT LAYOUT WILL NECESSITATE THAT ALL LONGITUDINAL JTS. COINCIDE WITH LANE LINES THRU LANE CONST. WILL BE CONTINUOUS WITH ALL LEFT TURN LANES & TRANSITIONS TO BE POURED AS FILL-INS SUBJECT TO APPROVAL BY THE OWNER'S PROJECT REP..
4. MIN. OF 6 LBS/IN/S.Y. LIME WILL BE REQ'D. FOR SUBGRADE STABILIZATION.
5. STRAIGHT CROWN (GABLE vs. PARABOLIC) MAY BE USED FOR CONCRETE STREETS. HEIGHT OF CROWN SHALL BE 7".
6. CLASS "C", 3600 PSI COMPRESSIVE STRENGTH CONCRETE SHALL BE USED.



TRANSVERSE CONTRACTION JT. TYPE W



EXP. JT. TYPE E



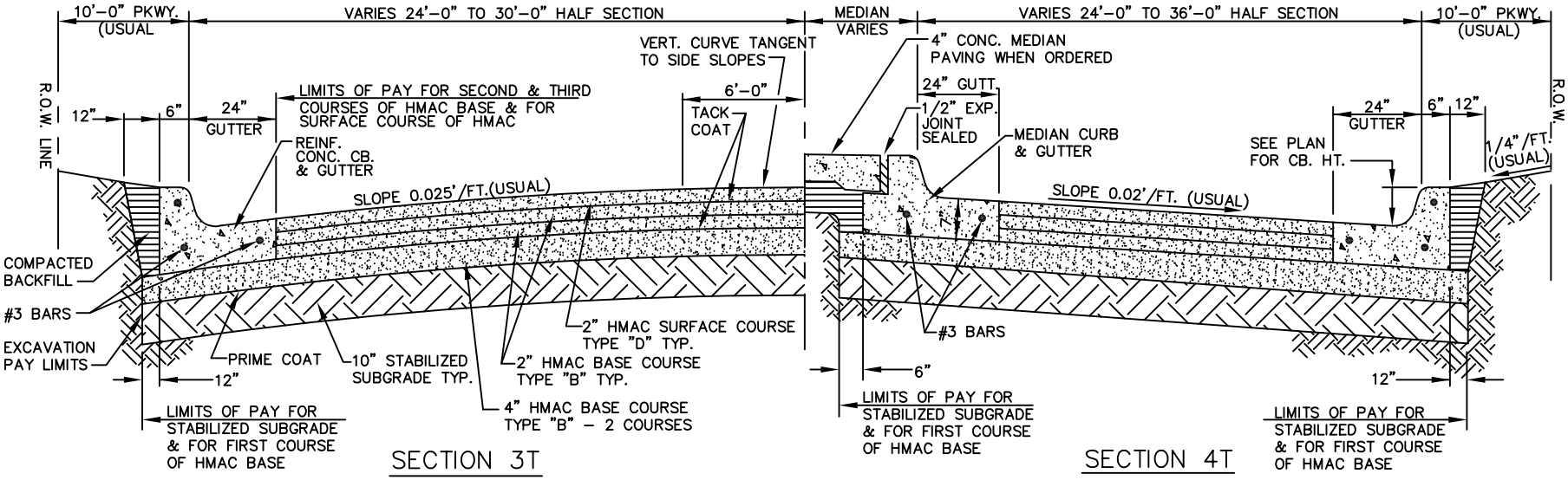
LONGITUDINAL OR TRANSVERSE CONST. JT. WITH TIE BAR TYPE C

NORTH RICHLAND HILLS

COLLECTOR STREETS
REINFORCED CONCRETE PAVEMENT

R 11-02-2009

FIGURE 4P



SECTION 3T

SECTION 4T

ARTERIAL & INDUSTRIAL STREETS

NOTES:

1. COAT WITH ASPHALT THE SIDES OF GUTTERS WHICH ARE IN CONTACT WITH HMAC PAVEMENT.
2. FOUNDATION COURSE-CEMENT OR LIME TREATED SUBGRADE (8")-IF THE NATURAL SUBGRADE HAS A P.I. LESS THAN 20, THE ENGINEER MAY SPECIFY CEMENT OR LIME TREATED SUBGRADE AFTER CONSIDERING LINEAR SHRINKAGE, SOIL CLASSIFICATION, SEEPAGE, AND OTHER FACTORS. IF THE NATURAL SUBGRADE HAS A P.I. GREATER THAN 20, LIME TREATED SUBGRADE SHALL BE USED. IF SUFFICIENT DEPTH OF SUITABLE SUBGRADE MATERIAL IS NOT AVAILABLE, IT SHALL BE REMOVED AND REPLACED WITH SUITABLE MATERIAL. AN ALTERNATE STABILIZING AGENT MAY BE USED IF APPROVED BY THE ENGINEER.
3. MINIMUM OF 6 LBS/IN/S.Y. LIME WILL BE REQUIRED FOR SUBGRADE STABILIZATION.
4. PRIME COAT SHALL BE APPLIED AT THE RATE OF 0.15-0.20 GALLONS PER S.Y.. TACK COAT SHALL BE APPLIED AT THE RATE OF 0.05-0.10 GALLONS PER S.Y..

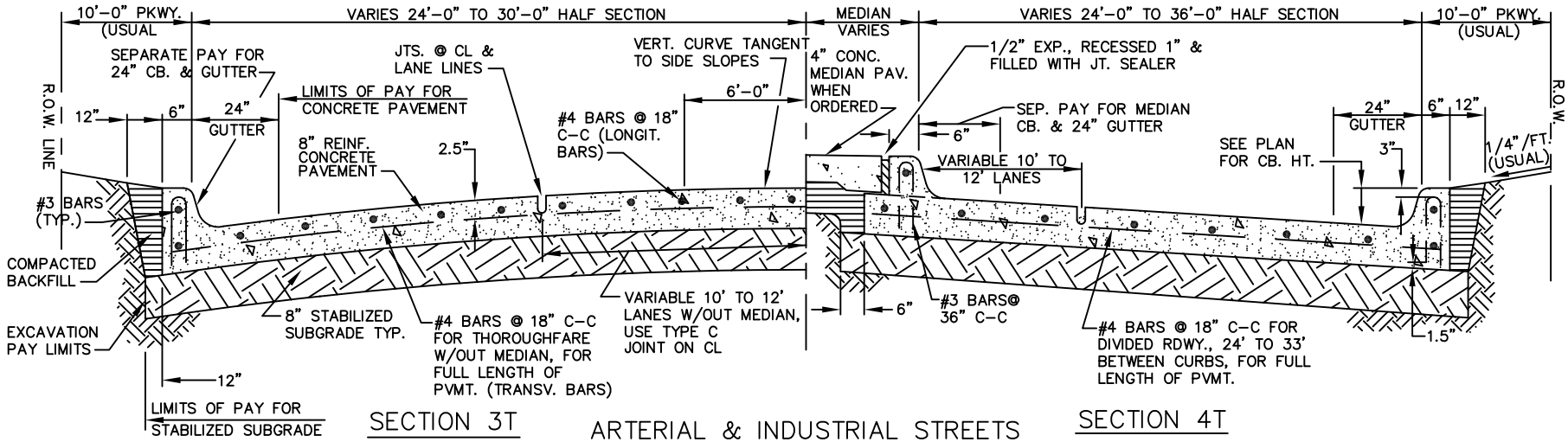
ORDINATES FOR PARABOLIC STREET CROWNS IN FEET				
RDWY.	30'	40'	48'	60'
CROWN	6"	7"	8"	8"
SEC.	R	R/C	C	A
DIST. OUT				
℄	0.000	0.000	0.000	0.000
5'	0.054	0.036	0.028	0.019
10'	0.217	0.143	0.113	0.074
15'	0.500	0.322	0.255	0.167
18'		0.464	0.367	0.240
20'		0.583	0.453	0.296
22'			0.548	0.359
24'			0.667	0.427
26'				0.501
28'				0.581

ARTERIAL & INDUSTRIAL STREETS
HOT MIX ASPHALT CONCRETE PAVEMENT

NORTH RICHLAND HILLS

R 07-01-2009

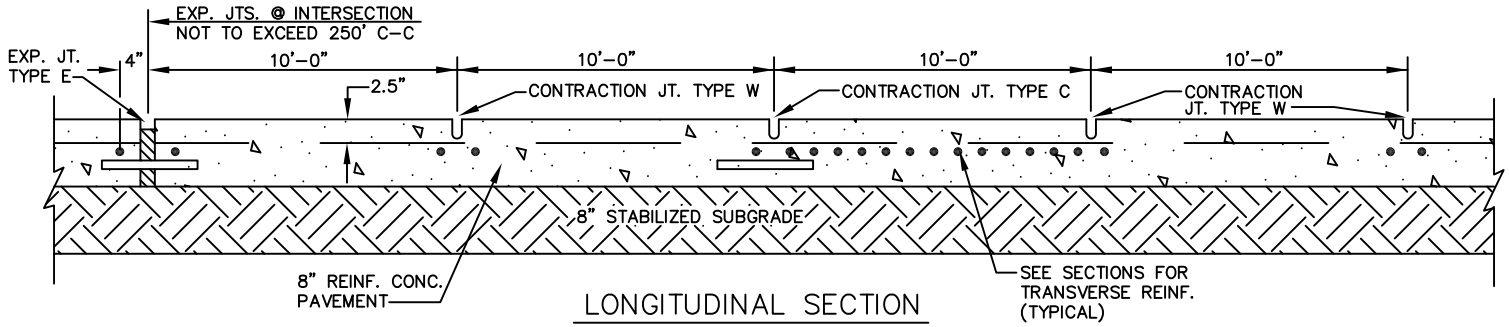
FIGURE 5P



SECTION 3T

ARTERIAL & INDUSTRIAL STREETS

SECTION 4T



LONGITUDINAL SECTION

GENERAL NOTES:

1. STEEL CHAIRS APPROVED BY THE OWNER'S PROJECT REPRESENTATIVE TO SUPPORT REINF. STEEL SHALL BE PLACED AT THE INTERSECTION OF LONGITUDINAL AND TRANSVERSE BARS AT SPACINGS OF 3'-0" LONGITUDINALLY AND 3'-4" TRANSVERSELY.

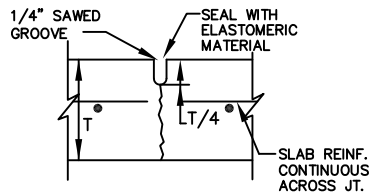
2. PROVIDE CONTINUOUS WELDED DOWEL BAR CHAIR CONSISTING OF 2 NO. 6 GAGE WIRE CHAIR AND DOWEL HOLDER AT EACH DOWEL & 2-3/8" O STEEL BARS WELDED AT EACH INTERSECTION. ALL DOWEL BARS SHALL HAVE ONE END FULLY COATED WITH ASPHALT (AS AC-10) TO PREVENT BOND WITH CONCRETE. DOWEL BARS SHALL BE PROVIDED WITH EXPANSION CAPS.

3. PAVEMENT LAYOUT WILL NECESSITATE THAT ALL LONGITUDINAL JOINTS COINCIDE WITH LANE LINES- THRU LANE CONST. WILL BE CONTINUOUS WITH ALL LEFT TURN LANES & TRANSITIONS TO BE POURED AS FILL-INS SUBJECT TO THE OWNER'S PROJECT REPRESENTATIVE.

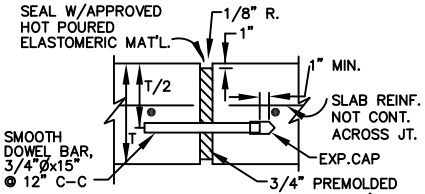
4. MINIMUM OF 6 LBS/IN/S.Y. LIME WILL BE REQUIRED FOR SUBGRADE STABILIZATION.

5. HEIGHT OF CROWN SHALL BE 8".

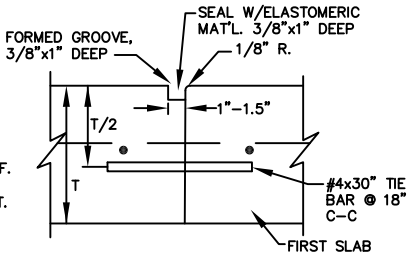
6. CLASS "C", 3600 PSI COMPRESSIVE STRENGTH CONCRETE SHALL BE USED.



TRANSVERSE CONTRACTION JT. TYPE W



EXP. JT. TYPE E



LONGITUDINAL OR TRANSVERSE CONST. JT. WITH TIE BAR TYPE C

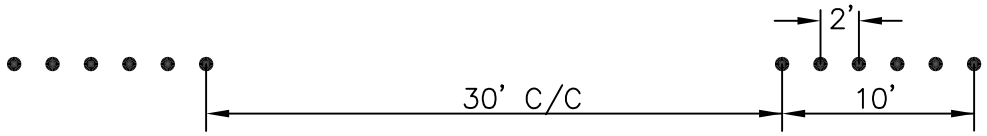
NORTH RICHLAND HILLS

ARTERIAL & INDUSTRIAL STREETS
REINFORCED CONCRETE PAVEMENT

R 11-02-2009

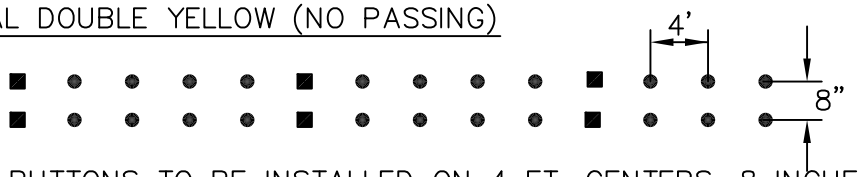
FIGURE 6P

TYPICAL DASH LINE — 10 FT. DASH WITH 6 BUTTONS ON 2 FT. CENTERS 30 FT. SPACES



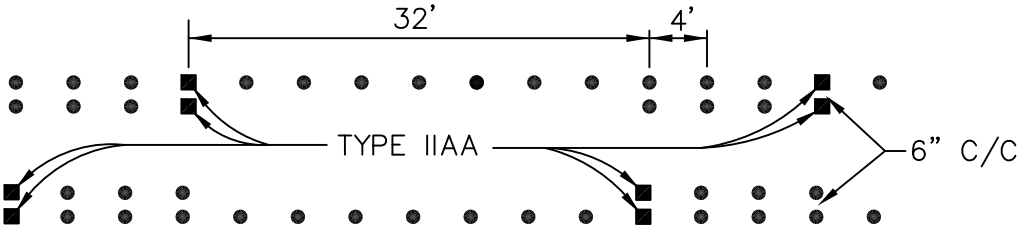
NOTE: LEAD BUTTONS FACING TRAFFIC FLOW WILL BE REFLECTIVE TYPE IC OR TYPE IA. ALL OTHER BUTTONS TYPE "W" OR "Y", AS SPECIFIED ON PLANS.

TYPICAL DOUBLE YELLOW (NO PASSING)



NOTE: BUTTONS TO BE INSTALLED ON 4 FT. CENTERS, 8 INCHES APART. LINE TO TERMINATE FOR INTERSECTIONS. BUTTONS TO BE TYPE "Y" WITH TYPE IIAA BUTTONS ON 20 FT. CENTERS. TYPE IIAA BUTTONS TO BE USED AT THE START AND END OF STRIPES AT INTERSECTIONS.

TYPICAL CONTINUOUS LEFT TURN LANE



NOTE: ALL BUTTONS TO BE TYPE "Y" AND TYPE IIAA. OUTSIDE LINE TO BE ON 4 FT. CENTERS AS ABOVE. INSIDE DASH TO BE ON 4 FT. CENTERS AS ABOVE. TYPE IIAA BUTTONS AT START OF EACH DASH TO MATCH TYPE IIAA BUTTONS IN THE LINE. LINES AND DASHES TO TERMINATE AT INTERSECTIONS WITH TYPE IIAA BUTTONS.

SPECIAL PROVISIONS:

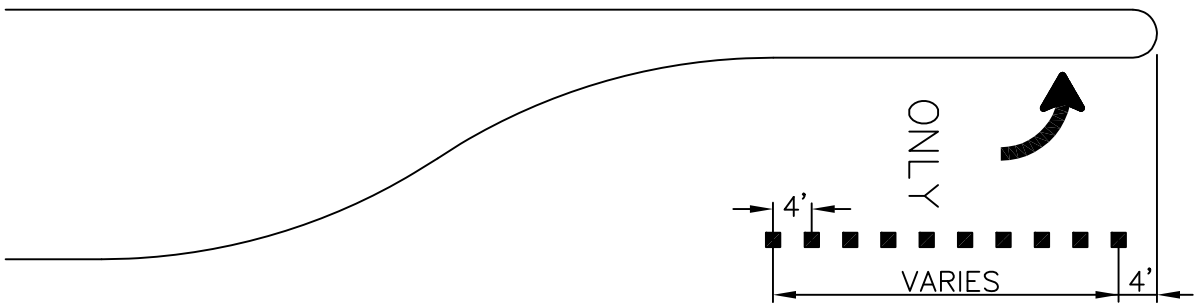
1. BUTTONS AS PER ITEM 672 TXDOT STD. SPECS. 2004.
2. ADHESIVE – TYPE II M AS PER ITEM 672 TXDOT STD. SPECS. 2004.
3. CONSTRUCTION – AS PER ITEM 672.3 TXDOT STD. SPECS. 2004.
4. REMOVAL – AS PER ITEM 677 TXDOT STD. SPECS. 2004.
5. ALL CONCRETE STREETS TO BE SAND BLASTED BEFORE BUTTON APPLICATION.
6. DESIGN TO BE APPROVED BY CITY OF NORTH RICHLAND HILLS.
7. COLOR OF BUTTONS TO BE FURNISHED AND INSTALLED IN ACCORDANCE WITH THE APPLICABLE PROVISIONS OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
8. SIZE OF ALL BUTTONS TO BE FOUR (4") INCHES IN DIAMETER UNLESS OTHERWISE SPECIFIED.

PAVEMENT MARKING DETAILS

NORTH RICHLAND HILLS

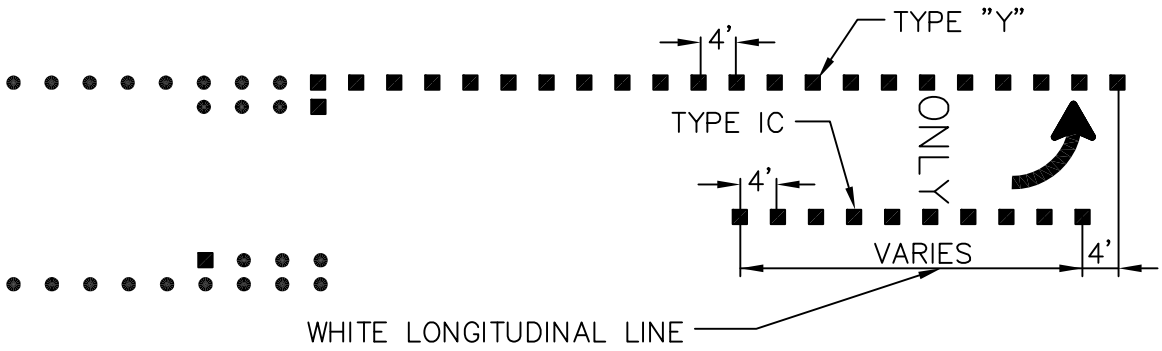
R 11-02-2009 FIGURE 7P

STREET WITH CURBED MEDIAN



NOTE: ALL BUTTONS TO BE TYPE IC.

STREET WITH TERMINATING CONTINUOUS LEFT TURN LANE AT SIGNALIZED INTERSECTION:



1. A STORAGE LANE SHALL BE DESIGNED TO ACCOMODATE THE APPROPRIATE AMOUNT OF TRAFFIC.

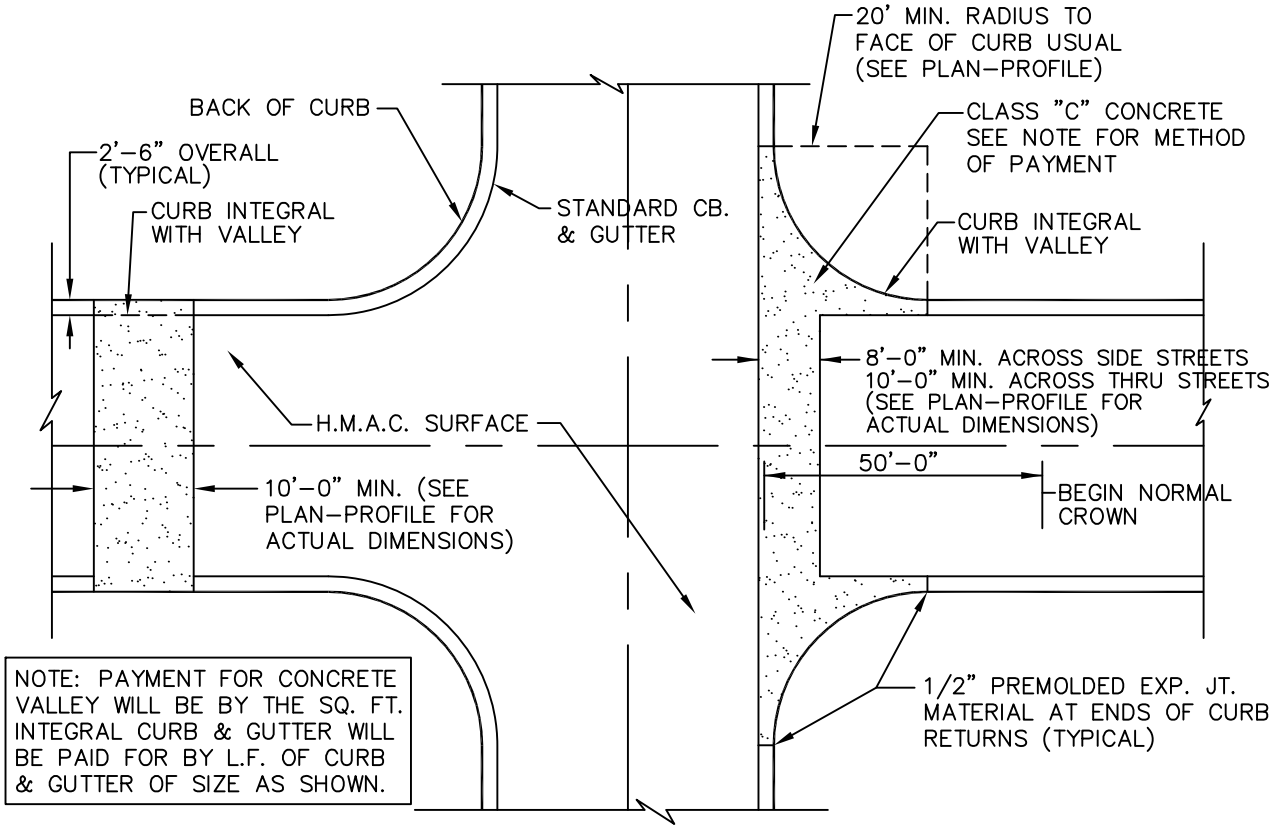
2. THE WHITE LONGITUDINAL LINE SHALL BE OF TYPE IC. (SEE LAYOUT DETAIL ABOVE.)

3. THE USE OF HOT THERMOPLASTICS WILL BE PERMITTED WHEN APPROVED BY THE PUBLIC WORKS STREETS DEPARTMENT.

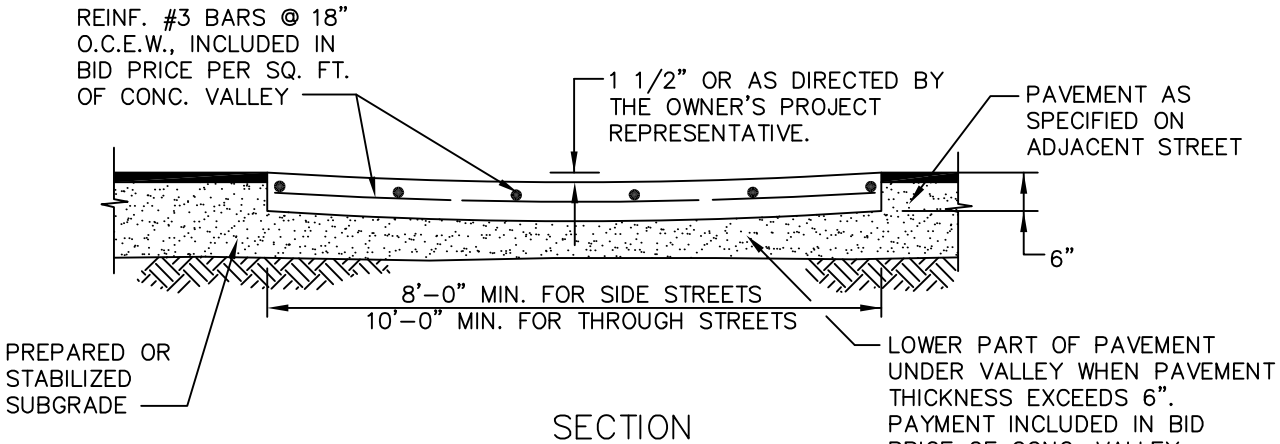
TYPICAL LEFT TURN LANES

NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 8P



PLAN
NOT TO SCALE



SECTION
NOT TO SCALE

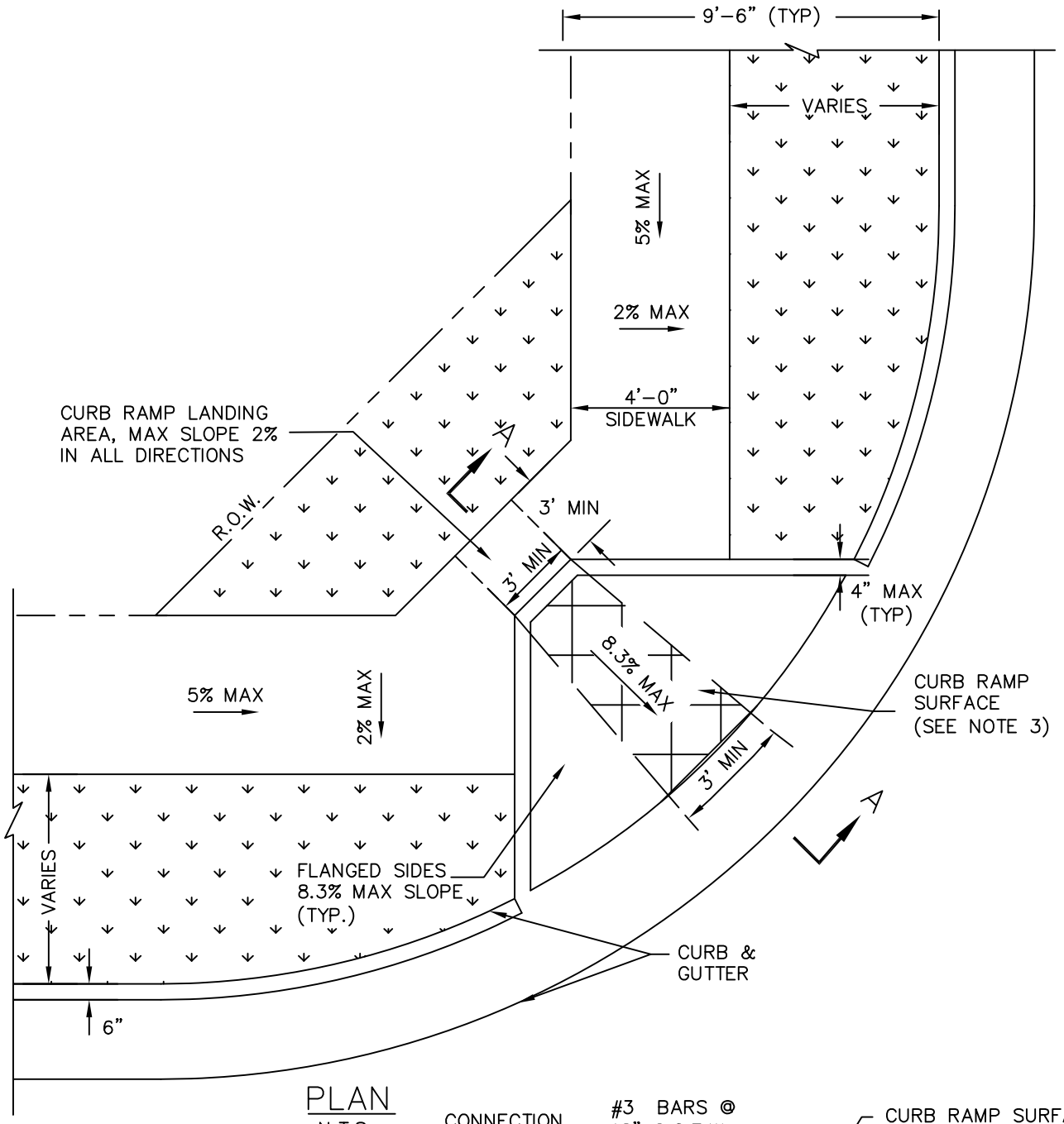
CROWN TRANSITION FOR CONCRETE VALLEY			
DISTANCE FROM ℄ OF VALLEY	CROWN		
	6"	7"	8"
0'	0.000'	0.000'	0.000'
5'	0.167'	0.167'	0.167'
10'	0.290'	0.290'	0.290'
20'	0.445'	0.445'	0.465'
30'	0.500'	0.540'	0.580'
40'	0.500'	0.583'	0.635'
50'	0.500'	0.583'	0.667'

NOTE: CONCRETE SHALL BE CLASS "C", 3600 PSI COMPRESSIVE STRENGTH AT 28 DAYS.

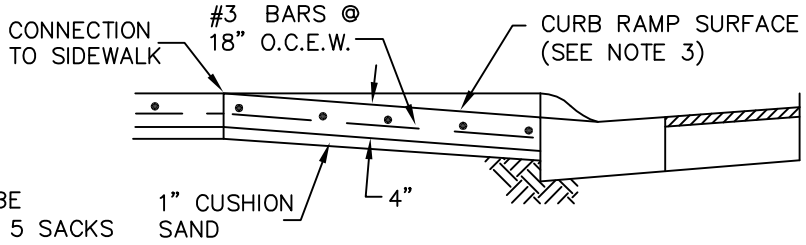
CONCRETE VALLEY DETAILS

NORTH RICHLAND HILLS

R 07–01–2009 FIGURE 9P



PLAN
N.T.S.



SECTION A-A
N.T.S.

NOTE:

1. ALL SIDEWALKS AND CURB RAMPS SHALL BE CONSTRUCTED OF CLASS "A" CONCRETE WITH 5 SACKS OF CEMENT/C.Y., MAXIMUM SLUMP OF 5 INCHES, AND A 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS.

2. CURB RAMP SURFACE COLOR SHALL BE BRICK RED.

3. CURB RAMP SURFACE SHALL COMPLY WITH CURRENT REQUIREMENTS OF TEXAS ACCESSIBILITY STANDARDS AND AMERICANS WITH DISABILITY ACT (ADA). SURFACES MUST BE APPROVED BY THE PUBLIC WORKS DEPARTMENT PRIOR TO CONSTRUCTING THE CURB RAMP.

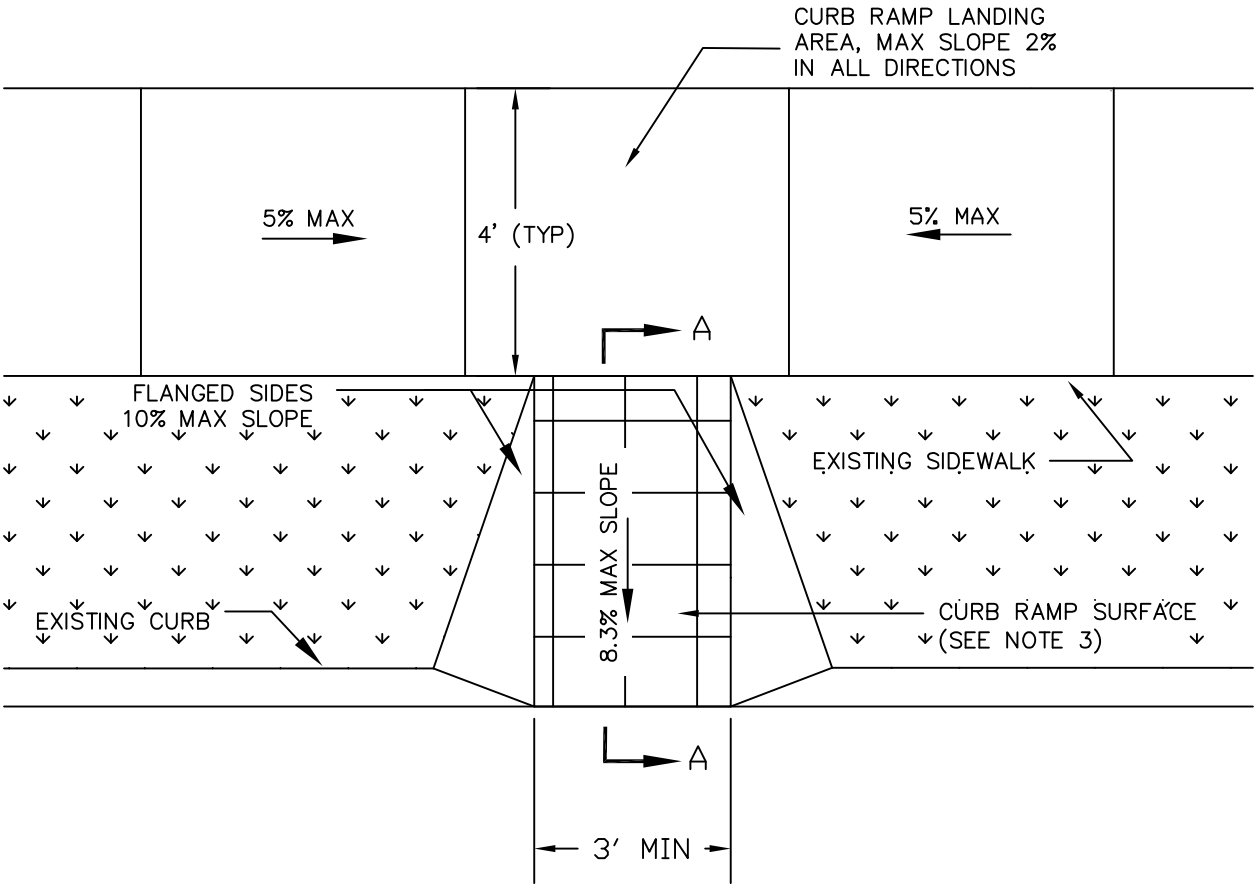
4. CURB RAMPS MUST COMPLY WITH ALL REQUIREMENTS OF TEXAS ACCESSIBILITY STANDARDS SECTION 4.7.

CURB RAMP DETAIL I

NORTH
RICHLAND
HILLS

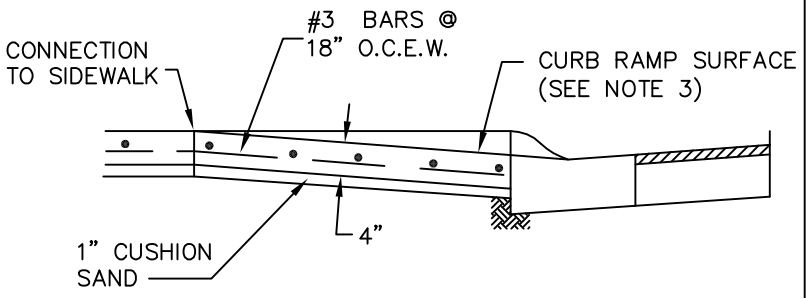
R 07-01-2009 FIGURE 10P-1

REMOVE 3 PANELS OF EXISTING SIDEWALK.



PLAN

N.T.S.



SECTION A–A

N.T.S.

NOTE:

1. All SIDEWALKS AND CURB RAMPS SHALL BE CONSTRUCTED OF CLASS "A" CONCRETE WITH 5 SACKS OF CEMENT/C.Y., MAXIMUM SLUMP OF 5 INCHES, AND A 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS.

2. CURB RAMP SURFACE COLOR SHALL BE BRICK RED.

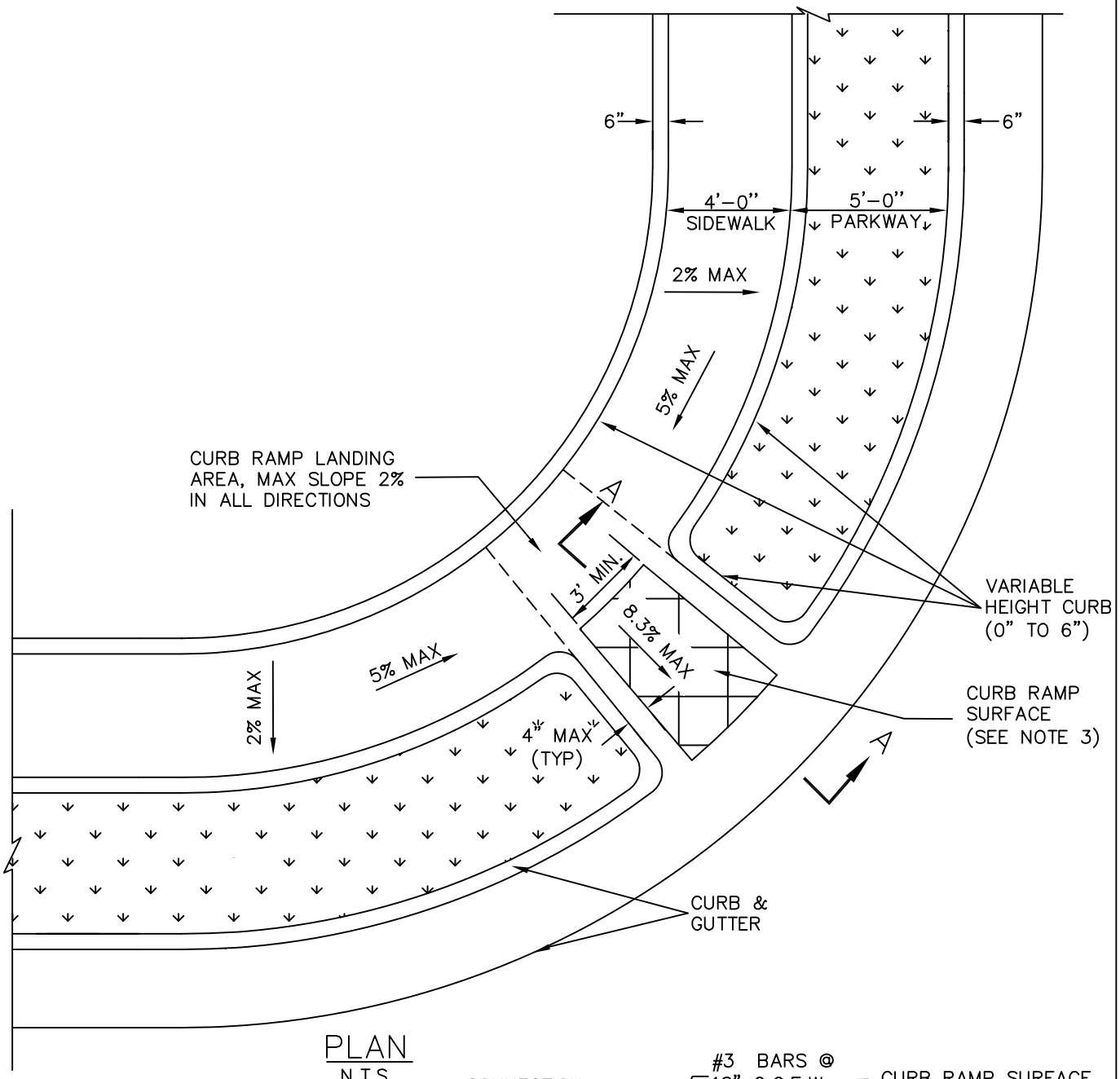
3. CURB RAMP SURFACE SHALL COMPLY WITH CURRENT REQUIREMENTS OF TEXAS ACCESSIBILITY STANDARDS AND AMERICANS WITH DISABILITY ACT (ADA). SURFACES MUST BE APPROVED BY THE PUBLIC WORKS DEPARTMENT PRIOR TO CONSTRUCTING THE CURB RAMP.

4. CURB RAMPS MUST COMPLY WITH ALL REQUIREMENTS OF TEXAS ACCESSIBILITY STANDARDS SECTION 4.7.

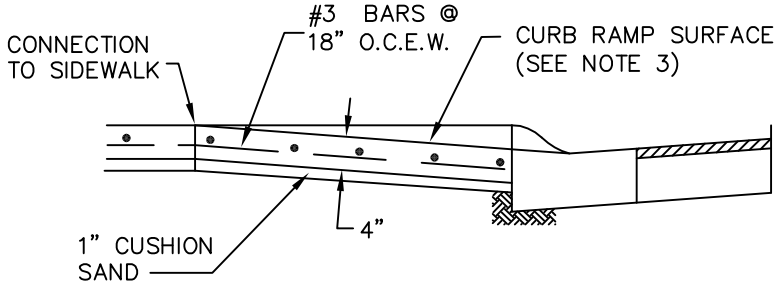
CURB RAMP DETAIL II

NORTH RICHLAND HILLS

R 07–01–2009 FIGURE 10P–2



PLAN
N.T.S.



SECTION A–A
N.T.S.

NOTES:

1. ALL SIDEWALKS AND CURB RAMPS SHALL BE CONSTRUCTED OF CLASS "A" CONCRETE WITH 5 SACKS OF CEMENT/C.Y., MAXIMUM SLUMP OF 5 INCHES, AND A 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS.

2. CURB RAMP SURFACE COLOR SHALL BE BRICK RED.

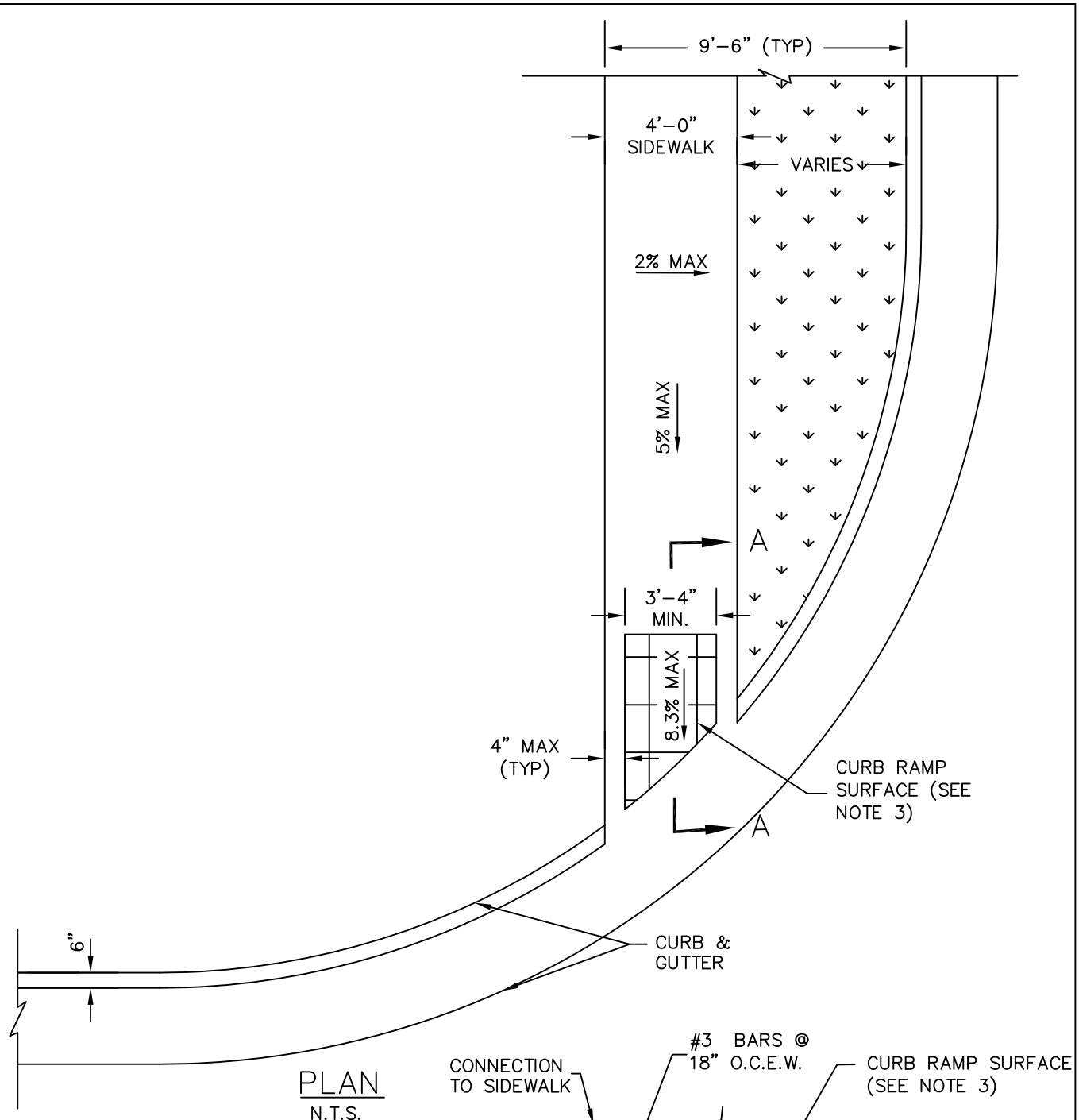
3. CURB RAMP SURFACE SHALL COMPLY WITH CURRENT REQUIREMENTS OF TEXAS ACCESSIBILITY STANDARDS AND AMERICANS WITH DISABILITY ACT (ADA). SURFACES MUST BE APPROVED BY THE PUBLIC WORKS DEPARTMENT PRIOR TO CONSTRUCTING THE CURB RAMP.

4. CURB RAMP MUST COMPLY WITH ALL REQUIREMENTS OF TEXAS ACCESSIBILITY STANDARDS SECTION 4.7.

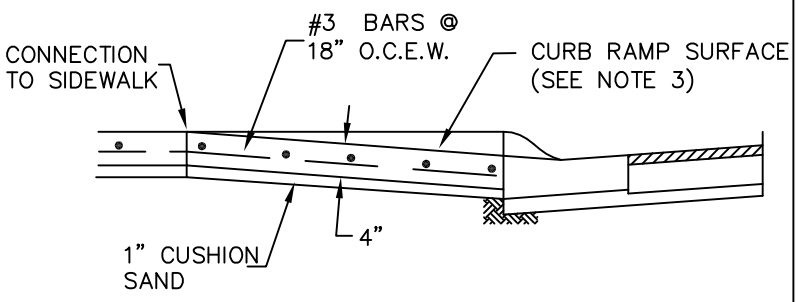
CURB RAMP DETAIL III

NORTH
RICHLAND
HILLS

R 07–01–2009 FIGURE 10P–3



PLAN
N.T.S.



SECTION A-A
N.T.S.

NOTES:

1. ALL SIDEWALKS AND CURB RAMPS SHALL BE CONSTRUCTED OF CLASS "A" CONCRETE WITH 5 SACKS OF CEMENT/C.Y., MAXIMUM SLUMP OF 5 INCHES, AND A 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS.

2. CURB RAMP SURFACE COLOR SHALL BE BRICK RED.

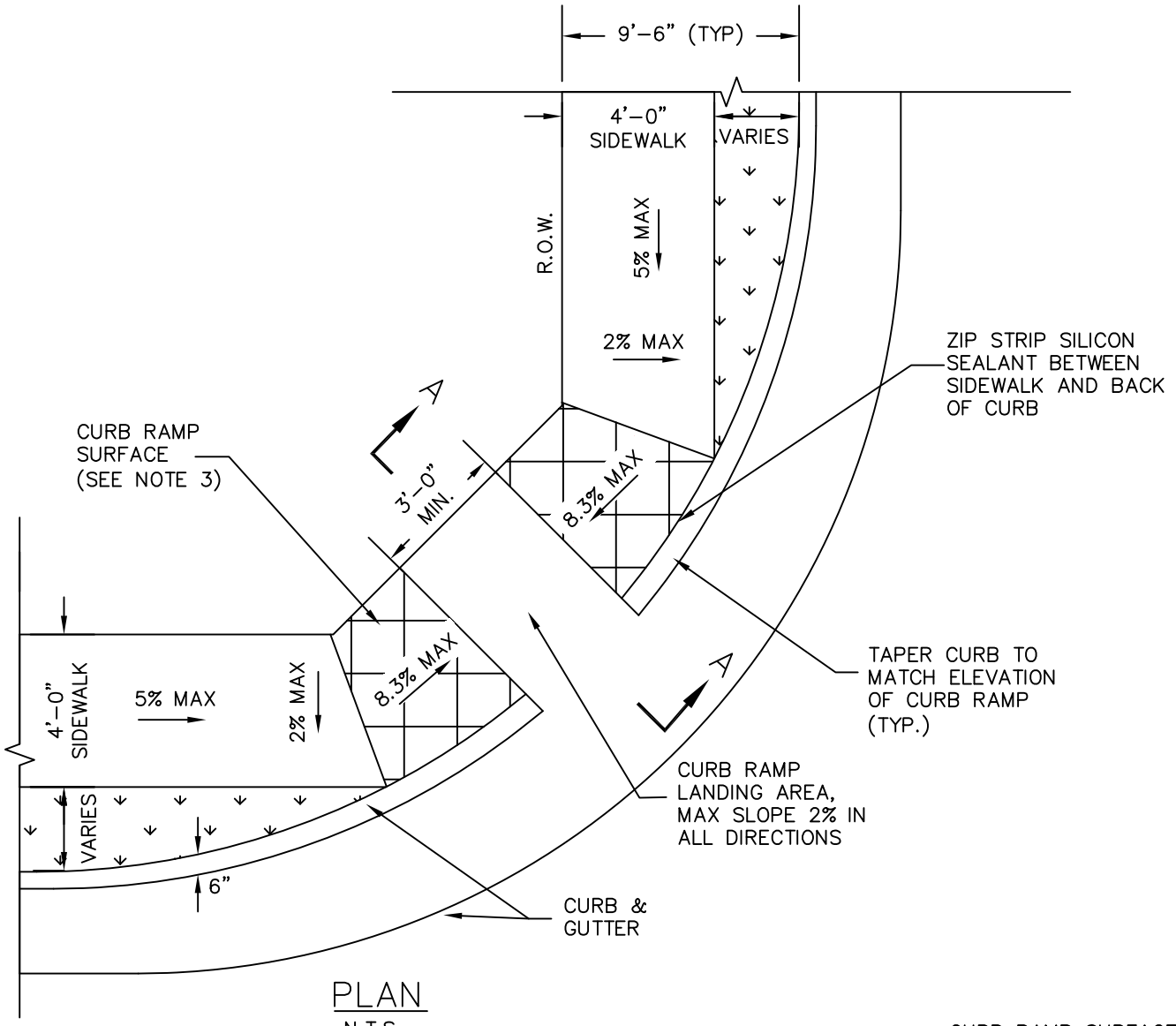
3. CURB RAMP SURFACE SHALL COMPLY WITH CURRENT REQUIREMENTS OF TEXAS ACCESSIBILITY STANDARDS AND AMERICANS WITH DISABILITY ACT (ADA). SURFACES MUST BE APPROVED BY THE PUBLIC WORKS DEPARTMENT PRIOR TO CONSTRUCTING THE CURB RAMP.

4. CURB RAMPS MUST COMPLY WITH ALL REQUIREMENTS OF TEXAS ACCESSIBILITY STANDARDS SECTION 4.7.

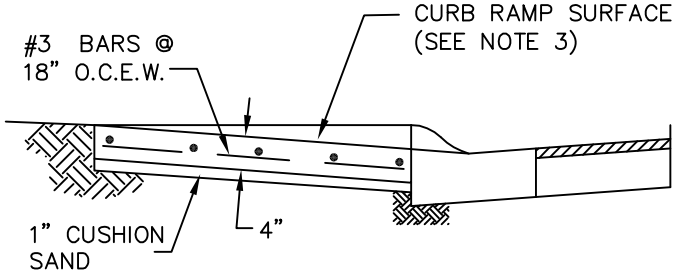
CURB RAMP DETAIL IV

NORTH
RICHLAND
HILLS

R 07-01-2009 FIGURE 10P-4



PLAN
N.T.S.



SECTION A-A
N.T.S.

NOTE:

1. ALL SIDEWALKS AND CURB RAMPS SHALL BE CONSTRUCTED OF CLASS "A" CONCRETE WITH 5 SACKS OF CEMENT/C.Y., MAXIMUM SLUMP OF 5 INCHES, AND A 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS.

2. CURB RAMP SURFACE COLOR SHALL BE BRICK RED.

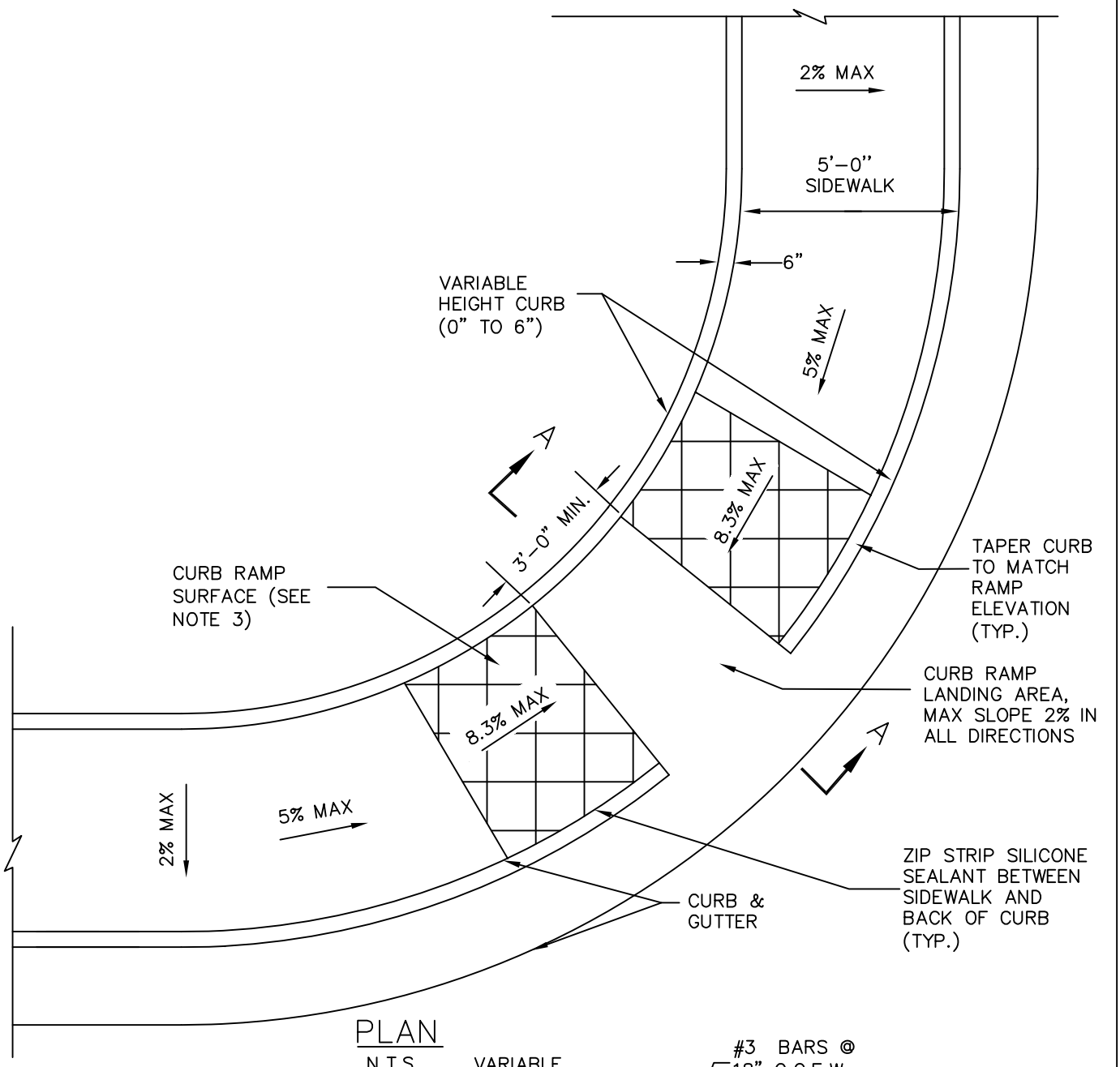
3. CURB RAMP SURFACE SHALL COMPLY WITH CURRENT REQUIREMENTS OF TEXAS ACCESSIBILITY STANDARDS AND AMERICANS WITH DISABILITY ACT (ADA). SURFACES MUST BE APPROVED BY THE PUBLIC WORKS DEPARTMENT PRIOR TO CONSTRUCTING THE CURB RAMP.

4. CURB RAMPS MUST COMPLY WITH ALL REQUIREMENTS OF TEXAS ACCESSIBILITY STANDARDS SECTION 4.7.

CURB RAMP DETAIL V

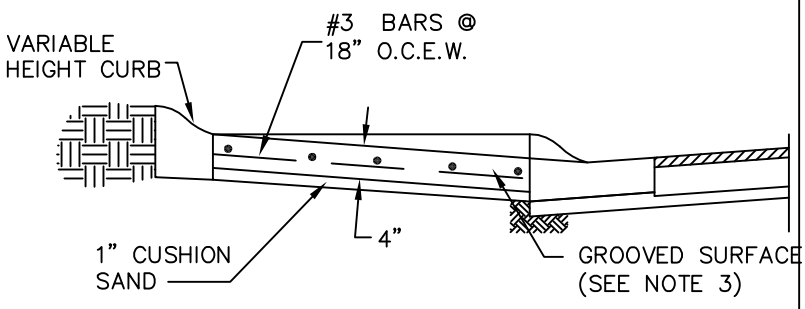
NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 10P-5



PLAN

N.T.S.



SECTION A–A

N.T.S.

NOTES:

1. ALL SIDEWALKS AND CURB RAMPS SHALL BE CONSTRUCTED OF CLASS "A" CONCRETE WITH 5 SACKS OF CEMENT/C.Y., MAXIMUM SLUMP OF 5 INCHES, AND A 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS.

2. CURB RAMP SURFACE COLOR SHALL BE BRICK RED.

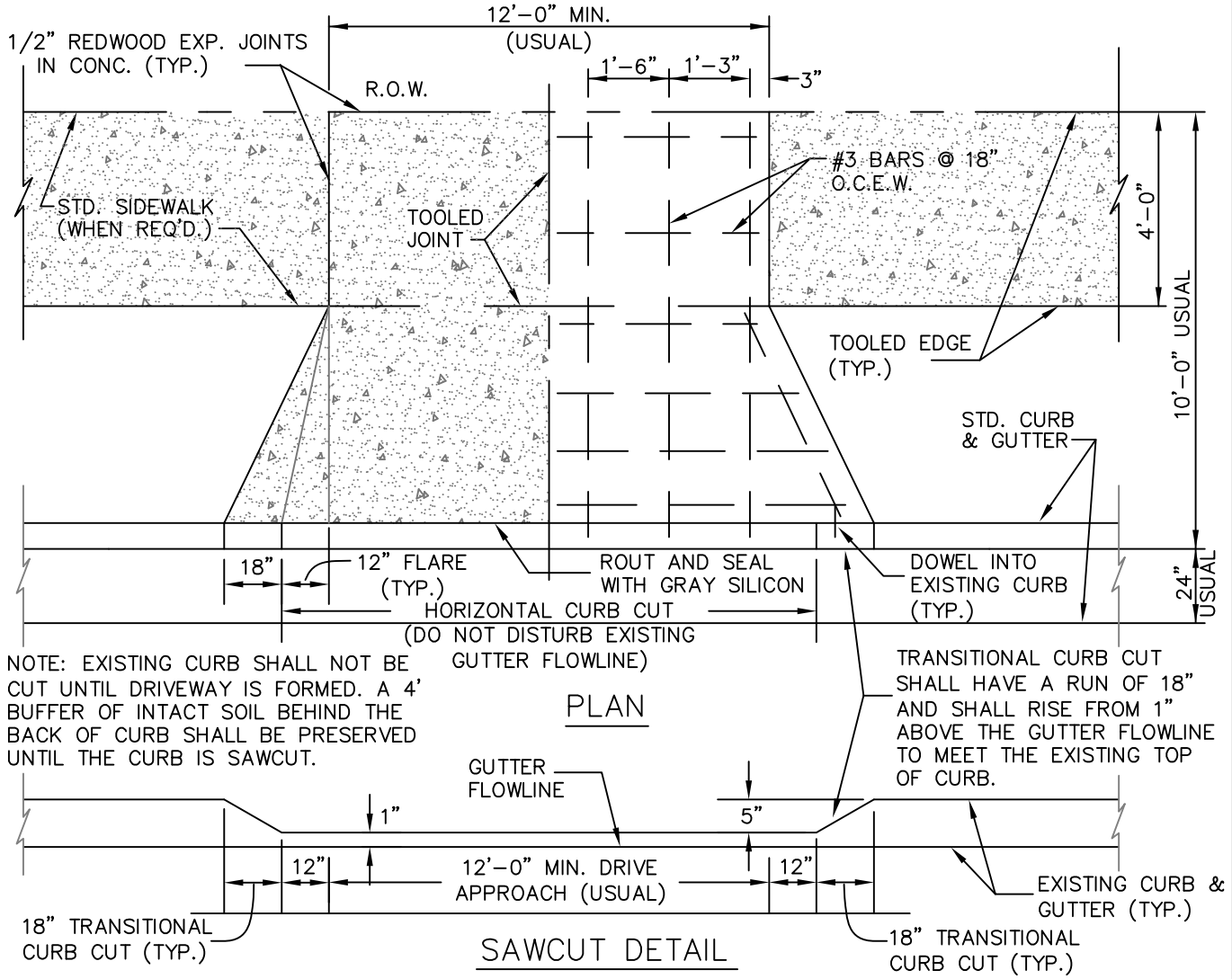
3. CURB RAMP SURFACE SHALL COMPLY WITH CURRENT REQUIREMENTS OF TEXAS ACCESSIBILITY STANDARDS AND AMERICANS WITH DISABILITY ACT (ADA). SURFACES MUST BE APPROVED BY THE PUBLIC WORKS DEPARTMENT PRIOR TO CONSTRUCTING THE CURB RAMP.

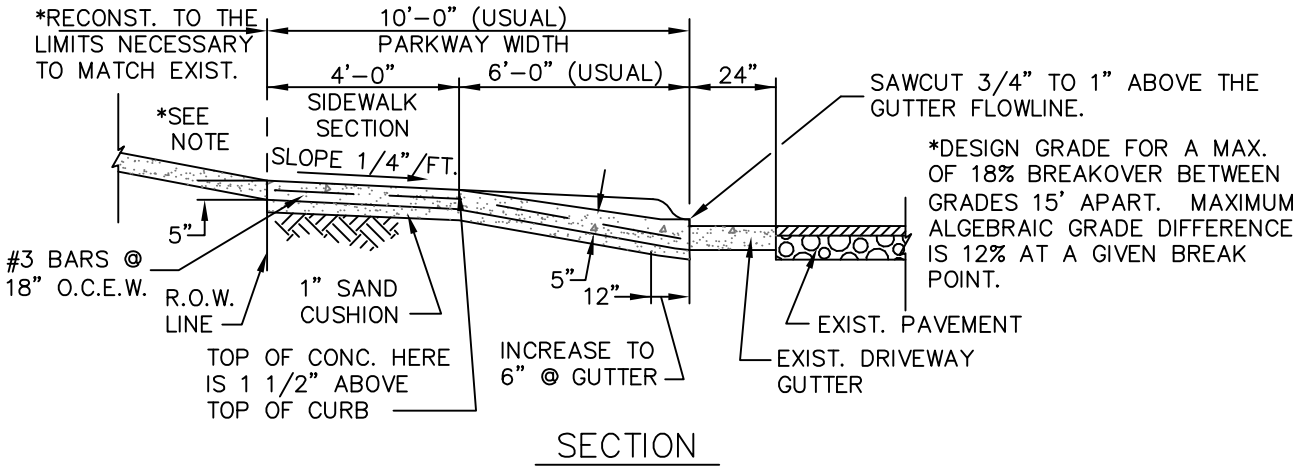
4. CURB RAMP MUST COMPLY WITH ALL REQUIREMENTS OF TEXAS ACCESSIBILITY STANDARDS SECTION 4.7.

CURB RAMP DETAIL VI

NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 10P-6





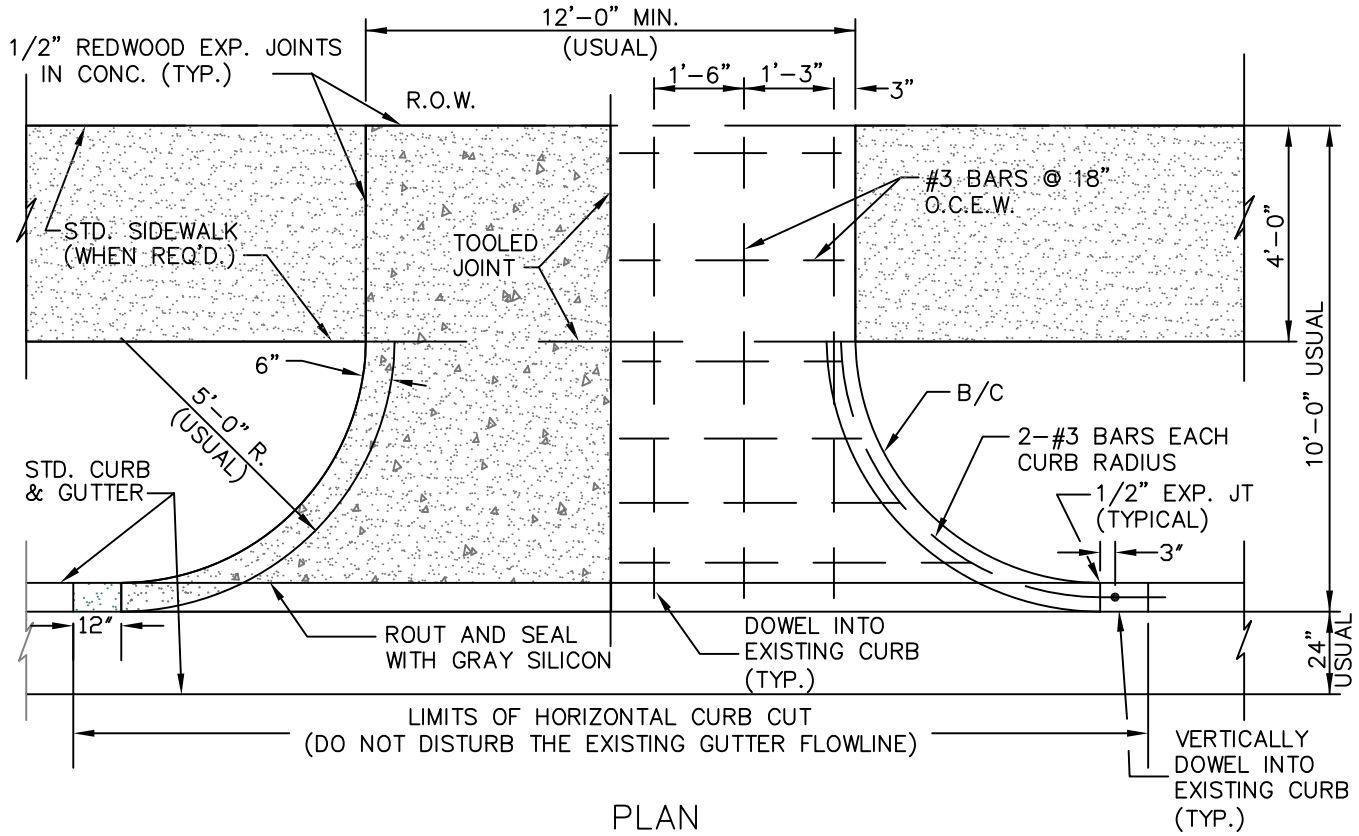
NOTES:

1. A HORIZONTAL CURB CUT IS REQUIRED FOR ALL DRIVE APPROACHES ONTO EXISTING STREETS. THE CURB CUT SHALL BE 3/4" TO 1" ABOVE THE GUTTER FLOWLINE.
2. ALL EXPOSED EDGES SHALL BE GROUND TO A 1/4" RADIUS.
3. MINIMUM THICKNESS OF DRIVEWAY IS 5", USE 3000 PSI COMPRESSIVE STRENGTH CONCRETE WITH 5" MAXIMUM SLUMP.
4. CONCRETE TO BE POURED WITHIN 48 HOURS FROM THE TIME THE CURB IS SAWCUT.
5. PARKWAY, SIDEWALK, AND DRIVEWAY SIDEWALK SECTION WILL ALL HAVE A 1/4" PER FOOT SLOPE DOWN IN THE DIRECTION OF THE TOP OF CURB.
6. SEE FIGURE 4P FOR EXPANSION JOINT DETAIL.

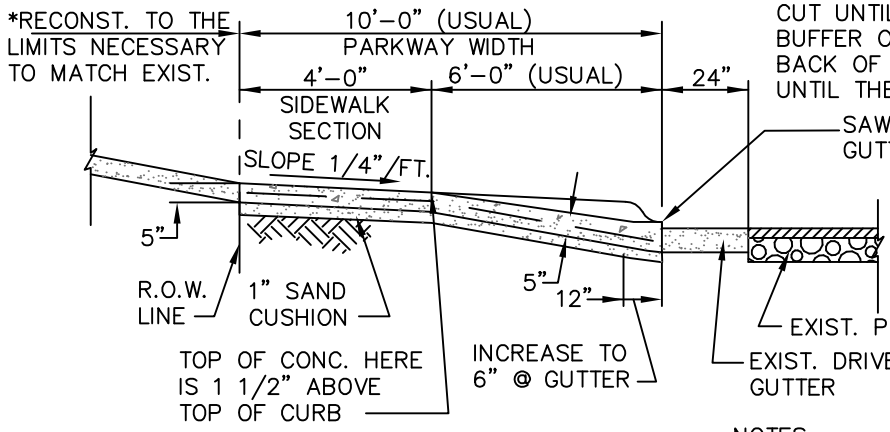
RESIDENTIAL DRIVE DETAILS

NORTH
RICHLAND
HILLS

R 07-01-2009 FIGURE 11P-1



PLAN

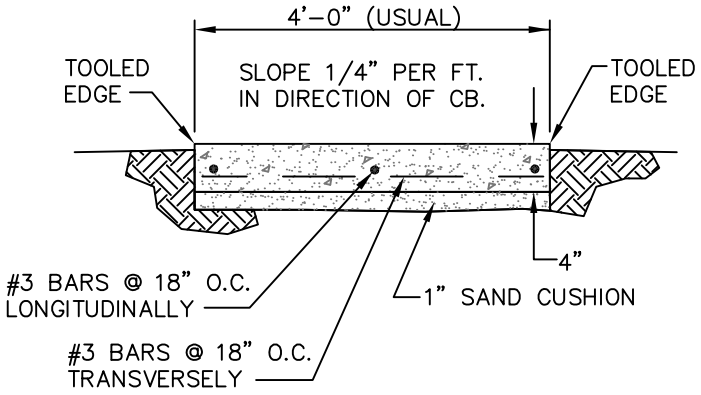


NOTE: EXISTING CURB SHALL NOT BE CUT UNTIL DRIVEWAY IS FORMED. A 4' BUFFER OF INTACT SOIL BEHIND THE BACK OF CURB SHALL BE PRESERVED UNTIL THE CURB IS SAWCUT.

SAWCUT 3/4" TO 1" ABOVE THE GUTTER FLOWLINE.

*DESIGN GRADE FOR A MAX. OF 18% BREAKOVER BETWEEN GRADES 15' APART. MAXIMUM ALGEBRAIC GRADE DIFFERENCE IS 12% AT A GIVEN BREAK POINT.

SECTION



DETAIL

STANDARD SIDEWALK

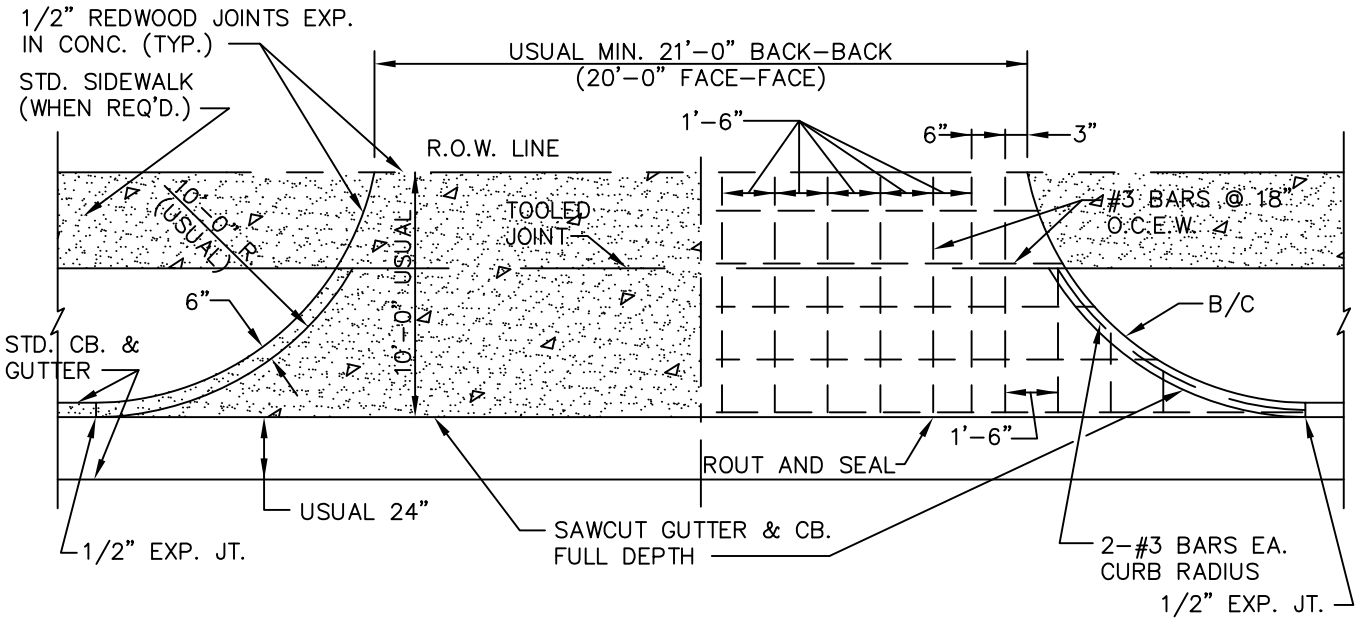
NOTES:

1. A HORIZONTAL CURB CUT IS REQUIRED FOR ALL DRIVE APPROACHES ONTO EXISTING STREETS. THE EXISTING CURB CUT SHALL BE 3/4" TO 1" ABOVE THE GUTTER FLOWLINE.
2. ALL EXPOSED EDGES SHALL BE GROUND TO A 1/4" RADIUS.
3. MINIMUM THICKNESS OF DRIVEWAY IS 5", USE 3000 PSI COMPRESSIVE STRENGTH CONCRETE WITH 5" MAXIMUM SLUMP.
4. CONCRETE TO BE POURED WITHIN 48 HOURS FROM THE TIME THE CURB & GUTTER IS SAWCUT.
5. PARKWAY, SIDEWALK, AND DRIVEWAY SIDEWALK SECTION WILL ALL HAVE A 1/4" PER FOOT SLOPE DOWN IN THE DIRECTION OF THE TOP OF CURB.
6. SEE FIGURE 4P FOR EXPANSION JOINT DETAIL.

RESIDENTIAL DRIVE DETAILS

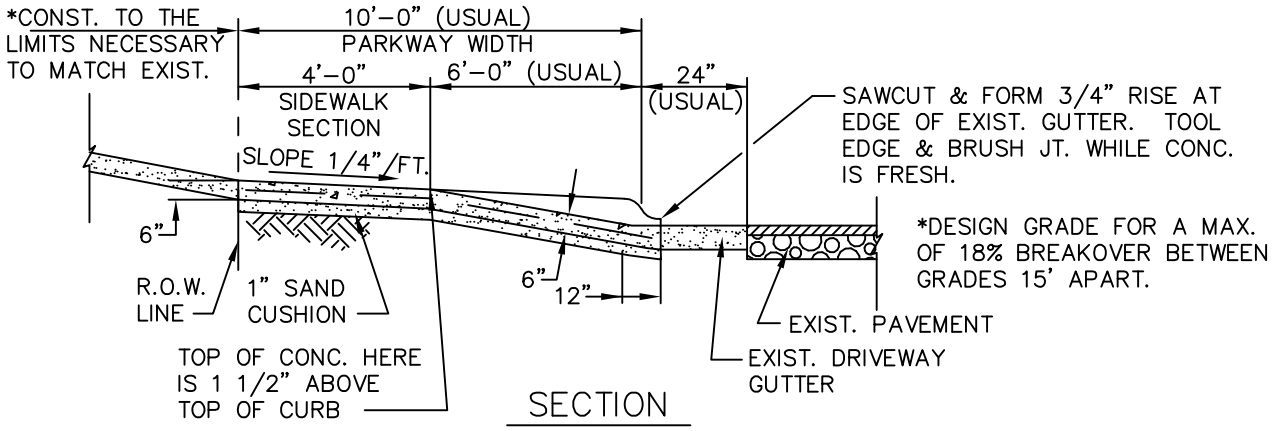
NORTH
RICHLAND
HILLS

R 07-01-2009 FIGURE 11P-2

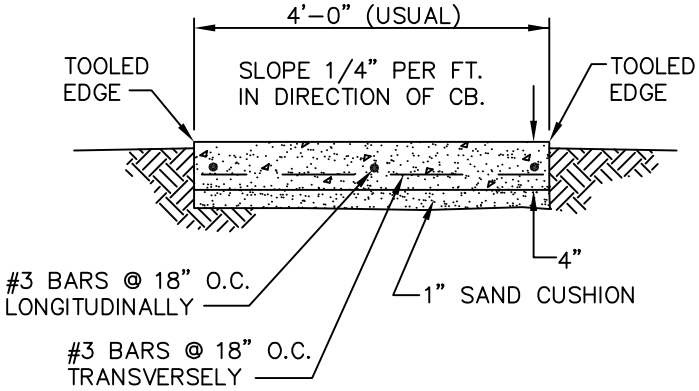


PLAN

NOTE: IF GUTTER IS CRACKED, DRIVEWAY AND GUTTER MUST BE POURED MONOLITHICALLY.



SECTION



DETAIL

STANDARD SIDEWALK

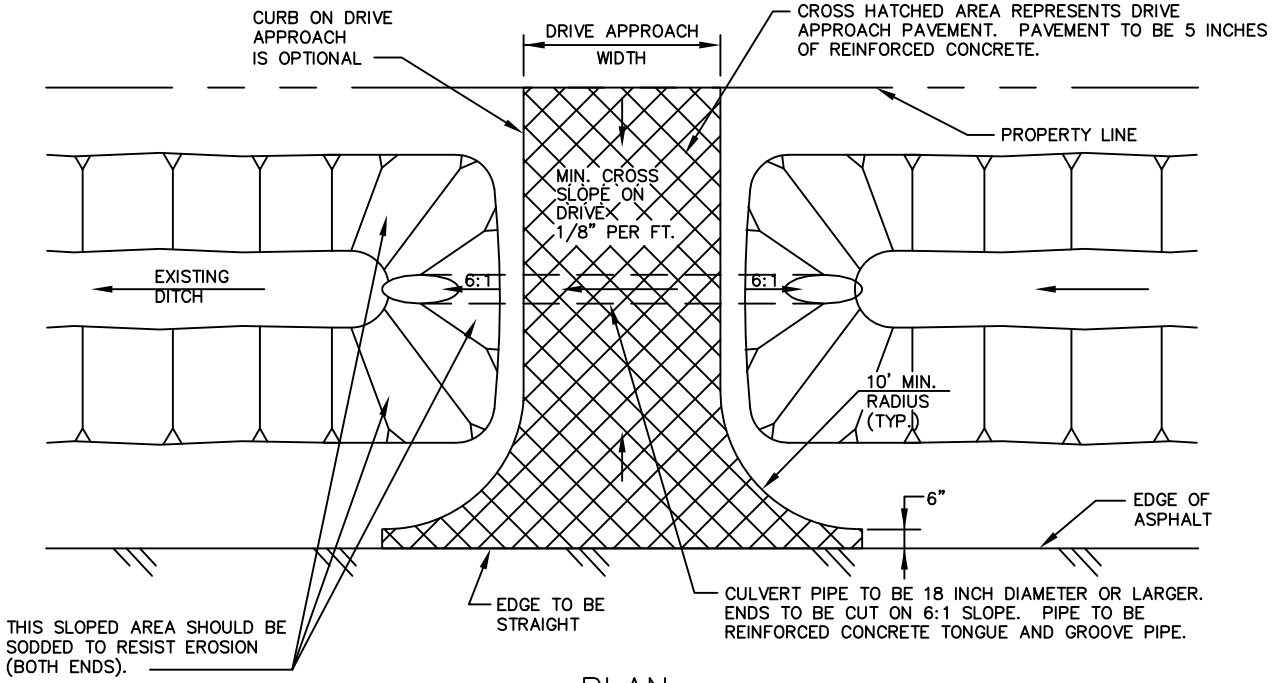
NOTES:

1. MINIMUM THICKNESS OF DRIVEWAY IS 6", USE 3000 PSI COMPRESSIVE STRENGTH CONCRETE WITH 5" MAXIMUM SLUMP.
2. CONCRETE TO BE POURED WITHIN 72 HOURS FROM THE TIME THE CURB & GUTTER IS SAWCUT.
3. PARKWAY, SIDEWALK, AND DRIVEWAY SIDEWALK SECTION WILL ALL HAVE A 1/4" PER FOOT SLOPE DOWN IN THE DIRECTION OF THE TOP OF CURB.
4. SEE FIGURE 4P FOR EXPANSION JOINT DETAIL.

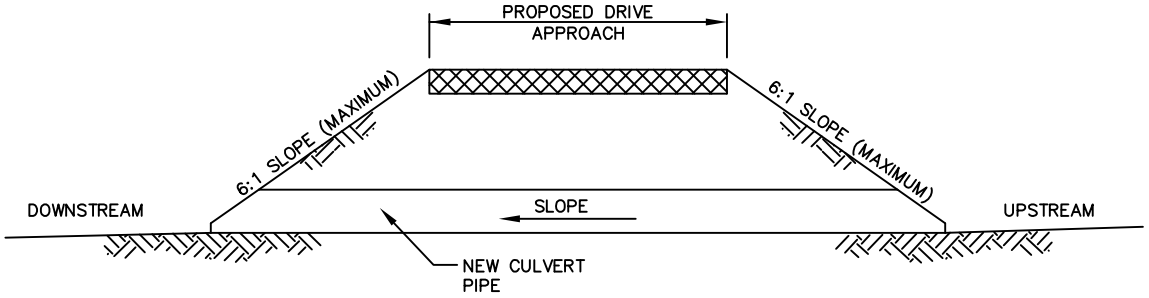
COMMERCIAL DRIVE DETAILS

NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 12P

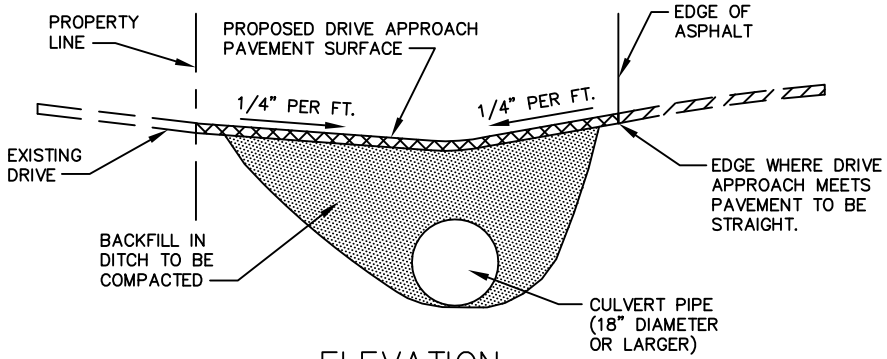


PLAN



NOTE: UPSTREAM AND DOWNSTREAM GRADING IN ROADWAY DITCH IS PROPERTY OWNER'S RESPONSIBILTY DURING DRIVE APPROACH INSTALLATION.

PROFILE



ELEVATION

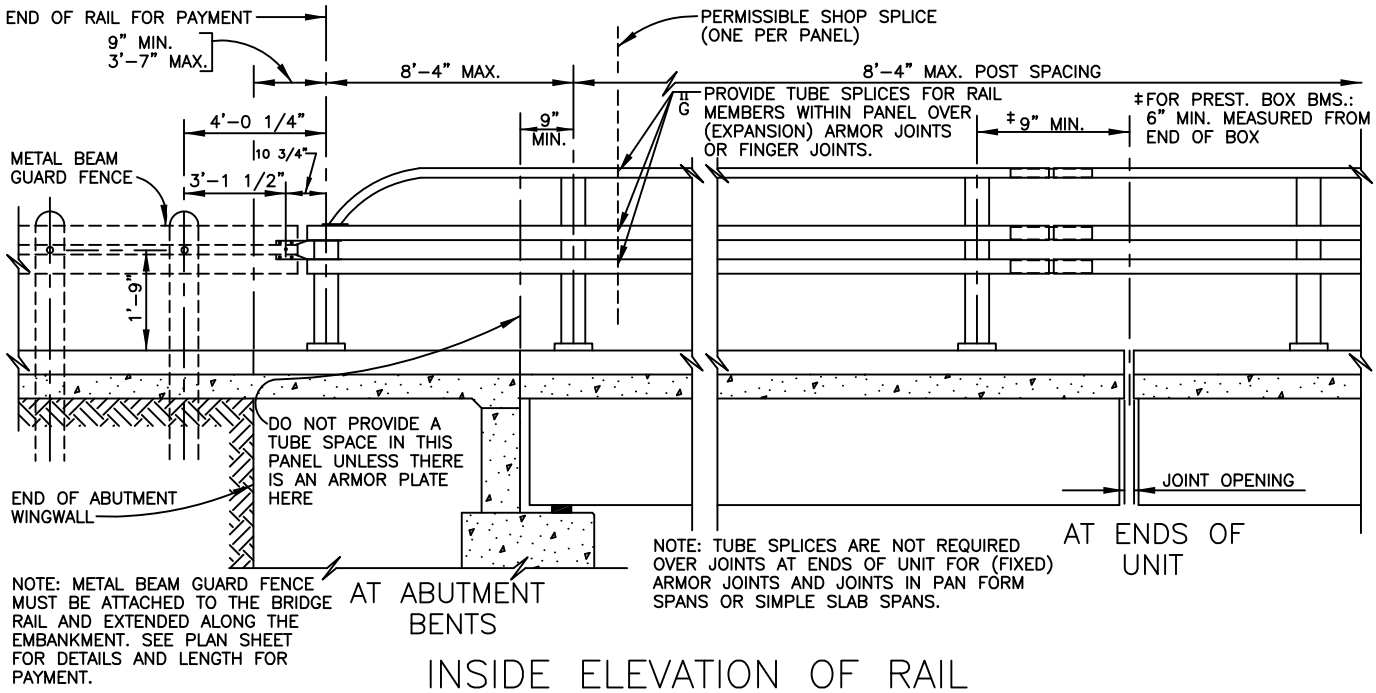
NOTES:

1. ALL CULVERT PIPE MUST BE REINFORCED CONCRETE PIPE THAT HAS NOT PREVIOUSLY BEEN USED.
2. DIAMETER OF CULVERT PIPE TO BE DETERMINED BY THE PUBLIC WORKS DEPARTMENT (18" MINIMUM).
3. FUTURE MAINTENANCE OF THE DRIVE APPROACH AND CULVERT PIPE IS THE PROPERTY OWNER'S RESPONSIBILITY.
4. ALL DITCH GRADING UPSTREAM AND DOWNSTREAM OF THE PROPOSED DRIVEWAY CULVERT IS THE PROPERTY OWNER'S RESPONSIBILTY.
5. A REINFORCED CONCRETE HEADWALL MAY BE CONSTRUCTED IN LIEU OF 6:1 EARTHEN GRADING AT THE PIPE INTAKE AND OUTFALL, WITH APPROVAL OF THE PUBLIC WORKS DEPARTMENT.

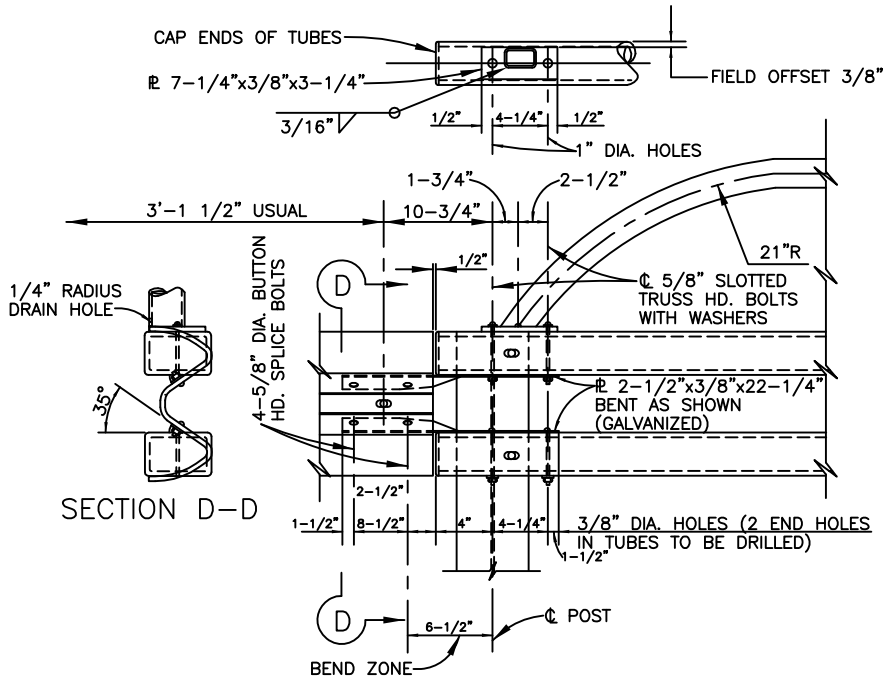
DRIVE WITH CULVERT DETAILS

NORTH RICHLAND HILLS

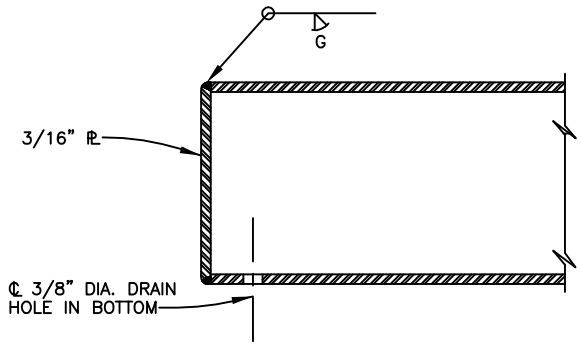
R 07-01-2009 FIGURE 13P



INSIDE ELEVATION OF RAIL



METAL BEAM GUARD FENCE TO RAIL CONN.

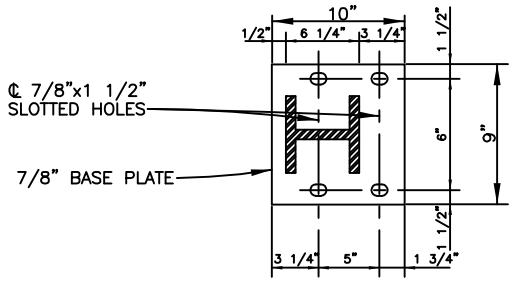


RAIL CAP DETAIL

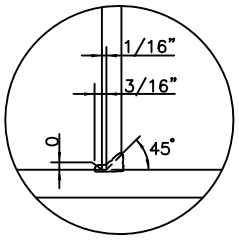
COMBINATION RAIL
TYPE C301

NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 14P-1

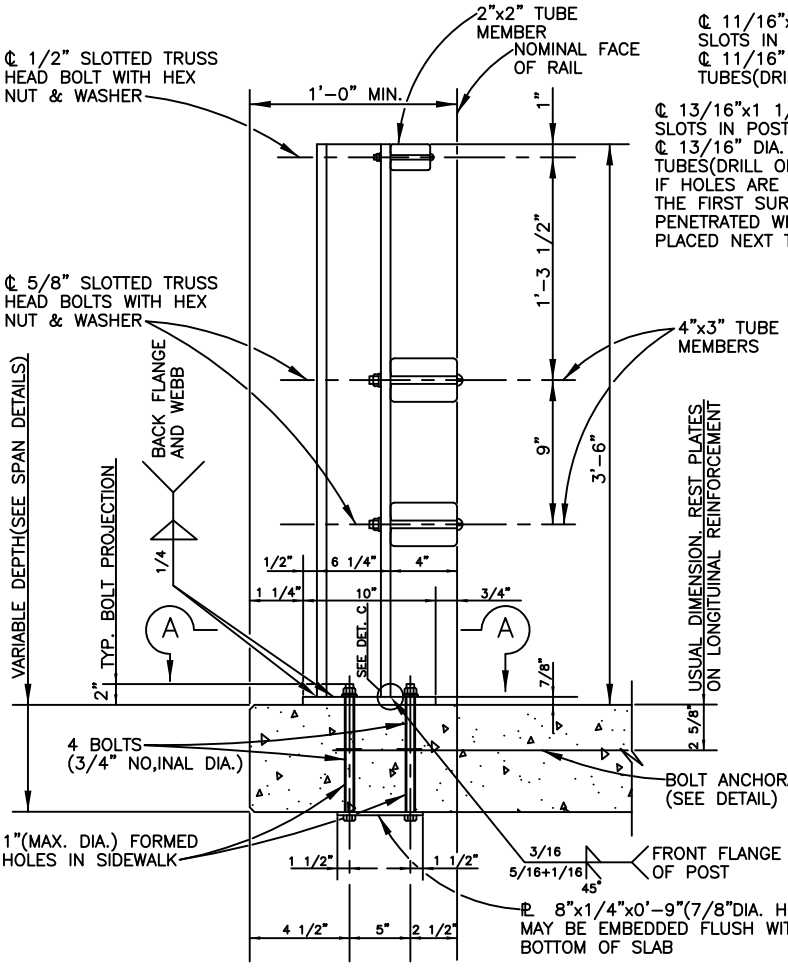


SECTION A–A

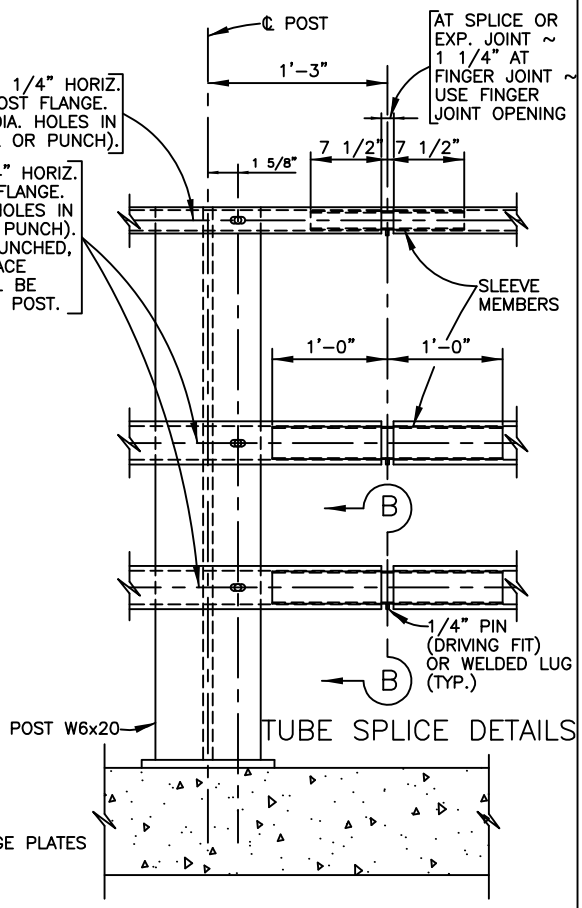


DETAIL C

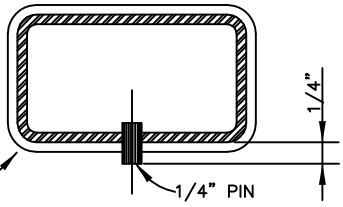
NOTE: IN LIEU OF FLANGE WELD SHOWN, A 3/8" FILLET WELD ALL AROUND INCLUDING EDGES OF FLANGE MAY BE USED.



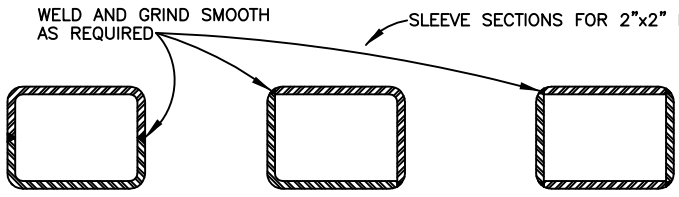
POST ELEVATIONS



TUBE SPLICE DETAILS



SECTION B–B



SLEEVE FABRICATION OPTIONS

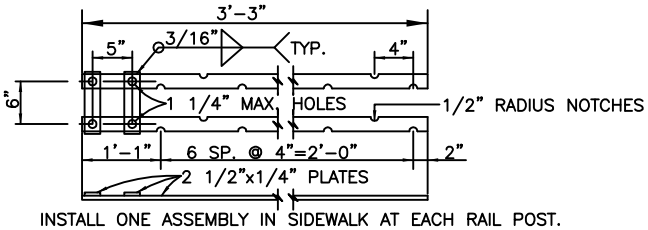
NOTE: THE DIFFERENCE BETWEEN THE OUTSIDE DIMENSIONS OF THE SLEEVE AND THE INSIDE DIMENSIONS OF THE RAIL SHALL NOT EXCEED .125" ALONG EITHER AXIS.

TUBE AND SLEEVE MEMBERS		
4"x3" RAIL MEMBER		SLEEVE THICKNESS
MATERIAL	THICKNESS	MATERIAL A36
A500 Gr C	.188"	.188"
A500 Gr B	.250"	.250"
A500 Gr A OR A501	.313"	.250"
2"x2" TUBE MEMBER		
ANY OF ABOVE OR EQUAL	.110"	.110"

COMBINATION RAIL
TYPE C301

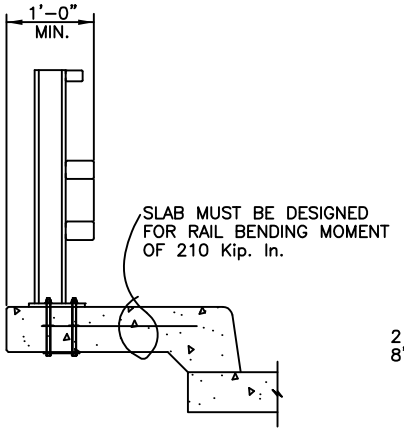
NORTH RICHLAND HILLS

R 07–01–2009 FIGURE 14P–2

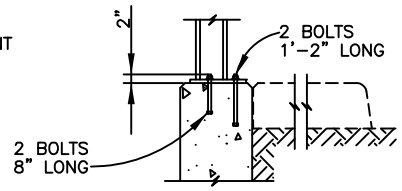


INSTALL ONE ASSEMBLY IN SIDEWALK AT EACH RAIL POST.
FIELD CUT OR BEND AS REQUIRED TO FIT SPECIAL CONDITIONS.
DO NOT GALVANIZE NOR OIL THIS ASSEMBLY.

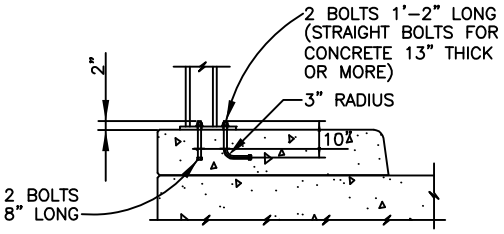
BOLT ANCHORAGE PLATES



USUAL MOUNTING



AT ABUTMENT WINGWALL



SPECIAL MOUNTING

POST MOUNTING DETAILS

GENERAL NOTES:

1. PUBLIC WORKS TO MAKE DETERMINATION ON BRIDGE RAILING CLASSIFICATION. ALL VEHICULAR SAFETY RAILS SHALL USE TYPE C301 COMBINATION RAIL AND ALL PEDESTRIAN SAFETY RAILS SHALL BE DESIGNED TO MEET THE RECOMMENDATIONS OF THE CITY IMAGE STUDY.

2. DESIGNED ACCORDING TO CURRENT AASHTO STANDARDS AND CURRENT INTERIM SPECIFICATIONS.

3. PANEL LENGTHS OF TUBE MEMBERS SHALL BE ATTACHED CONTINUOUSLY TO A MINIMUM OF THREE POSTS (EXCEPT AT ABUTMENTS WITH EXPANSION JOINTS).

4. THE FACE OF RAILING SHALL BE VERTICAL IF ADJACENT TO A WALKWAY UNLESS OTHERWISE SHOWN IN PLANS. RAIL POSTS SHALL BE PERPENDICULAR TO ADJACENT ROADWAY GRADE. GROUT MAY BE USED UNDER BASE PLATES IF NECESSARY.

5. EXPOSED EDGES OF HANDRAIL AND HANDRAIL POSTS SHALL BE ROUNDED OR CHAMFERED TO APPROXIMATELY 1/16" BY GRINDING.

6. ALL BOLTS, NUTS, WASHERS, ANCHORAGE PLATES, BOTTOM PLATES AND M.B.G.F. CONNECTORS ARE CONSIDERED PARTS OF THE RAIL FOR PAYMENT.

7. ALL STEEL COMPONENTS EXCEPT REINFORCING SHALL BE GALVANIZED UNLESS OTHERWISE SHOWN ON PLANS.

8. ANCHOR BOLTS SHALL BE 3/4" DIA. ASTM-A325(OR A321 THREADED RODS WITH TACK WELDED NUTS). THREADED RODS MAY BE 0.670" MIN. DIA. WITH ROLLED THREADS. EACH BOLT SHALL HAVE A HARDENED STEEL WASHER AND A 2" PLAIN STEEL WASHER. NUTS SHALL CONFORM TO A563 REQUIREMENTS AND SHALL BE TAPPED AFTER GALVANIZING. BOLTS AND NUTS SHALL HAVE CLASS A 2B FIT TOLERANCES.

9. SHOP DRAWINGS TO BE SUBMITTED TO THE BRIDGE ENGINEER FOR APPROVAL WILL BE REQUIRED ONLY FOR RAILS ON HORIZONTAL CURVES IN WHICH CASE THE RAIL MEMBERS SHALL BE FABRICATED TO THE REQUIRED RADIUS FOR RADII OF 600' OR LESS.

10. FOR RAILS NOT REQUIRING SHOP DRAWINGS, ERECTION DRAWINGS SHOWING PANEL LENGTHS, SPLICE LOCATIONS, RAIL POST SPACING AND ANCHOR BOLT SETTING SHALL BE SUBMITTED TO THE RESIDENT ENGINEER FOR APPROVAL.

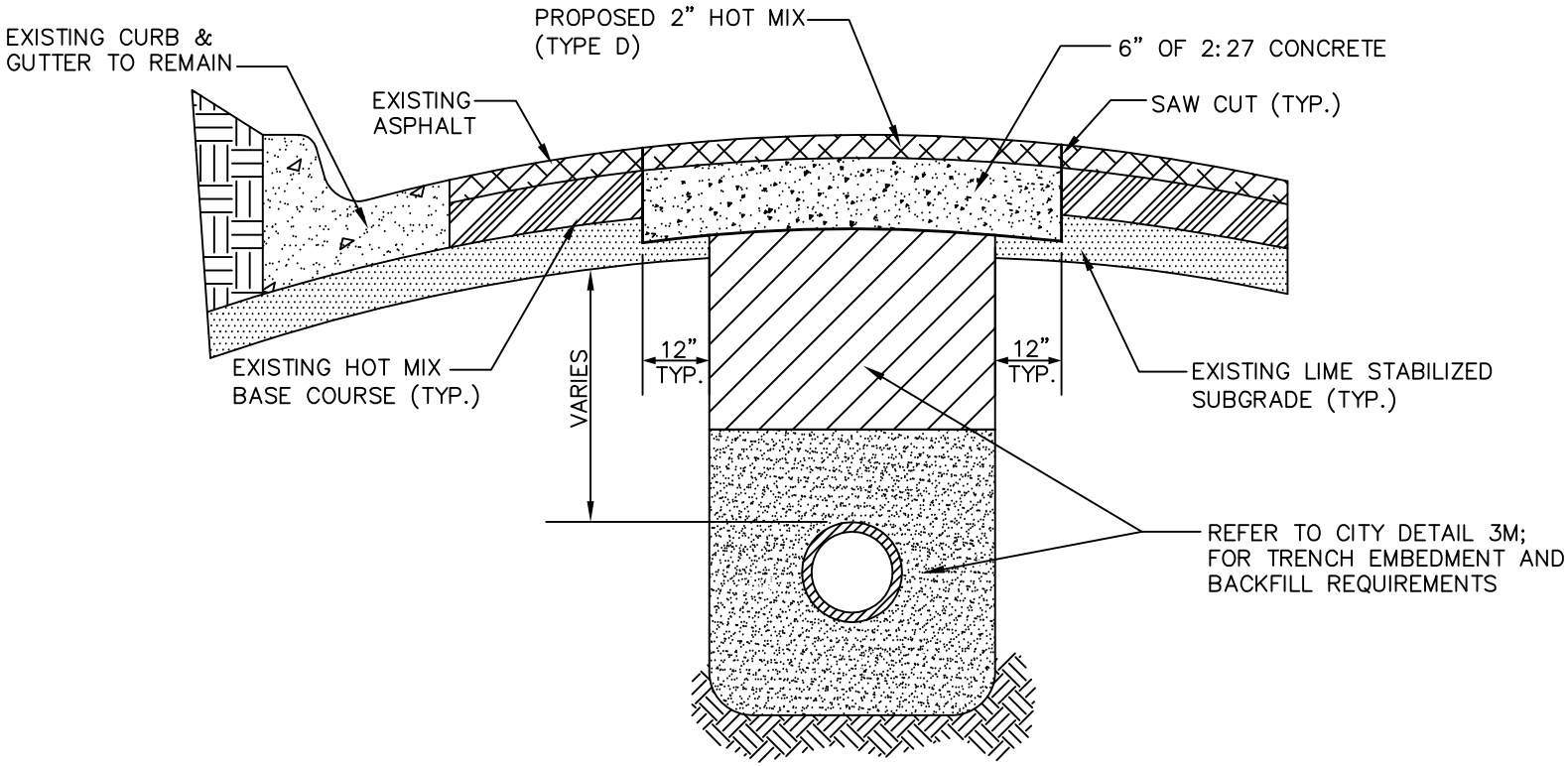
11. SHOP DRAWINGS MAY BE SUBMITTED AS 11"x18" PRINTS PROVIDED THEY ARE CLEARLY LEGIBLE.

12. ALL OPEN ENDS OF RAIL SHALL BE CAPPED.

COMBINATION RAIL
TYPE C301

NORTH
RICHLAND
HILLS

R 07-01-2009 FIGURE 14P-3



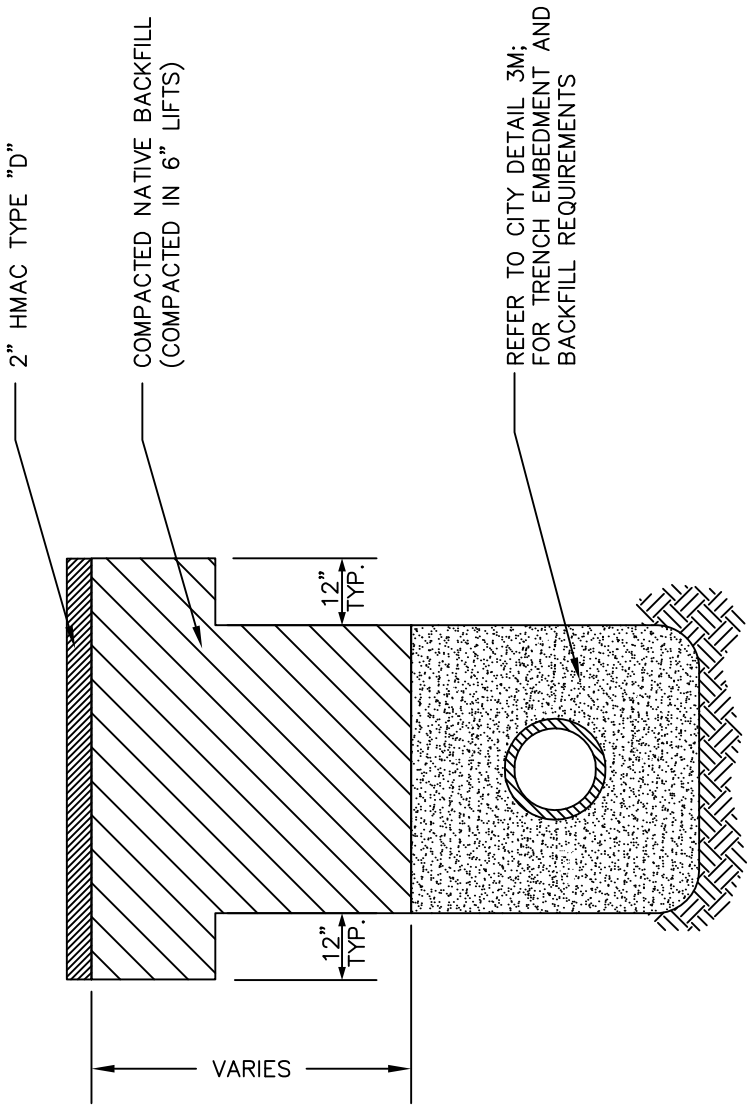
TYPICAL STREET SECTION

NOT TO SCALE

PERMANENT ASPHALT
PAVEMENT REPLACEMENT

NORTH
RICHLAND
HILLS

R 07-01-2009 FIGURE 15P-1



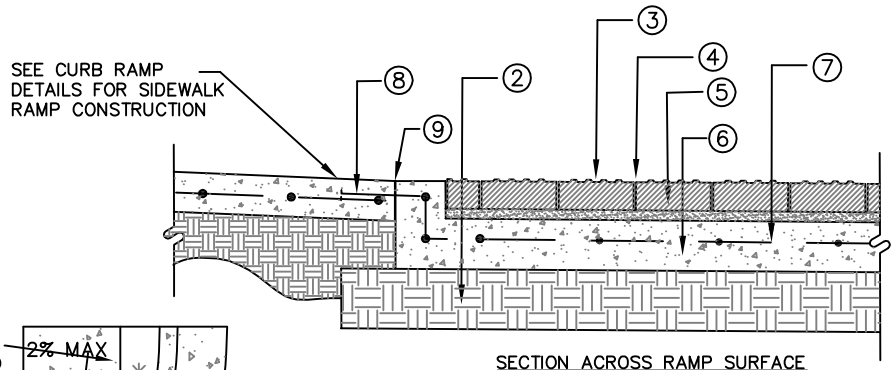
1. AN ALL WEATHER PATCH MUST BE INSTALLED WITHIN 5 DAYS OF OPEN CUTTING ANY PUBLIC STREET.

TEMPORARY ASPHALT PATCH

NORTH RICHLAND HILLS

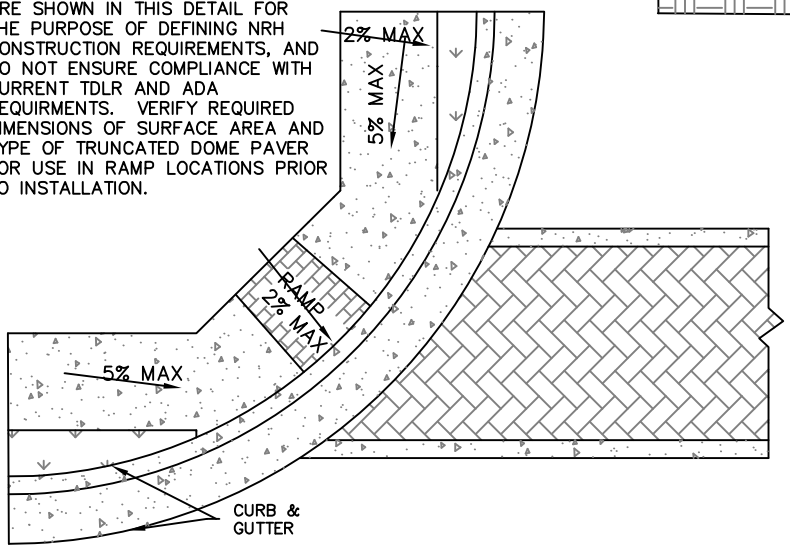
R 07-01-2009 FIGURE 15P-2

DETECTABLE WARNING PAVERS ON CONCRETE BASE



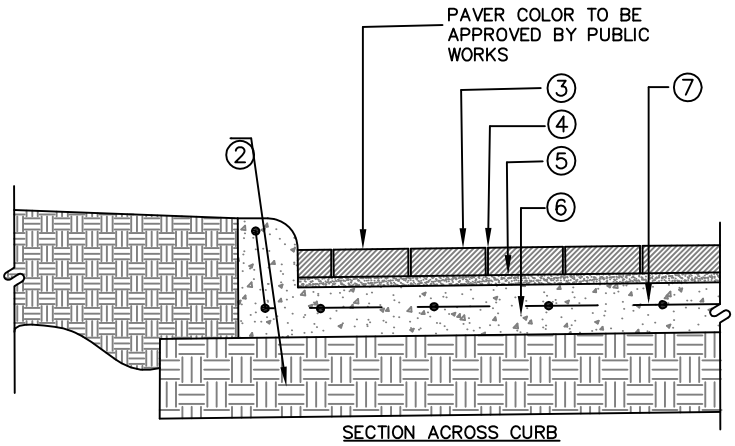
SECTION ACROSS RAMP SURFACE

PAVER DIMENSIONS AND LOCATION ARE SHOWN IN THIS DETAIL FOR THE PURPOSE OF DEFINING NRH CONSTRUCTION REQUIREMENTS, AND DO NOT ENSURE COMPLIANCE WITH CURRENT TDLR AND ADA REQUIRMENTS. VERIFY REQUIRED DIMENSIONS OF SURFACE AREA AND TYPE OF TRUNCATED DOME PAVER FOR USE IN RAMP LOCATIONS PRIOR TO INSTALLATION.

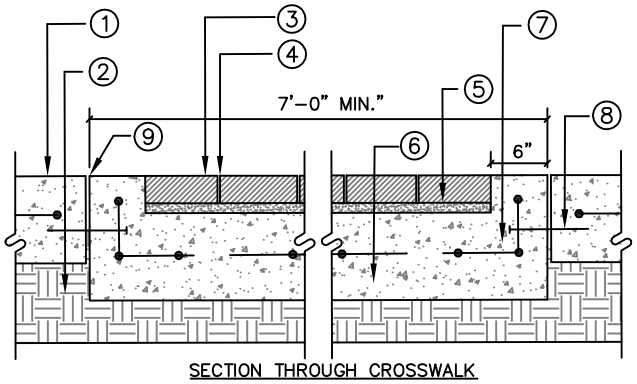


DETECTABLE WARNING PAVERS USED AS CURB RAMP SURFACE ARE TO COMPLY WITH CURRENT TDLR AND ADA STADARDS WITH REGARD TO MINIMUM DIMENSIONS, SURFACE TYPE AND COLOR.

VEHICULAR PAVERS ON CONCRETE BASE



SECTION ACROSS CURB



SECTION THROUGH CROSSWALK

① ADJOINING CONCRETE ROADWAY

② SUBGRADE ACCORDING TO CIVIL ROADWAY PLANS

③ 4"X8"X60MM, BY PAVESTONE OR EQUAL, LAY 90° HERRINGBONE PATTERN. STANDARD FINISH. PLACE ON CONCRETE BASE. COLOR: TO BE APPROVED BY CITY.

④ BRUSH SAND INTO JOINTS, JOINTS NO GREATER THAN $\frac{1}{8}$".

⑤ 1" SAND SETTING BED

⑥ REINFORCED CONCRETE PAVEMENT. MINIMUM 4" THICK BENEATH PAVERS IN NON VEHICULAR LOCATIONS. CONCRETE THICKNESS BENEATH PAVERS IN VEHICULAR LOCATIONS TO MATCH STANDARD CONCRETE THICKNESS FOR ROADWAY CLASSIFICATION. REFER TO STANDARD DETAILS.

⑦ REBAR ACCORDING TO STANDARD DETAILS FOR PAVEMENT.

⑧ 8" NO. 3 DOWELS @ 18" O.C.

⑨ EXPANSION JOINT

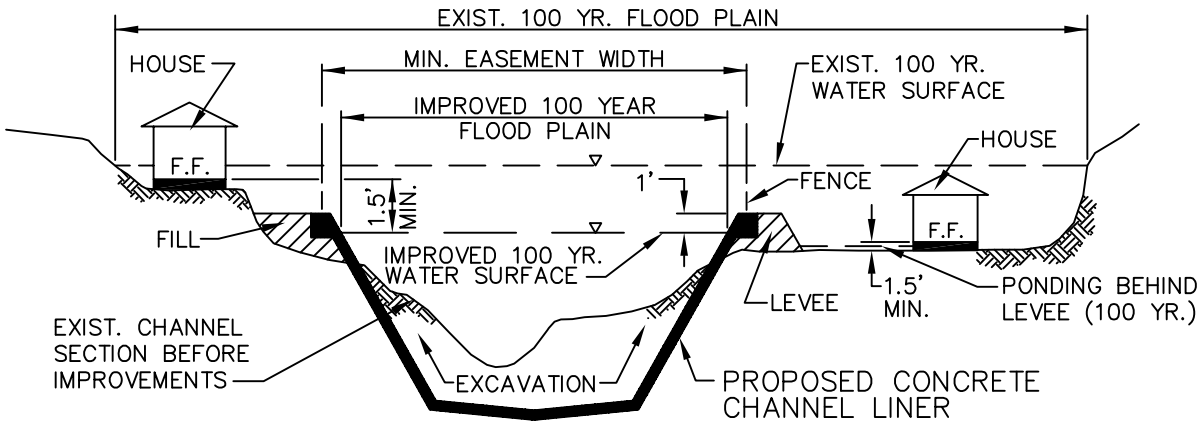
PAVERS IN PUBLIC ROW

NORTH RICHLAND HILLS

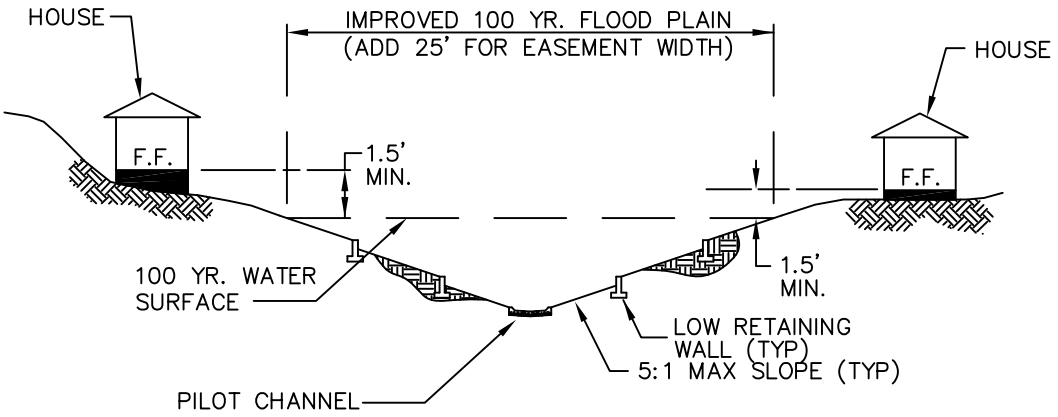
R 07-01-2009 FIGURE 16P

Drainage

1D	Channel Liners
2D	Storm Drain Flood Limits
3D	Reinforced Concrete Channel Liner Details
4D	Concrete Pilot Channel
5D	Concrete Flume
6D	Concrete Channel Apron for S.D. with Vertical Headwall
7D	Concrete Channel Apron for S.D. with Sloping Headwall
8D	Concrete Collar Details
9D	Storm Drain Tap Detail
10D	Concrete Plug Details
11D	Standard Drop Inlet
12D-1	Standard 4' Square Storm Drain Manhole/Vault, Sht. 1 of 2
12D-2	Standard 4' Square Storm Drain Manhole/Vault, Sht. 2 of 2
13D-1	Standard 5' Square Storm Drain Manhole/Vault, Sht. 1 of 2
13D-2	Standard 5' Square Storm Drain Manhole/Vault, Sht. 2 of 2
14D-1	Standard 6' Square Storm Drain Manhole/Vault, Sht. 1 of 2
14D-2	Standard 6' Square Storm Drain Manhole/Vault, Sht. 2 of 2
15D	Angled Storm Drain Manhole/Vault Detail
16D-1	Standard Curb Inlet, Detail No. 1
16D-2	Standard Curb Inlet, Detail No. 2
16D-3	Standard Curb Inlet, Detail No. 3
17D	Inlet Protection Block and Gravel
18D-1	Channel Access Ramp, Sht. 1 of 2
18D-2	Channel Access Ramp, Sht. 2 of 2



FULL 100 YR. CONCRETE CHANNEL LINER

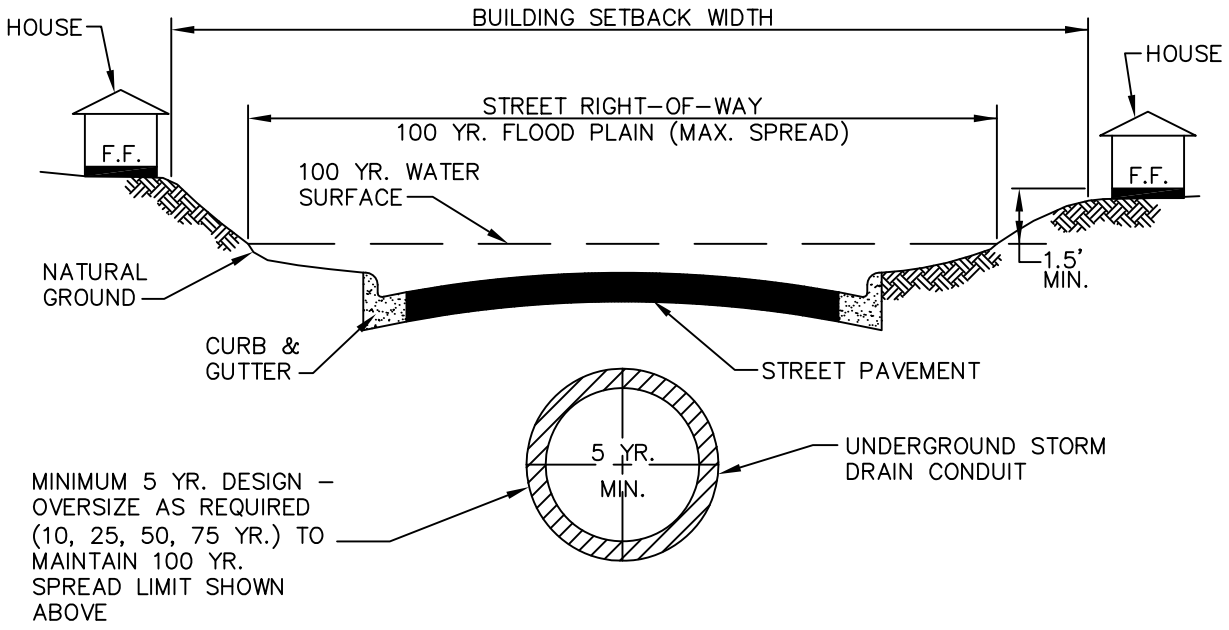


TERRACED EARTHEN CHANNEL

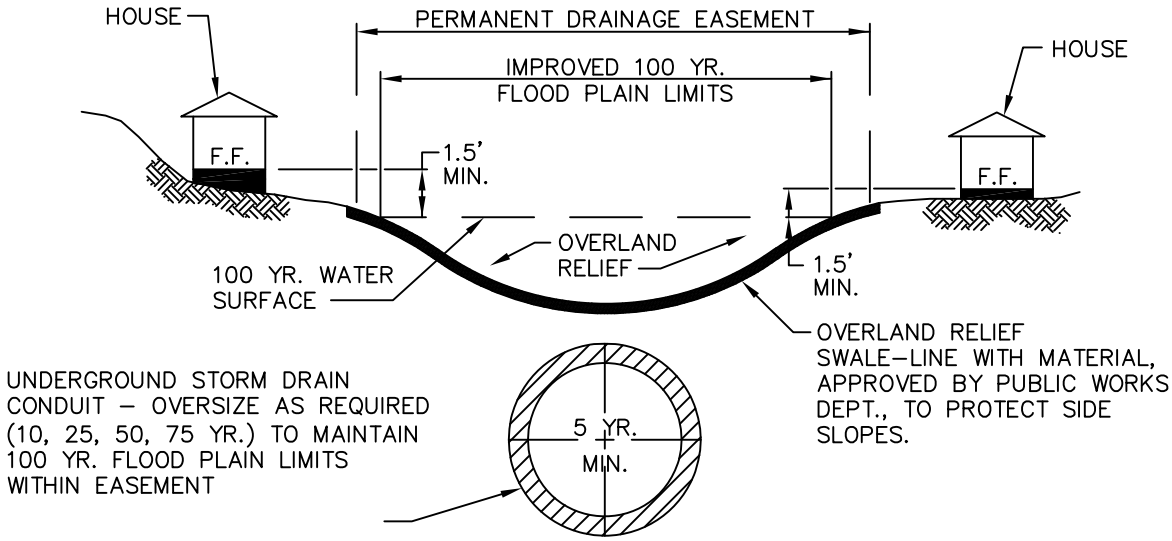
CHANNEL LINERS

NORTH
RICHLAND
HILLS

R 07-01-2009 FIGURE 1D



STORM DRAIN IN STREET

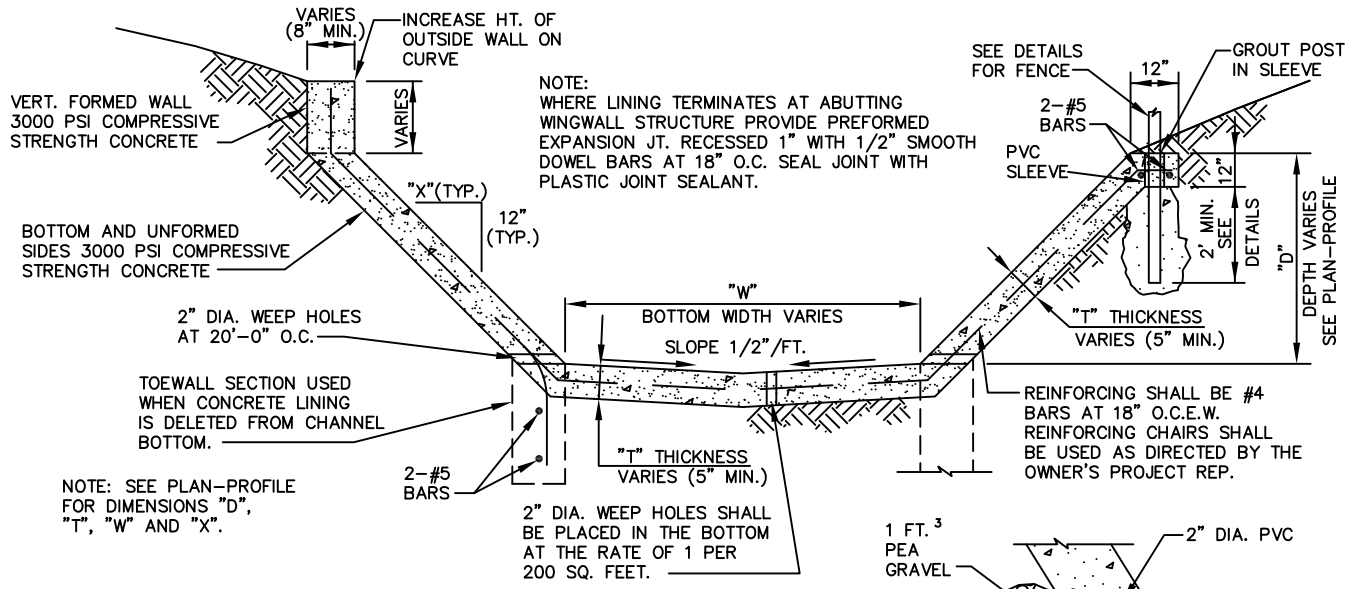


STORM DRAIN IN EASEMENT

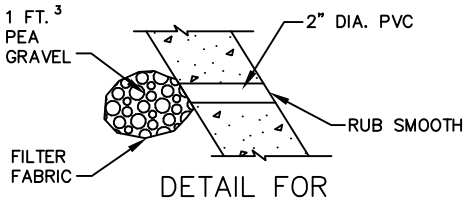
STORM DRAIN FLOOD LIMITS

NORTH
RICHLAND
HILLS

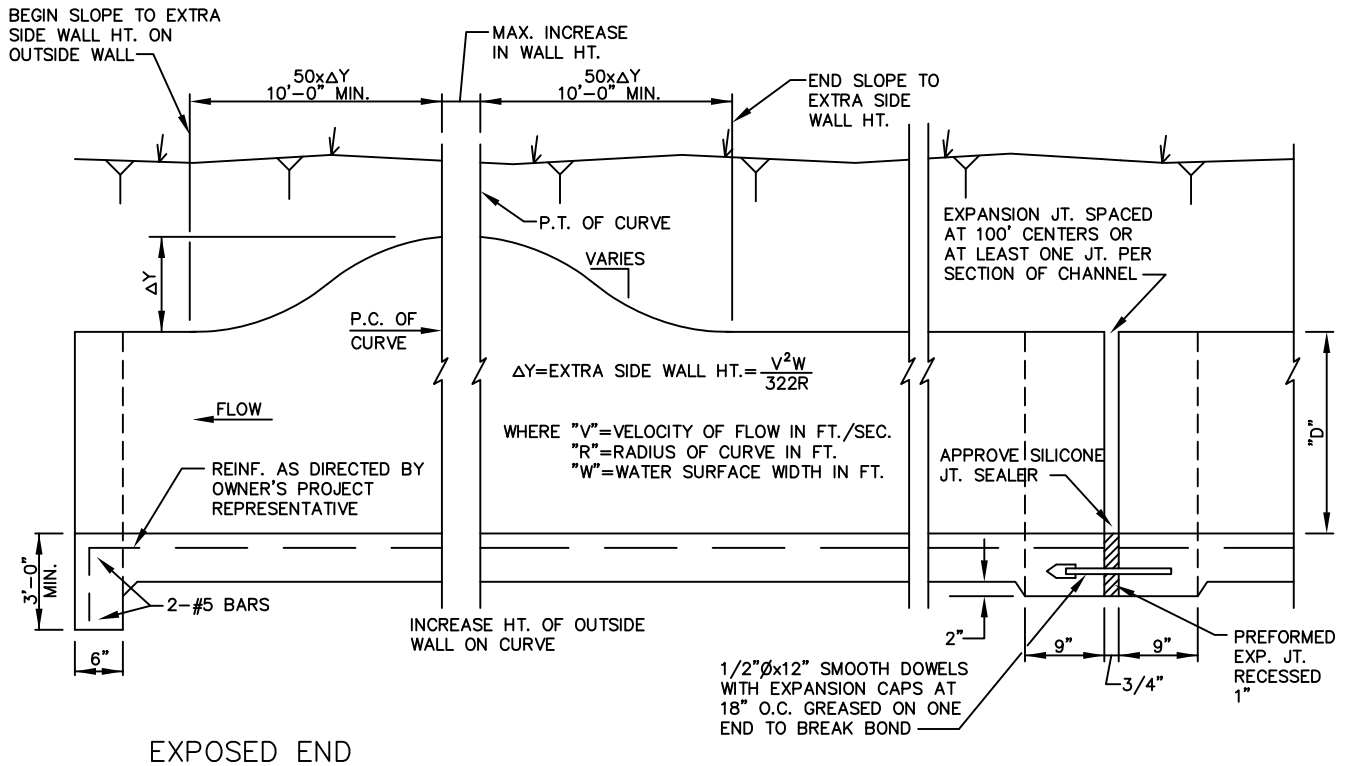
R 07-01-2009 FIGURE 2D



TYPICAL TRAPEZOIDAL SECTION



DETAIL FOR WEEP HOLES



EXPOSED END

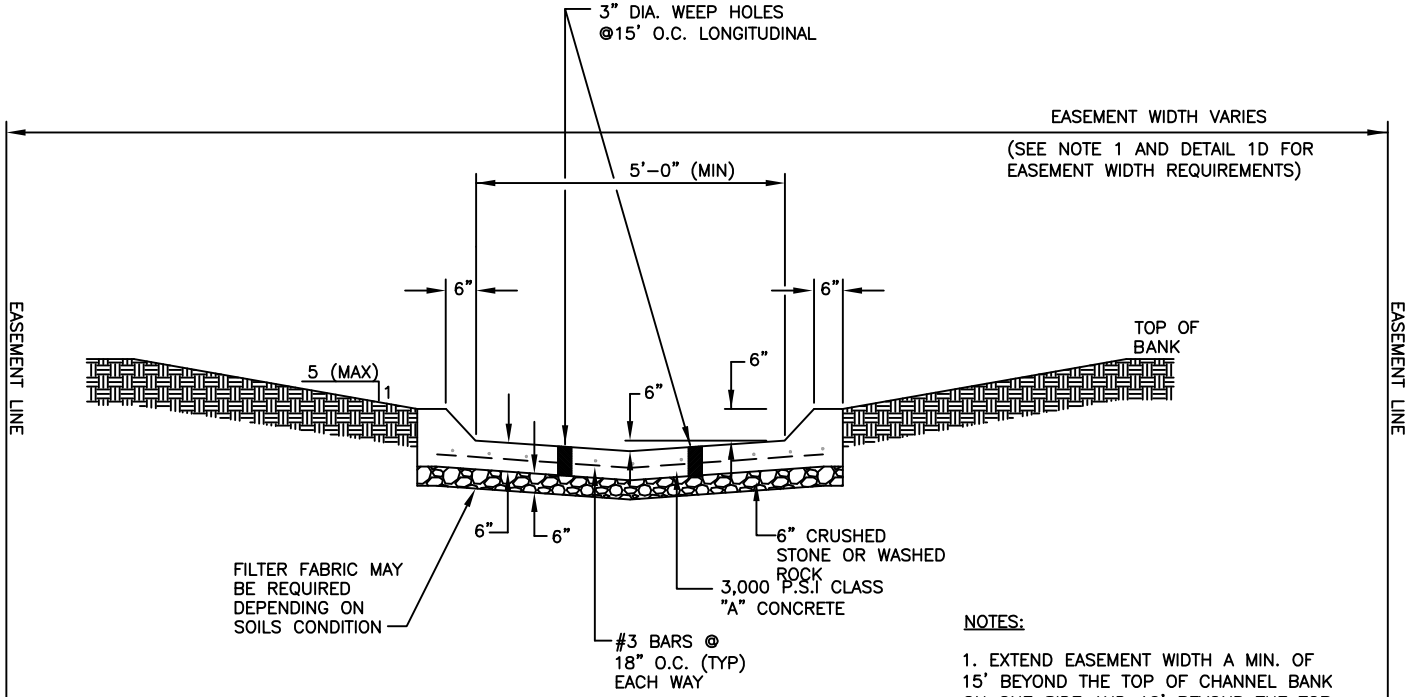
EXPANSION JOINT

DETAILS OF REINFORCED CONCRETE CHANNEL LINER

REINFORCED CONCRETE CHANNEL LINER DETAILS

NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 3D



NOTES:

1. EXTEND EASEMENT WIDTH A MIN. OF 15' BEYOND THE TOP OF CHANNEL BANK ON ONE SIDE AND 10' BEYOND THE TOP OF CHANNEL BANK ON THE OTHER SIDE.

2. SIDE SLOPES SHALL BE SMOOTH EARTHEN FREE OF ROCKS AND SHALL RECEIVE THE FOLLOWING; 6" OF TOPSOIL, HYDROMULCH, AND A SOIL RETENTION BLANKET, OR AN ALTERNATIVE APPROVED BY THE PUBLIC WORKS DEPARTMENT. ALL VEGETATION SHALL EXTEND TO THE EASEMENT LINES ON EACH SIDE OF THE CHANNEL.

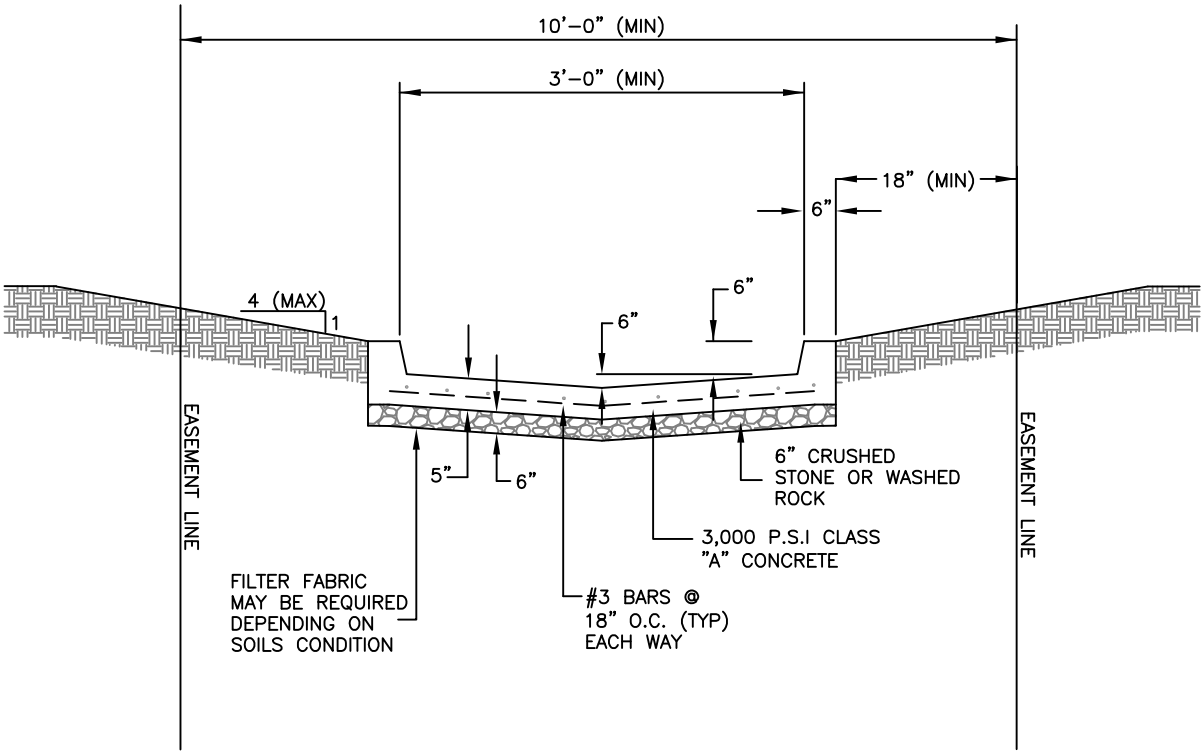
3. EXPANSION JOINTS SHALL BE CONSTRUCTED AS REQUIRED BY THE PUBLIC WORKS DEPARTMENT.

4. CONTROL JOINTS SHALL BE CONSTRUCTED AND SPACED IN DIRECT PROPORTION TO THE WIDTH OF THE FLUME, I.E. 10' FLUME WIDTH RESULTS IN 10' CONTROL JOINT SPACING

CONCRETE PILOT CHANNEL

NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 4D



NOTES:

1. FLUME SHALL BE CONTAINED IN A PERMANENT DRAINAGE EASEMENT AT LEAST 10' IN WIDTH WITH A MINIMUM OF 18" OF EASEMENT ON EACH SIDE OF THE FLUME MEASURED FROM BACK OF CURB.

2. SIDE SLOPES SHALL BE SMOOTH EARTHEN FREE OF ROCKS AND SHALL RECEIVE THE FOLLOWING; 6" OF TOPSOIL, HYDROMULCH, AND A SOIL RETENTION BLANKET, OR AN ALTERNATIVE APPROVED BY THE PUBLIC WORKS DEPARTMENT. ALL VEGETATION SHALL EXTEND TO THE EASEMENT LINES ON EACH SIDE OF THE FLUME.

3. NO FENCING WILL BE PERMITTED THAT ENCROACHES OR CROSSES THE FLUME.

4. 12" MINIMUM DIAMETER ROCK RUBBLE RIP-RAP, GROUTED WITH ONE HALF OF ROCK EXPOSED MUST BE INSTALLED AT THE OUTFALL TO MINIMIZE EROSION.

5. EXPANSION JOINTS SHALL BE CONSTRUCTED AS REQUIRED BY THE PUBLIC WORKS DEPARTMENT.

6. CONTROL JOINTS SHALL BE CONSTRUCTED AND SPACED IN DIRECT PROPORTION TO THE WIDTH OF THE FLUME, I.E. 5' FLUME WIDTH RESULTS IN 5' CONTROL JOINT SPACING.

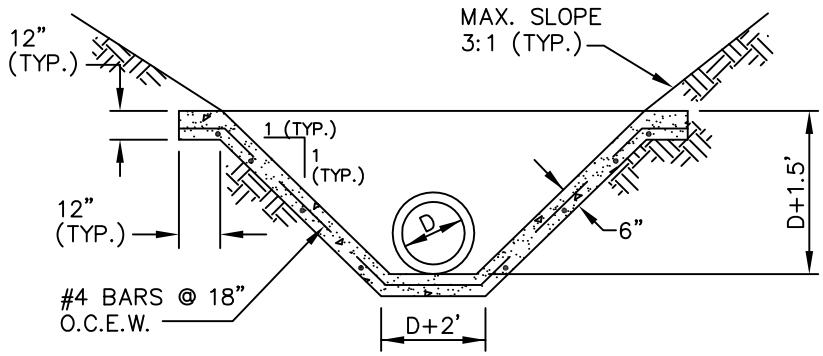
7. FLUMES WHICH INTERSECT SIDEWALKS OR FUTURE SIDEWALK LOCATIONS SHALL BE CONSTRUCTED WITH ADA ACCESSIBLE RAMPS TO ACCOMODATE THE CROSSING. FLUMES SHALL NOT BE "BRIDGED" BY STEEL PLATES OR OTHER SUCH STRUCTURES.

8. THE CONCRETE FLUME DETAILED IN THIS DRAWING IS NOT INTENDED FOR USE AS A PILOT CHANNEL IN EARTHEN CHANNELS. SEE DETAIL 4D FOR CONCRETE PILOT CHANNEL REQUIREMENTS.

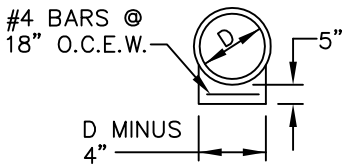
CONCRETE FLUME

NORTH RICHLAND HILLS

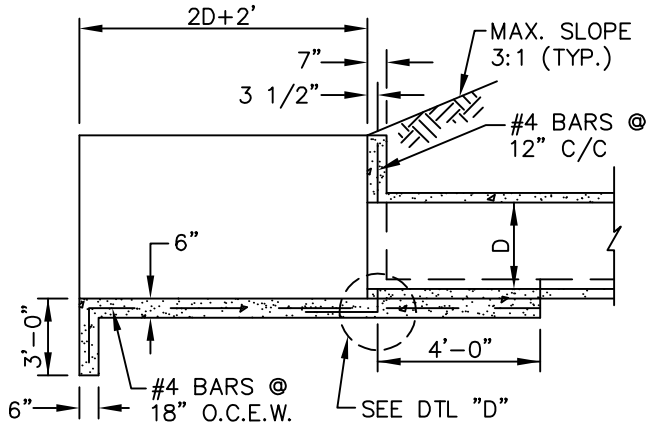
R 07-01-2009 FIGURE 5D



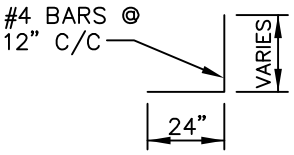
SECTION B–B
N.T.S.



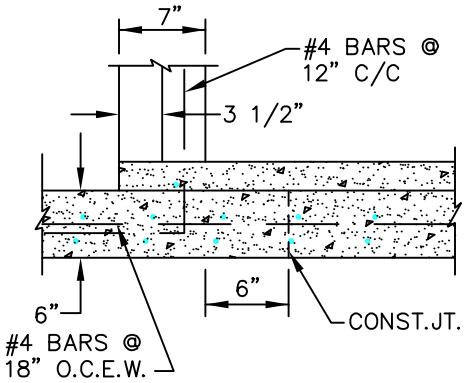
SECTION C–C
N.T.S.



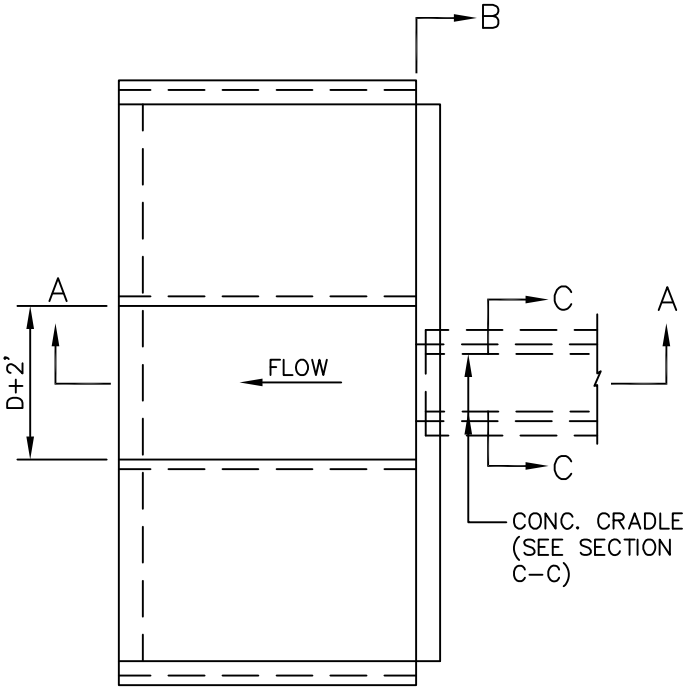
SECTION A–A
N.T.S.



BAR DETAIL
N.T.S.



DETAIL "D"
N.T.S.



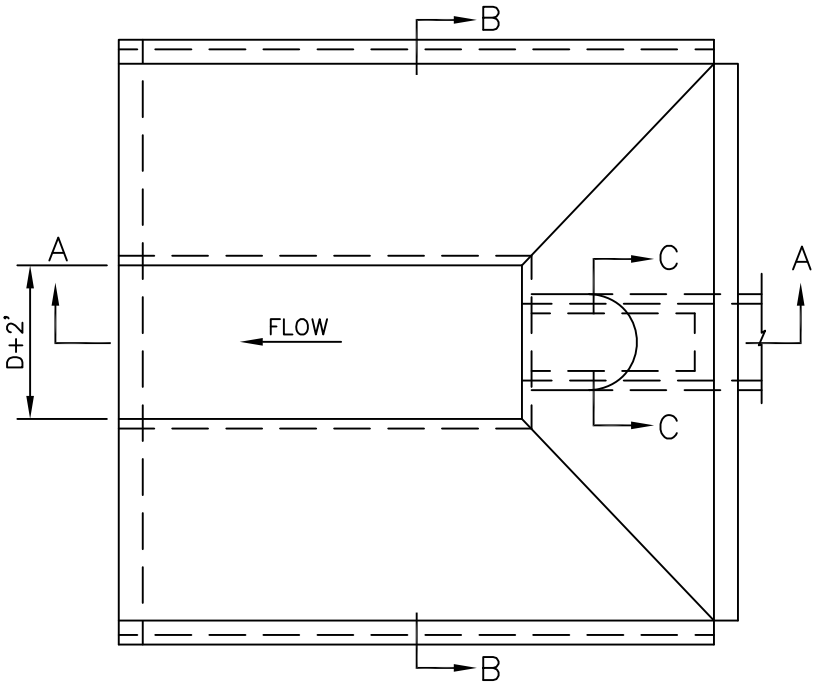
PLAN
N.T.S.

NOTE:
FOR PIPE DIAMETER (SEE PLAN AND PROFILE SHEET.)

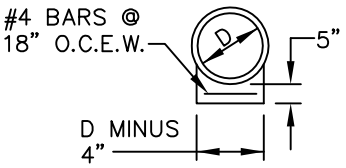
CONCRETE CHANNEL APRON FOR STORM DRAIN WITH VERTICAL HEADWALL

NORTH RICHLAND HILLS

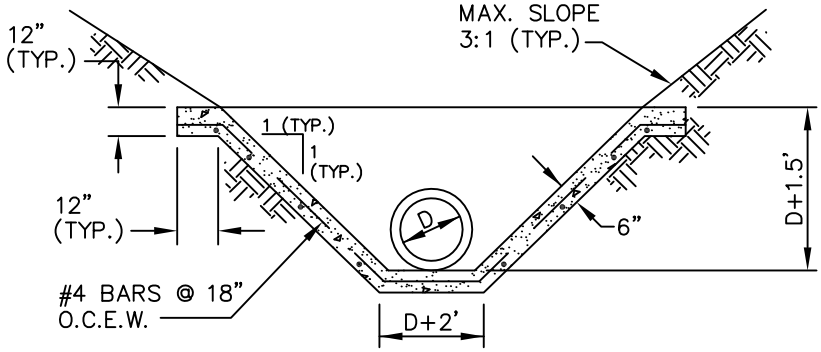
R 07–01–2009 FIGURE 6D



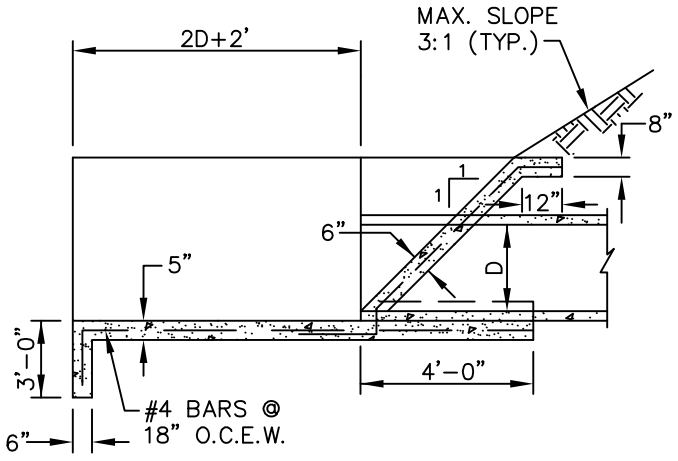
PLAN
N.T.S.



SECTION C–C
N.T.S.



SECTION B–B
N.T.S.



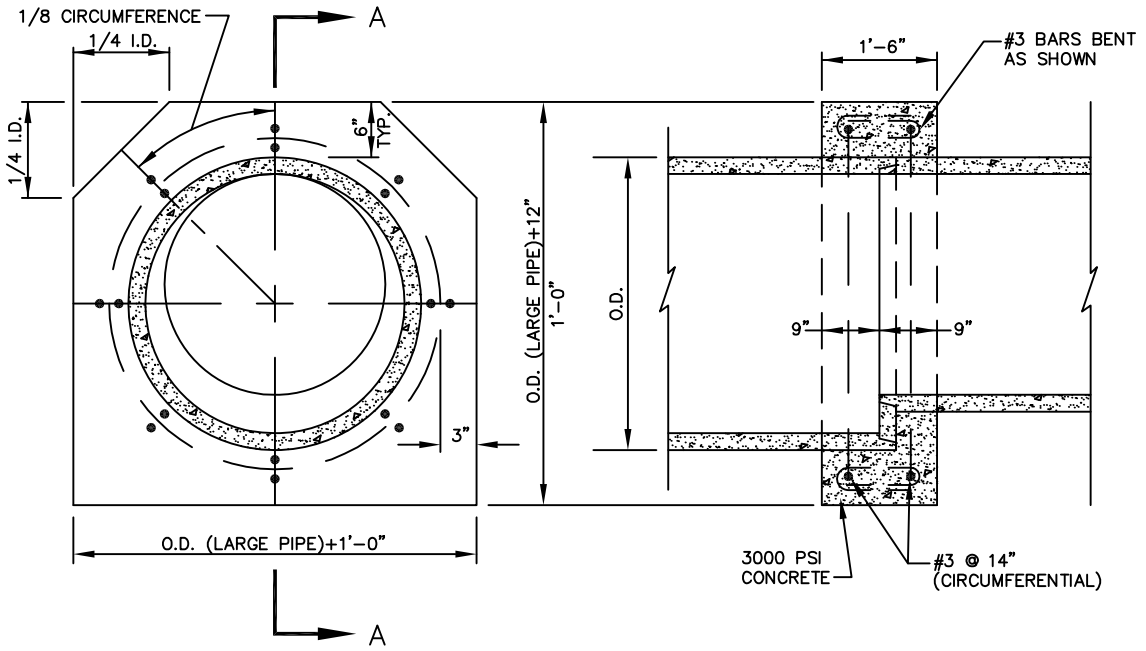
SECTION A–A
N.T.S.

NOTE:
FOR PIPE DIAMETER, SEE PLAN AND PROFILE SHEET.

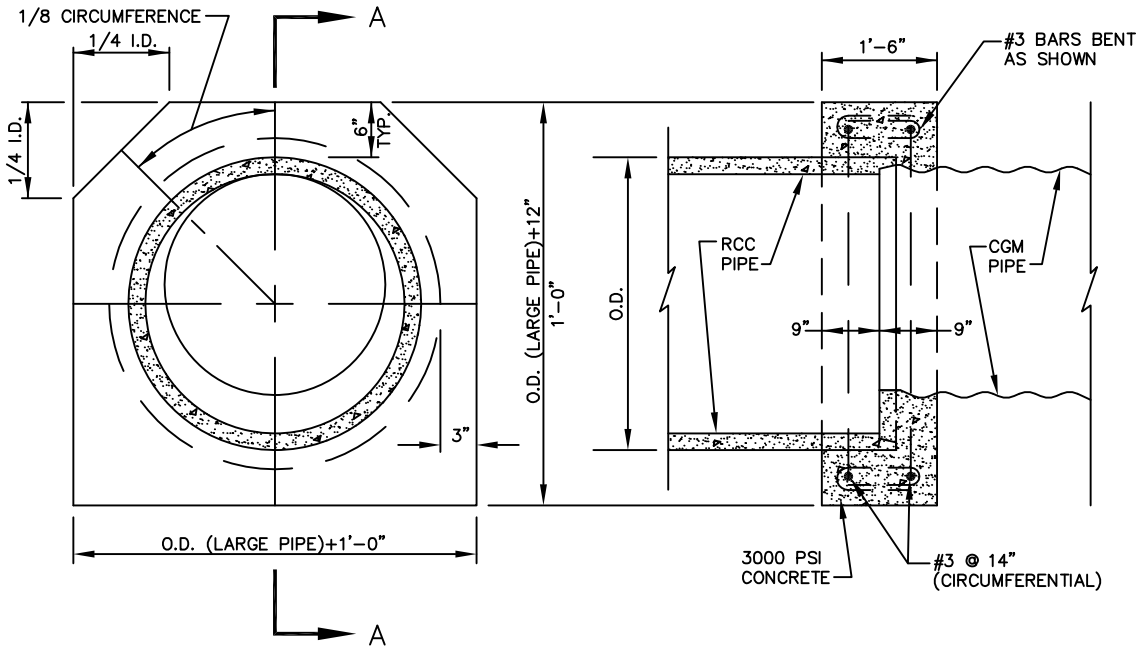
CONCRETE CHANNEL APRON FOR STORM DRAIN WITH SLOPING HEADWALL

NORTH
RICHLAND
HILLS

R 07–01–2009 FIGURE 7D



COUPLING OF R.C.C. PIPES OF DIFFERENT DIAMETERS



COUPLING OF RCCP TO CGMP

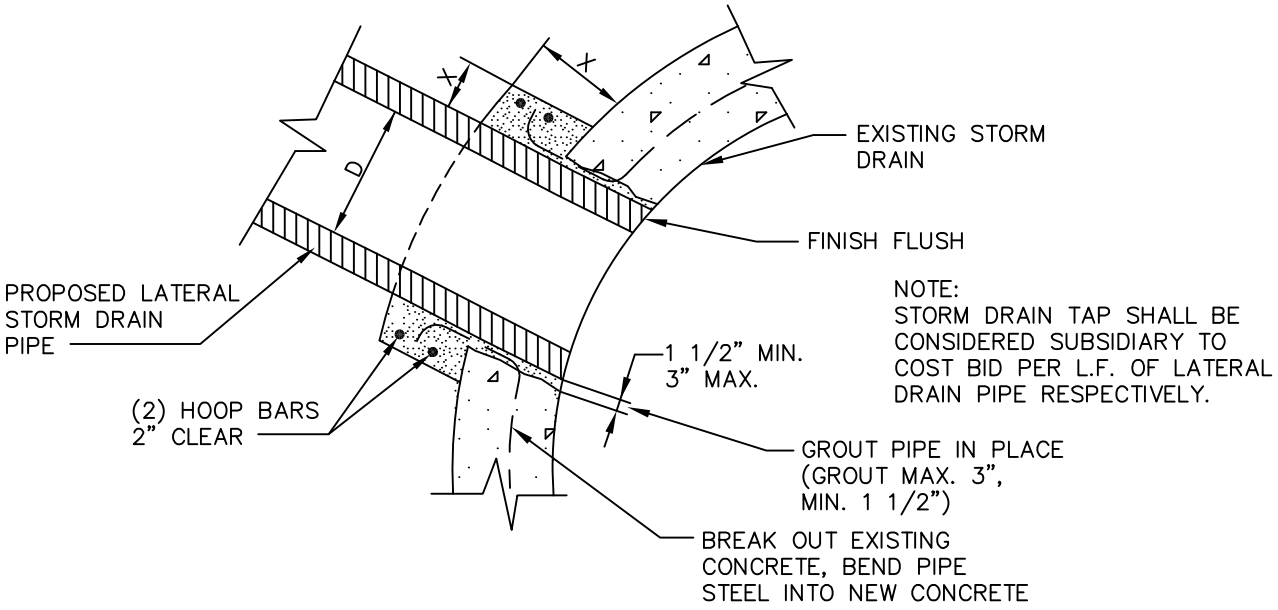
CONCRETE COLLAR DETAILS

CONCRETE COLLAR DETAILS

NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 8D

D	X	HOOP BARS
18" OR SMALLER	6"	#3
LARGER THAN 18"	9"	#4



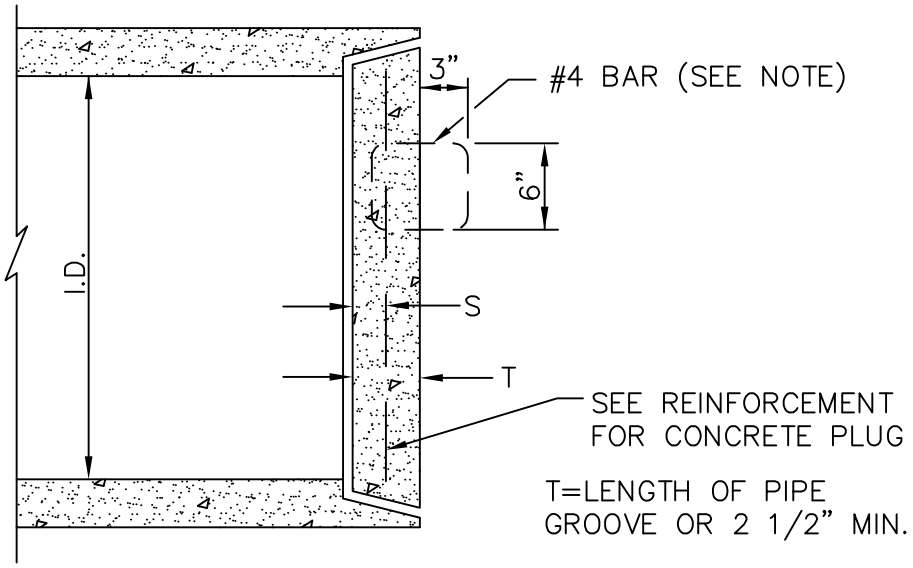
STORM DRAIN TAP DETAIL

NOTE: PREFABRICATED FITTINGS SHALL BE USED ON ALL PROPOSED STORM DRAINS.

STORM DRAIN TAP DETAIL

NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 9D



REINFORCEMENT FOR CONCRETE PLUG

PIPE SIZE	REINF. BAR	DISTANCE C–C	S
18"–39"	#3	12" E.W.	1/2T
42"–54"	#3	12" E.W.	1/3T
60"–72"	#4	12" E.W.	1/4T

NOTE: STEEL HANDLE FOR REINFORCED CONCRETE PIPE PLUG SHALL BE LOCATED 1/4 I.D. ABOVE CENTER POINT OF PLUG. TWO STEEL HANDLES WILL BE REQUIRED ON PLUGS OF 36" PIPES OR LARGER AND SHALL BE PLACED 1/4 I.D. APART AND 1/4 I.D. ABOVE CENTER OF PLUG.

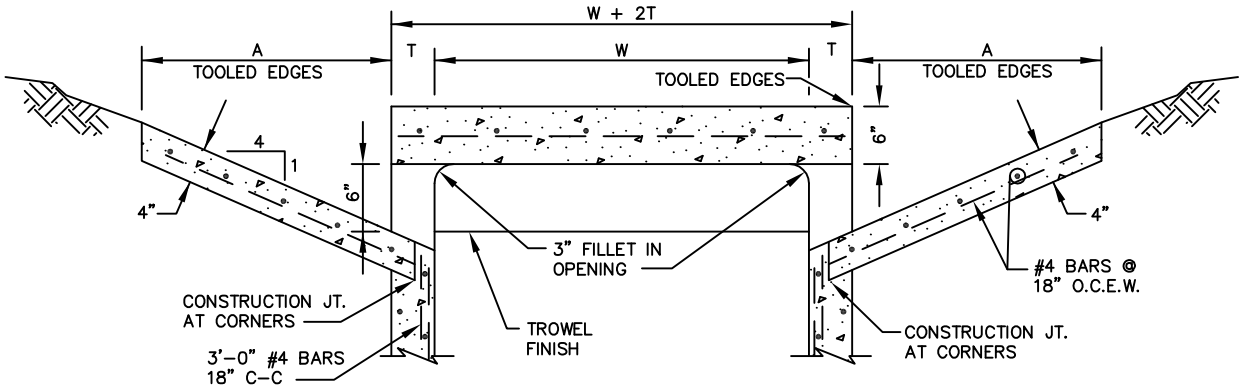
CONCRETE PLUG DETAILS

NO SCALE

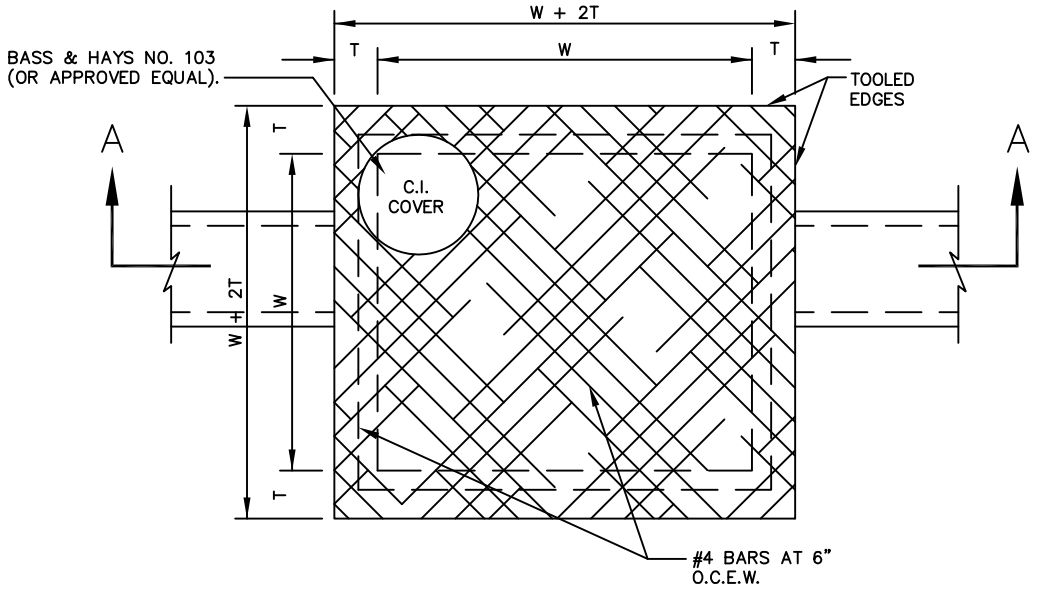
CONCRETE PLUG DETAILS

NORTH RICHLAND HILLS

R 07–01–2009 FIGURE 10D



SECTION A-A



PLAN VIEW

INLET SIZE	T	W	A
2' SQUARE	7"	2'-0"	2'-0"
4' SQUARE	7"	4'-0"	3'-0"
5' SQUARE	8"	5'-0"	4'-0"
6' SQUARE	9"	6'-0"	4'-0"

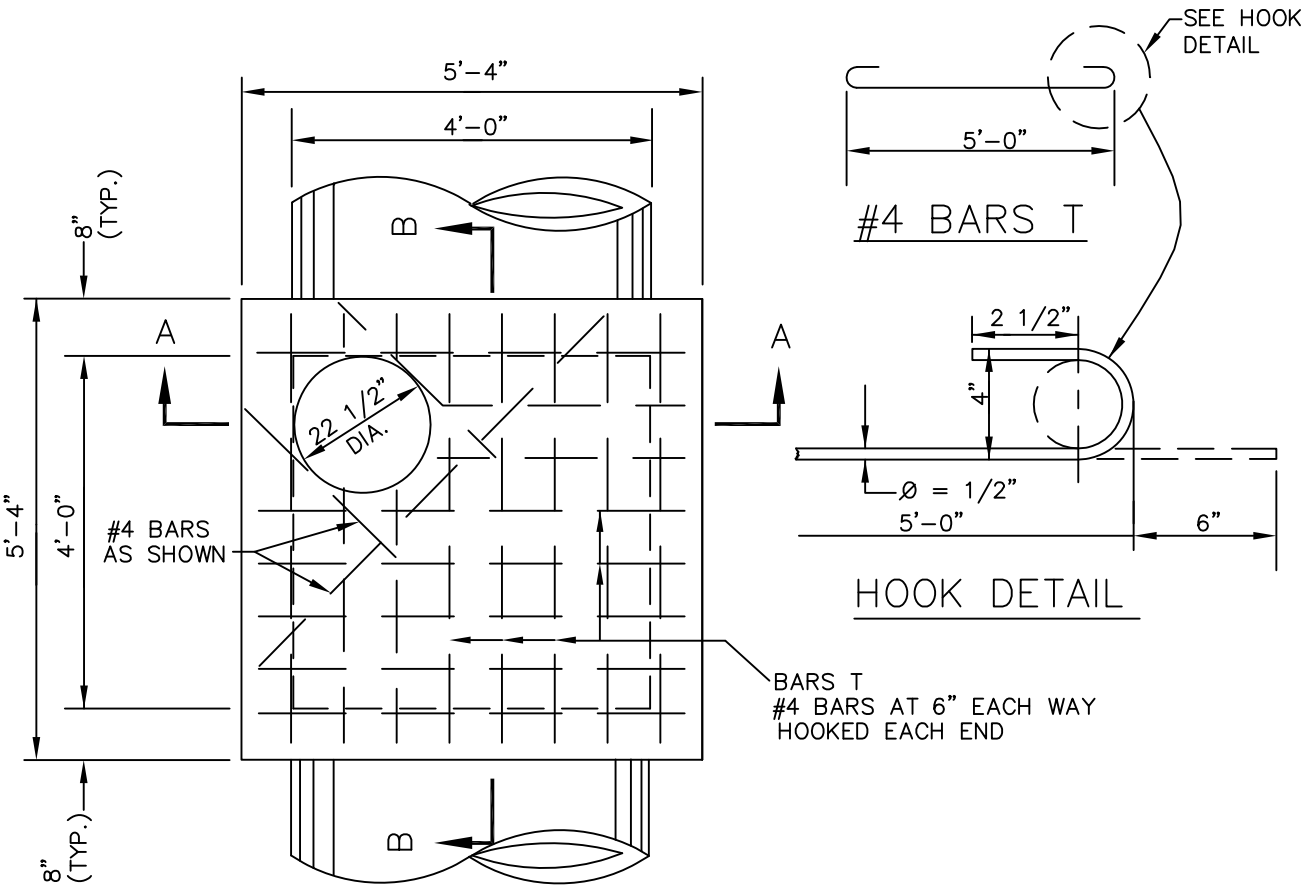
NOTES:

1. MATERIAL AND WORKMANSHIP SHALL CONFORM WITH THE REQUIREMENTS OF NORTH RICHLAND HILLS STANDARD SPECIFICATIONS FOR STANDARD CONCRETE MANHOLES. MINIMUM 3000 PSI CONCRETE.
2. LAYERS OF REINFORCING STEEL NEAREST THE INTERIOR AND EXTERIOR SURFACES SHALL HAVE A COVER OF 2" TO THE CENTER OF BARS, UNLESS OTHERWISE NOTED.
3. FOR DETAILS OF REINFORCING OF LOWER PORTIONS OF INLET SEE APPROPRIATE SQUARE MANHOLE DETAILS.
4. DEPTH OF REINFORCING OF LOWER PORTIONS OF INLET IS VARIABLE. APPROXIMATE DEPTH WILL BE SHOWN ON PLANS AT LOCATION OF INLET.
5. ALL STANDARD DROP INLETS SHALL HAVE ONE OPENING ON EACH SIDE UNLESS OTHERWISE SHOWN ON PLANS.
6. DECK MAY BE REINFORCED SAME AS 4' SQUARE MANHOLE.

STANDARD DROP INLET

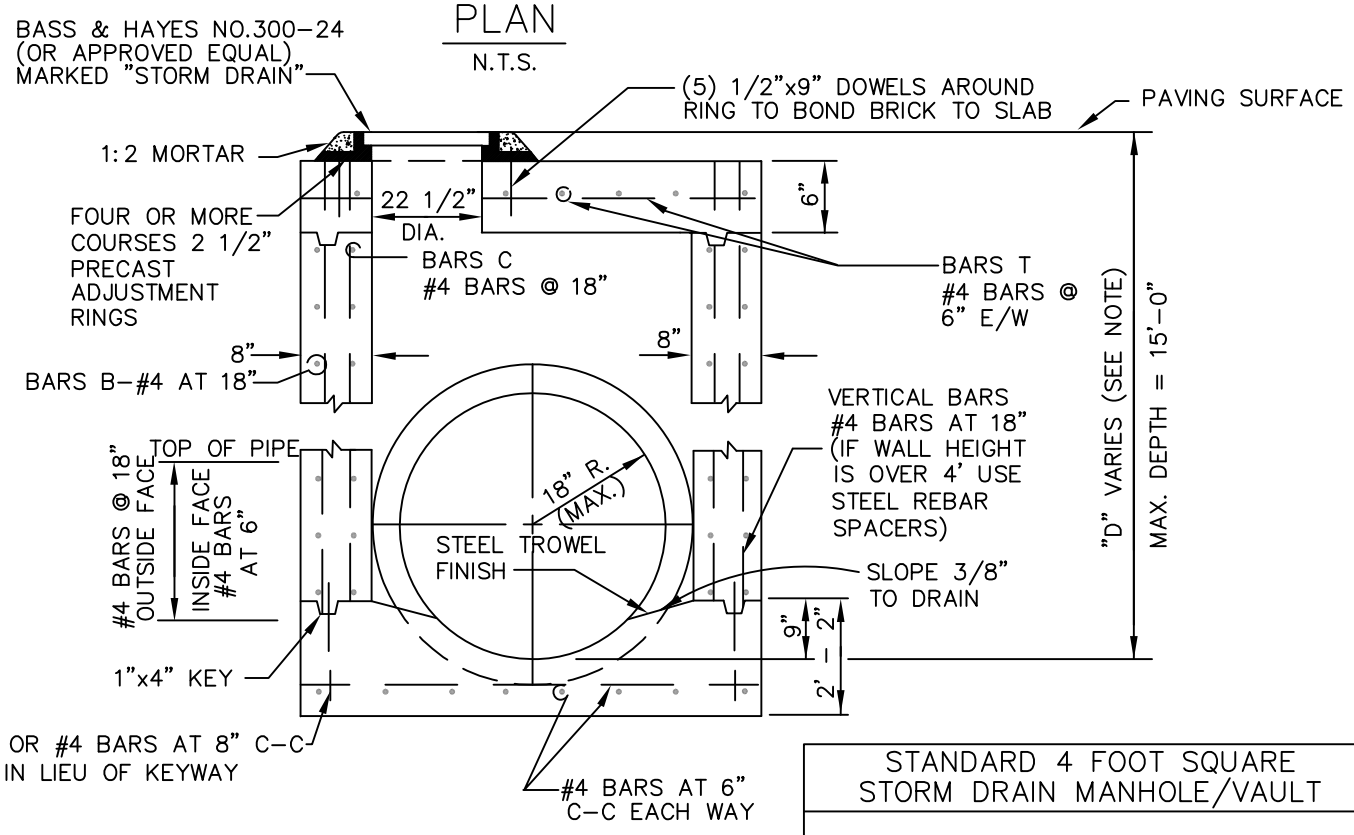
NORTH
RICHLAND
HILLS

R 07-01-2009 FIGURE 11D



PLAN

N.T.S.



SECTION A-A

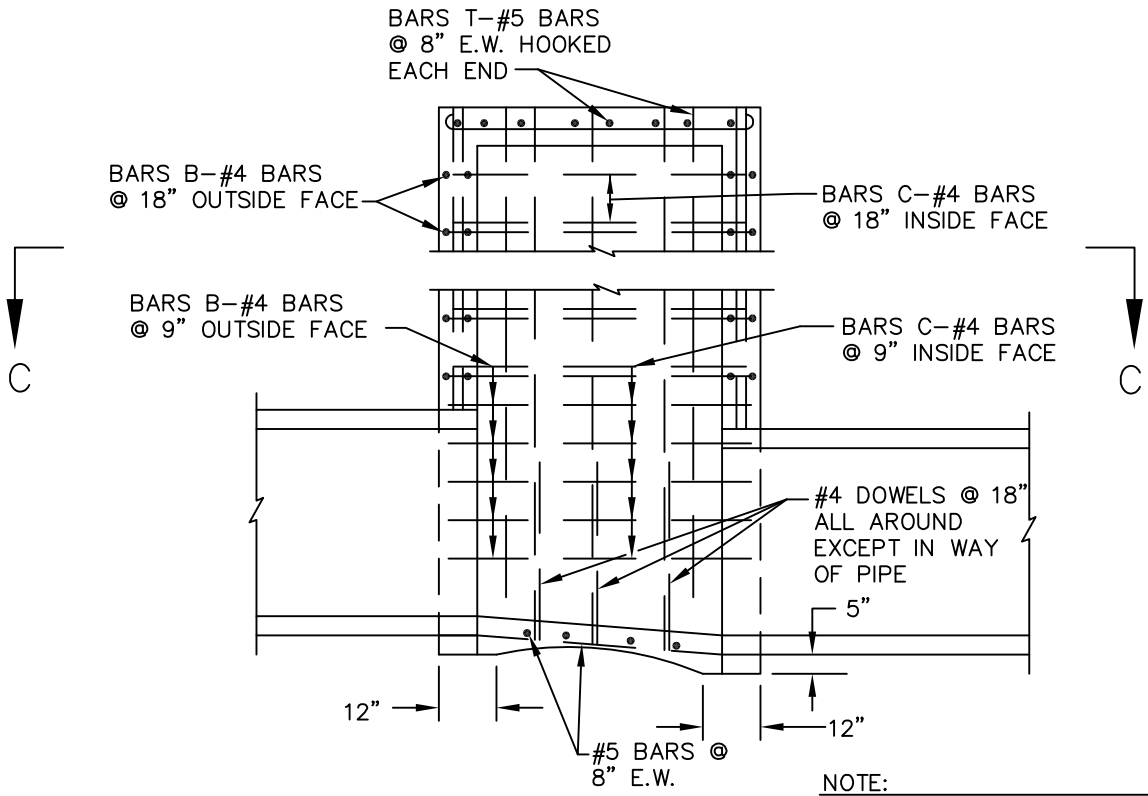
N.T.S.

NOTE:
DEPTH "D" SHALL BE SHOWN ON STORM DRAIN PLAN AND PROFILE SHEETS

STANDARD 4 FOOT SQUARE STORM DRAIN MANHOLE/VAULT

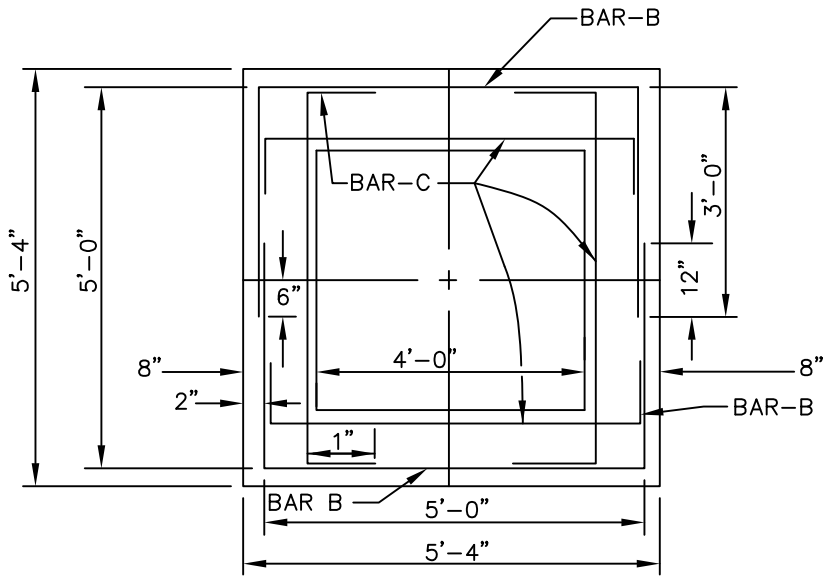
NORTH RICHLAND HILLS

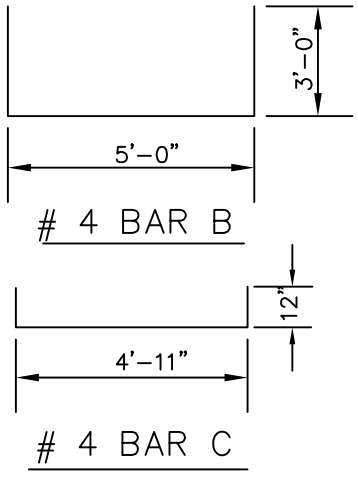
R 07-01-2009 FIGURE 12D-1



SECTION B–B
N.T.S.

NOTE:
SLOPE INVERT OF MANHOLE AS INDICATED ON PLAN–PROFILE SHEET.





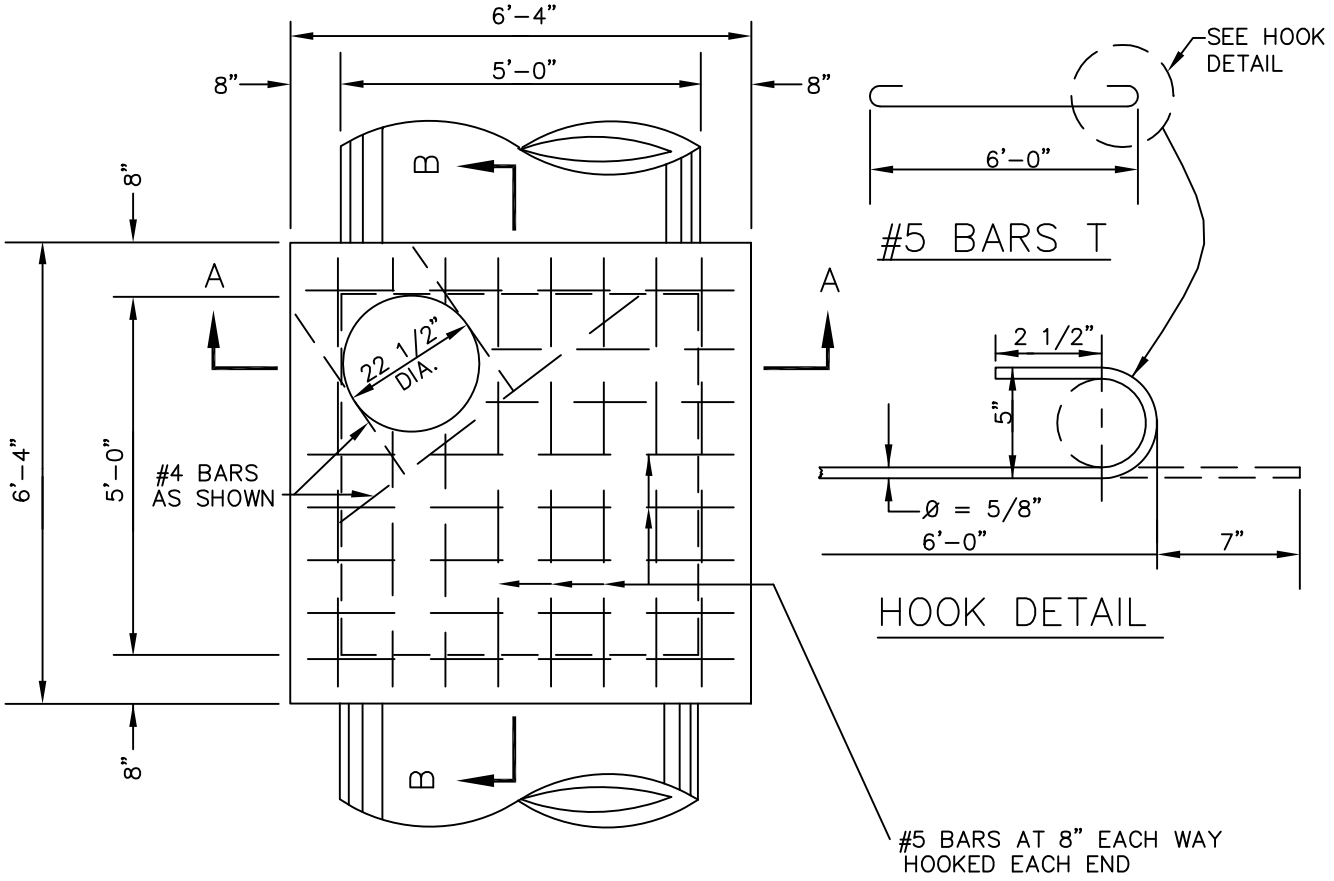
SECTION C–C
(VERTICAL BARS NOT SHOWN)
N.T.S.

NOTES:
1. MATERIALS AND WORKMANSHIP SHALL CONFORM WITH THE REQUIREMENTS OF STANDARD SPECIFICATION FOR STANDARD MANHOLES.
2. LAYERS OF REINFORCING STEEL NEAREST THE INTERIOR AND EXTERIOR SURFACE SHALL HAVE A COVER OF 2" TO THE CENTER OF BARS, UNLESS OTHERWISE NOTED.
3. EXCAVATION FOR MANHOLE TO BE INCLUDED IN UNIT PRICE BID FOR MANHOLE.
4. STANDARD 4 FOOT SQUARE MANHOLE SHALL NOT BE USED IF STORM DRAIN PIPE I.D. IS GREATER THAN 36".

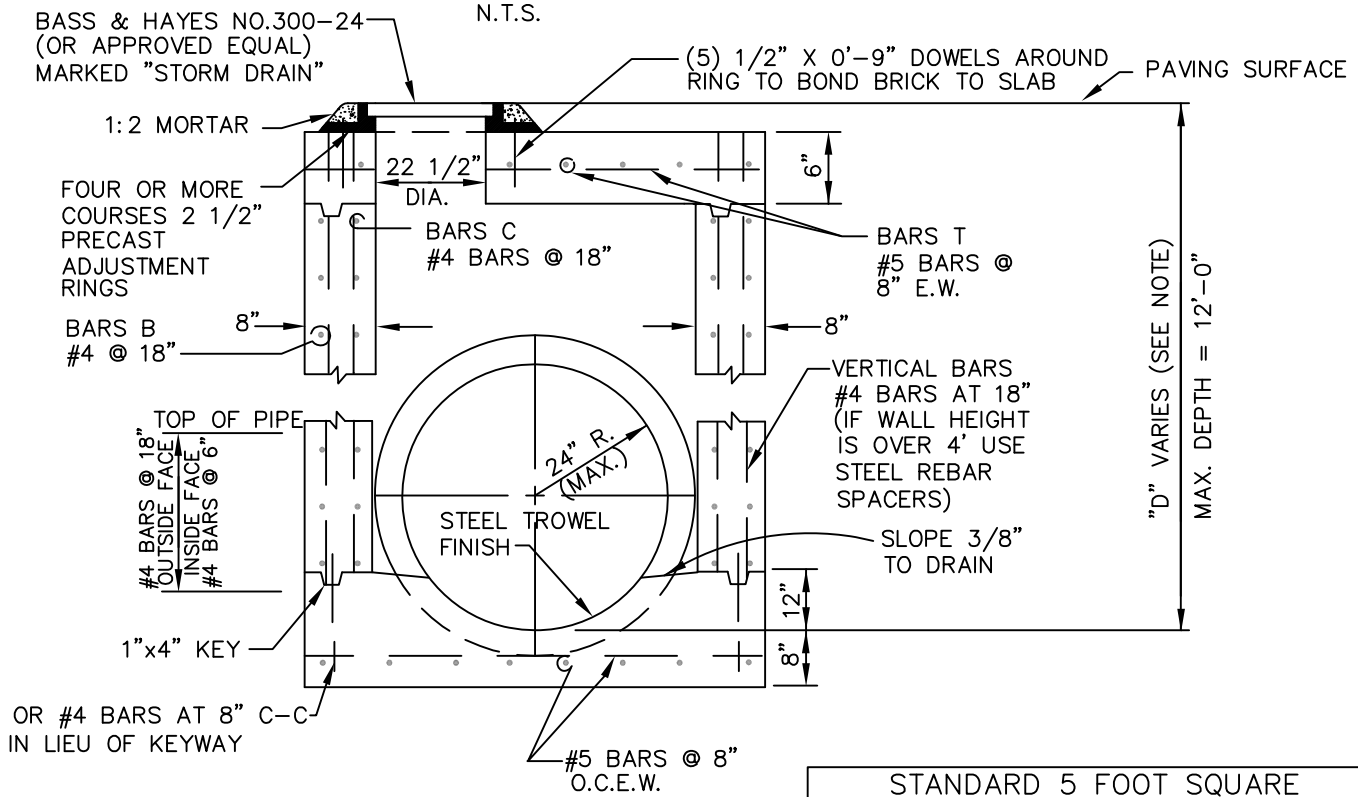
STANDARD 4 FOOT SQUARE
STORM DRAIN MANHOLE/VAULT

NORTH
RICHLAND
HILLS

R 07–01–2009 FIGURE 12D–2



PLAN
N.T.S.



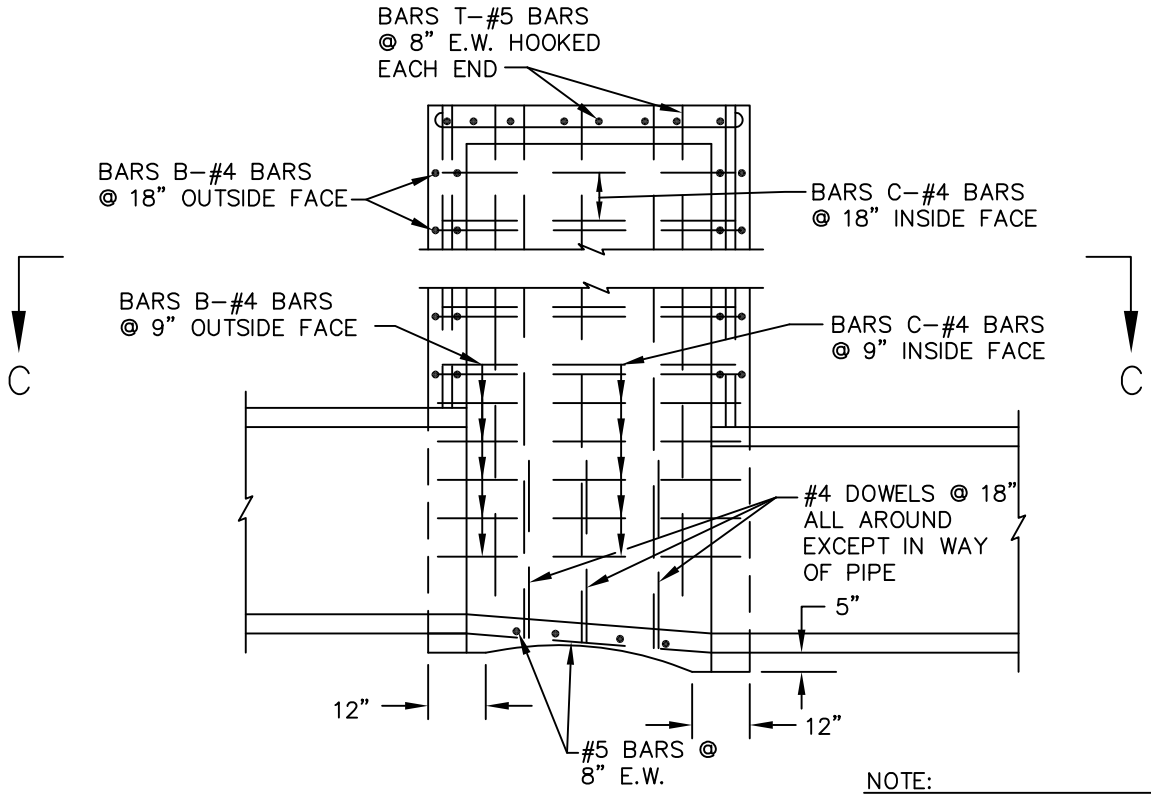
SECTION A-A
N.T.S.

NOTE:
DEPTH "D" SHALL BE SHOWN ON STORM DRAIN PLAN AND PROFILE SHEETS

STANDARD 5 FOOT SQUARE STORM DRAIN MANHOLE/VAULT

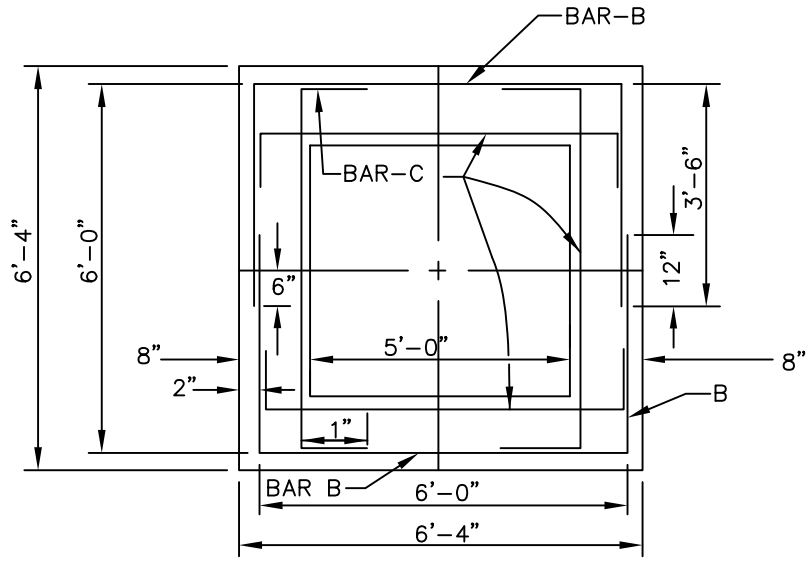
NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 13D-1

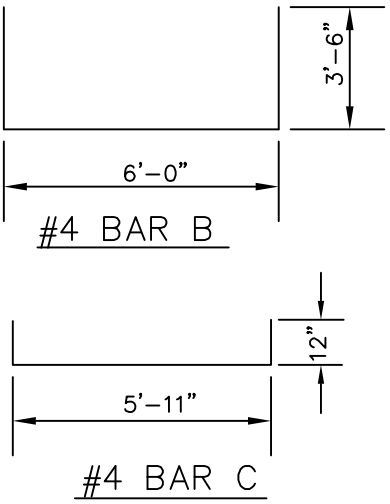


SECTION B–B
N.T.S.

NOTE:
SLOPE INVERT OF MANHOLE AS INDICATED ON PLAN–PROFILE SHEET.



SECTION C–C
(VERTICAL BARS NOT SHOWN)
N.T.S.

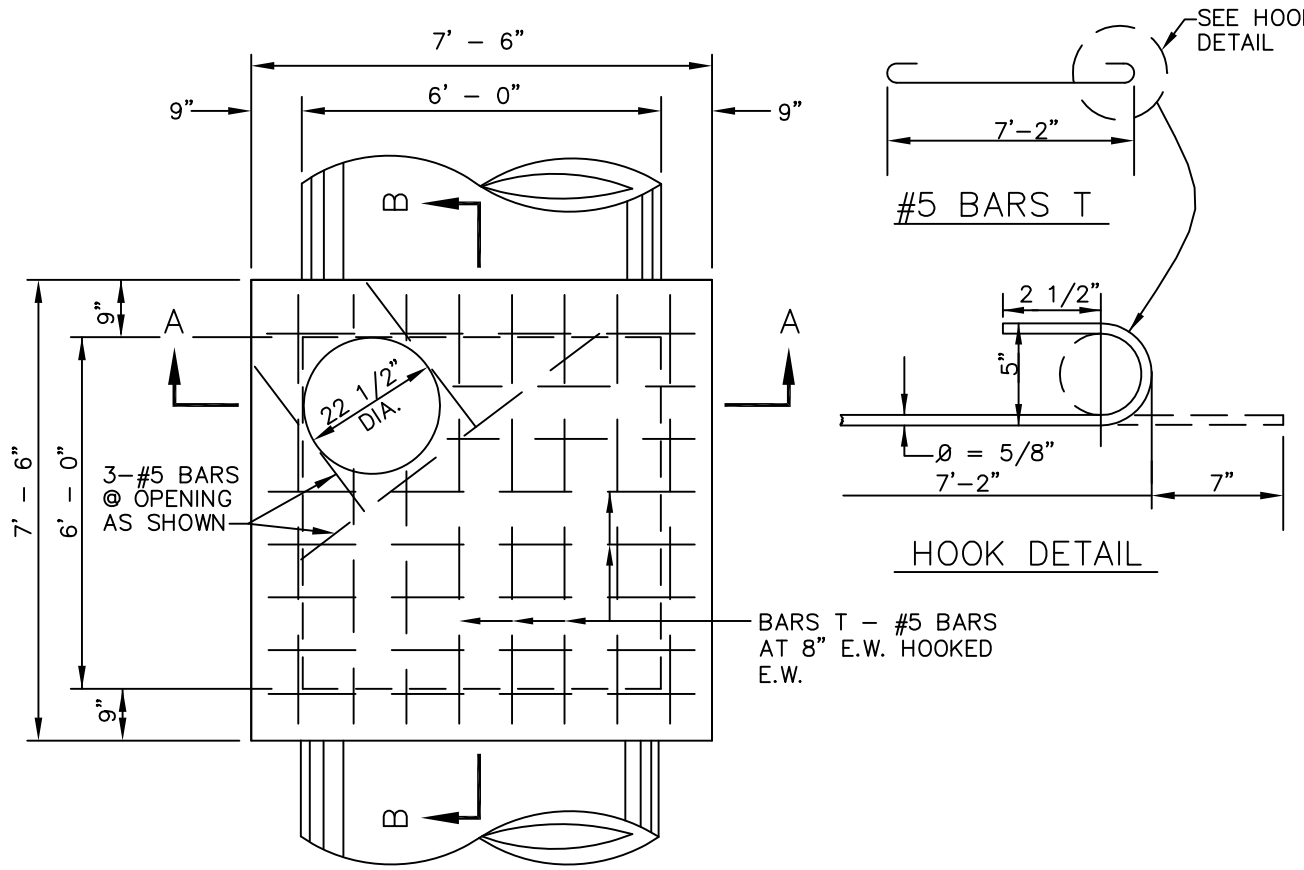


NOTES:
1. MATERIALS AND WORKMANSHIP SHALL CONFORM WITH THE REQUIREMENTS OF STANDARD SPECIFICATION FOR STANDARD MANHOLES.
2. LAYERS OF REINFORCING STEEL NEAREST THE INTERIOR AND EXTERIOR SURFACE SHALL HAVE A COVER OF 2" TO THE CENTER OF BARS, UNLESS OTHERWISE NOTED.
3. EXCAVATION FOR MANHOLE TO BE INCLUDED IN UNIT PRICE BID FOR MANHOLE.

STANDARD 5 FOOT SQUARE
STORM DRAIN MANHOLE/VAULT

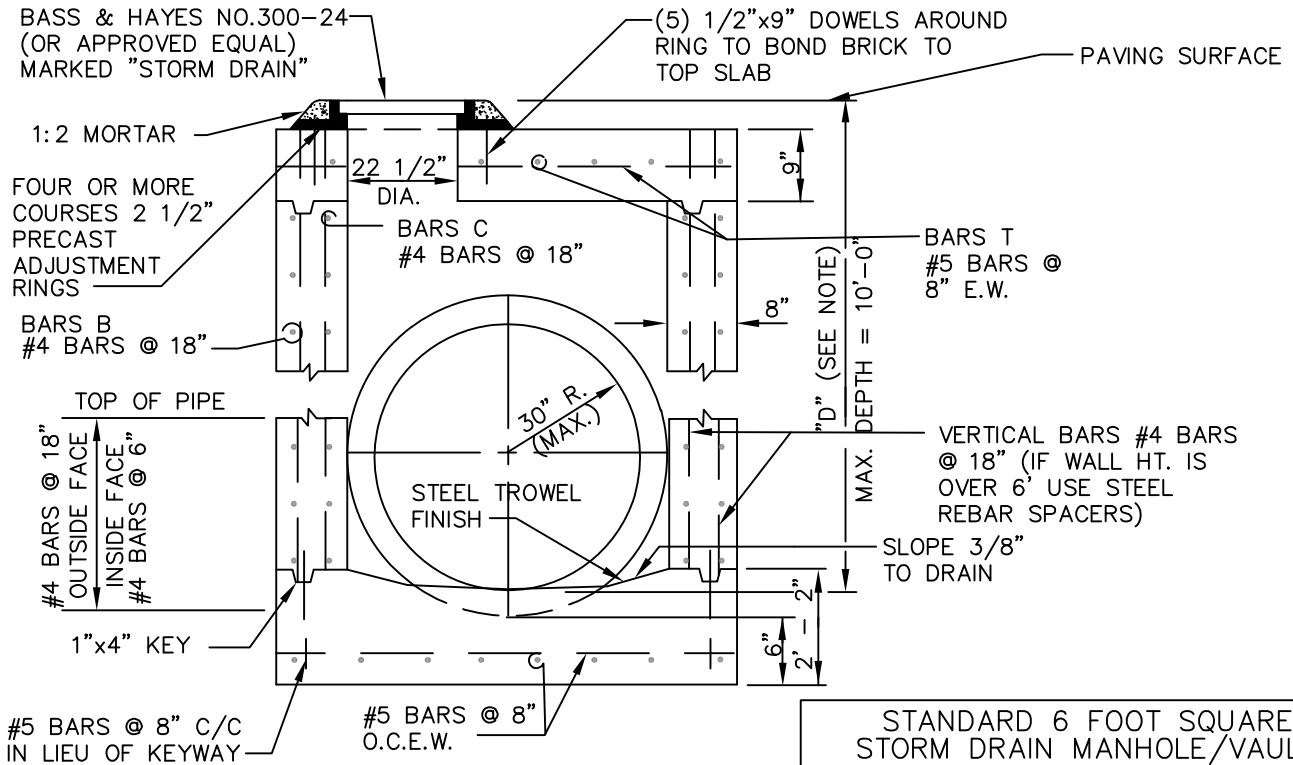
NORTH
RICHLAND
HILLS

R 07–01–2009 FIGURE 13D–2



PLAN

N.T.S.



SECTION A–A

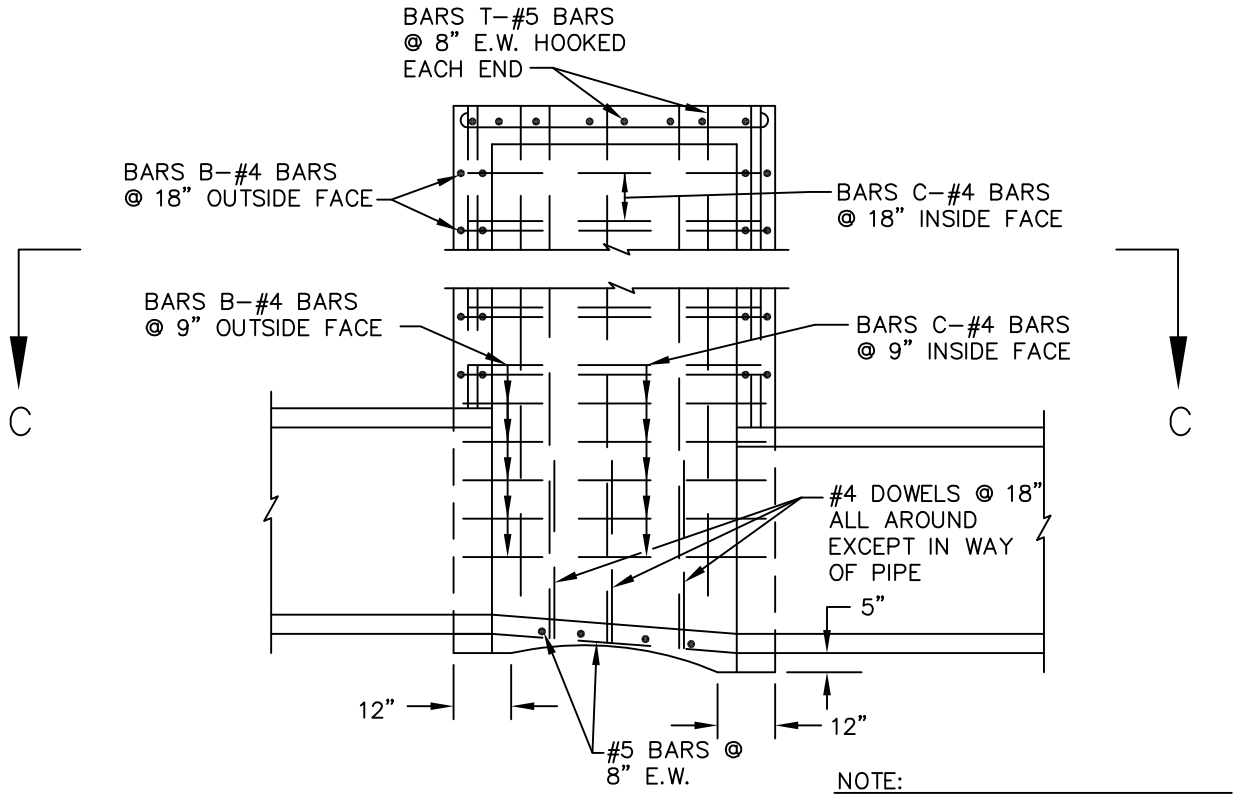
N.T.S.

NOTE:
DEPTH "D" SHALL BE SHOWN ON STORM DRAIN PLAN AND PROFILE SHEET

STANDARD 6 FOOT SQUARE STORM DRAIN MANHOLE/VAULT

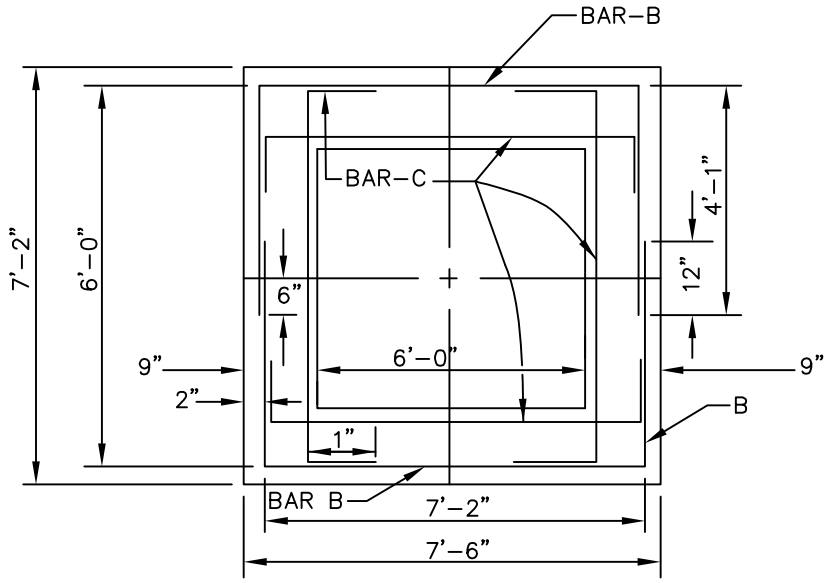
NORTH RICHLAND HILLS

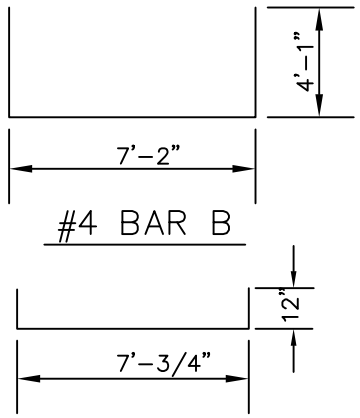
R 07–01–2009 FIGURE 14D–1



SECTION B–B
N.T.S.

NOTE:
SLOPE INVERT OF MANHOLE AS INDICATED ON PLAN–PROFILE SHEET.





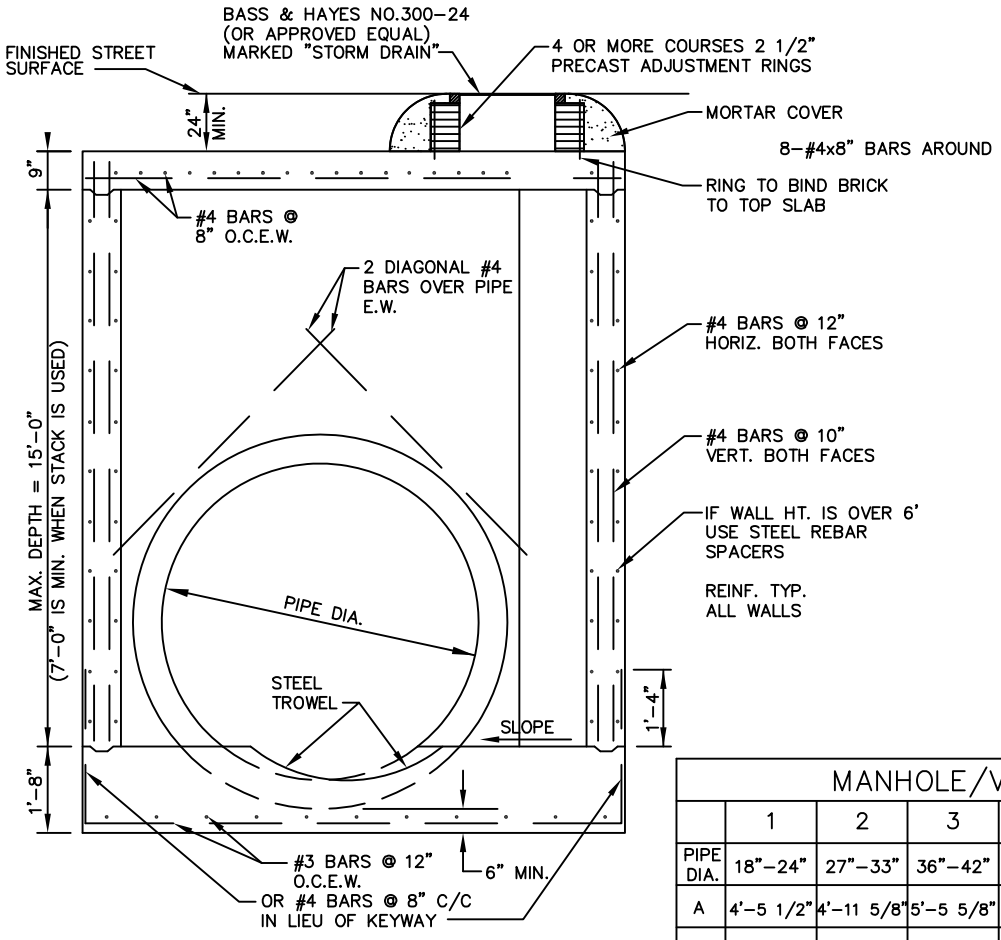
SECTION C–C
(VERTICAL BARS NOT SHOWN)
N.T.S.

NOTES:
1. MATERIALS AND WORKMANSHIP SHALL CONFORM WITH THE REQUIREMENTS OF STANDARD SPECIFICATION FOR STANDARD MANHOLES.
2. LAYERS OF REINFORCING STEEL NEAREST THE INTERIOR AND EXTERIOR SURFACE SHALL HAVE A COVER OF 2" TO THE CENTER OF BARS, UNLESS OTHERWISE NOTED.
3. EXCAVATION FOR MANHOLE TO BE INCLUDED IN UNIT PRICE BID FOR MANHOLE.

STANDARD 6 FOOT SQUARE
STORM DRAIN MANHOLE/VAULT

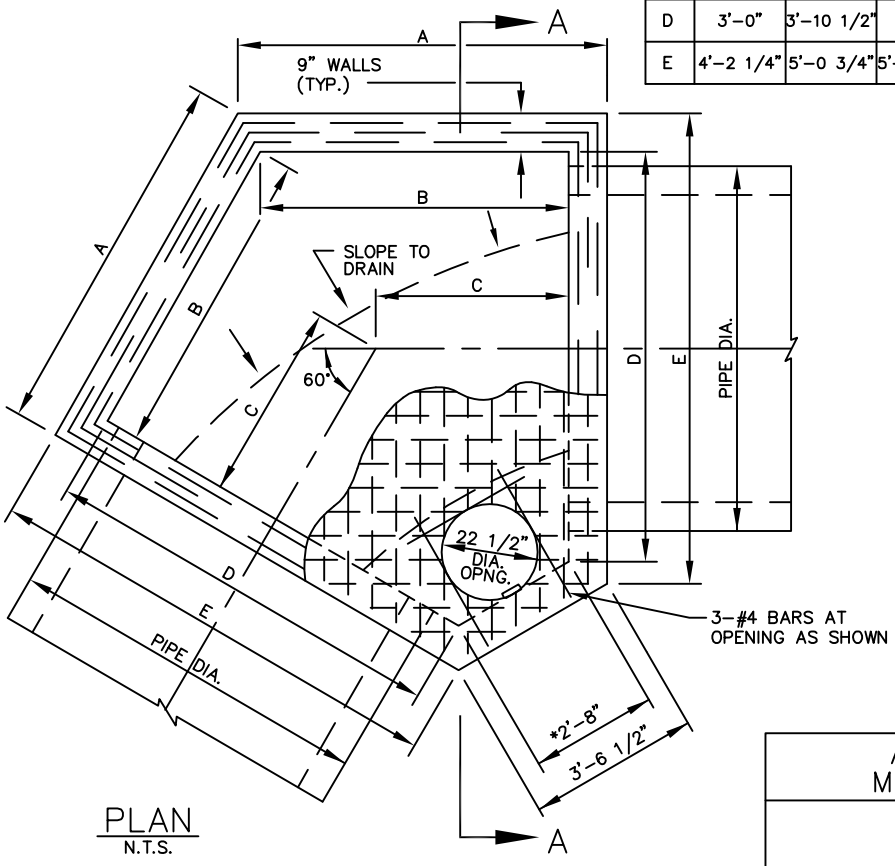
NORTH
RICHLAND
HILLS

R 07–01–2009 FIGURE 14D–2



SECTION A-A
N.T.S.

MANHOLE/VAULT TYPE						
	1	2	3	4	5	6
PIPE DIA.	18"-24"	27"-33"	36"-42"	48"-54"	60"-66"	72"
A	4'-5 1/2"	4'-11 5/8"	5'-5 5/8"	6'-1 3/4"	6'-9 7/8"	7'-6"
B	3'-3 5/16"	3'-9 3/8"	4'-3 7/16"	4'-11 1/2"	5'-7 5/8"	6'-3 3/4"
C	2'-5"	2'-8"	2'-11"	3'-3"	3'-7"	3'-11"
D	3'-0"	3'-10 1/2"	4'-9"	5'-11"	7'-1"	8'-3"
E	4'-2 1/4"	5'-0 3/4"	5'-11 1/4"	7'-1 1/4"	8'-3 1/4"	9'-5 1/4"



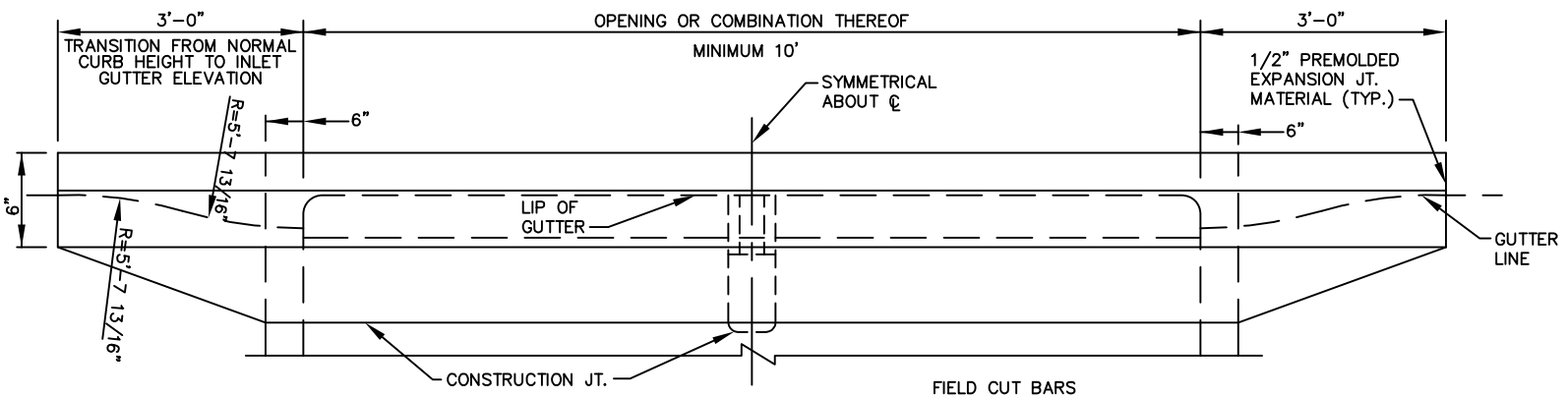
PLAN
N.T.S.

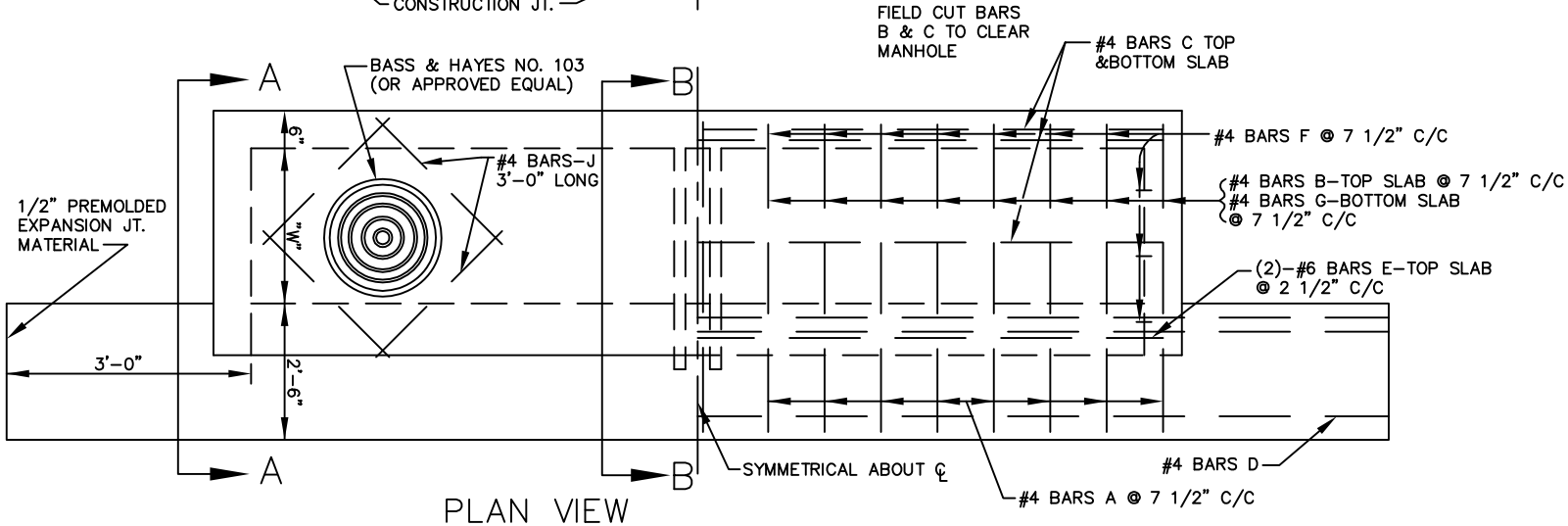
NOTES:
*1. THE 2'-8" DIMENSION SHALL IN ALL CASES BE THE CONTROL DIMENSION AND ANY DEVIATION IN OTHER DIMENSIONS ENCOUNTERED IN THE FIELD SHALL BE ADJUSTED BY THE ENGINEER.
2. MIN. 3000 PSI STRENGTH CONCRETE AT 28 DAYS, MIN. 40 GRADE STEEL.

ANGLED STORM DRAIN
MANHOLE/VAULT DETAIL

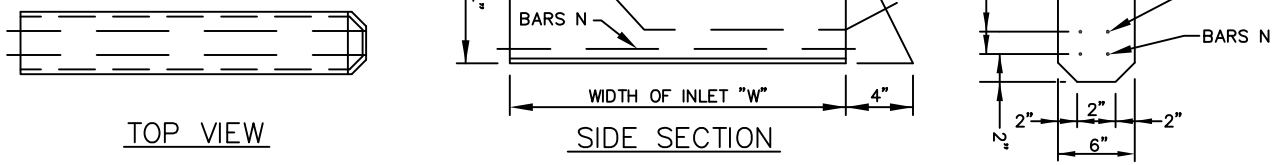
NORTH
RICHLAND
HILLS

R 07-01-2009 FIGURE 15D



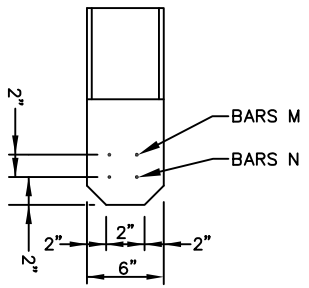


PLAN VIEW
N.T.S.



TOP VIEW

SIDE SECTION



END VIEW

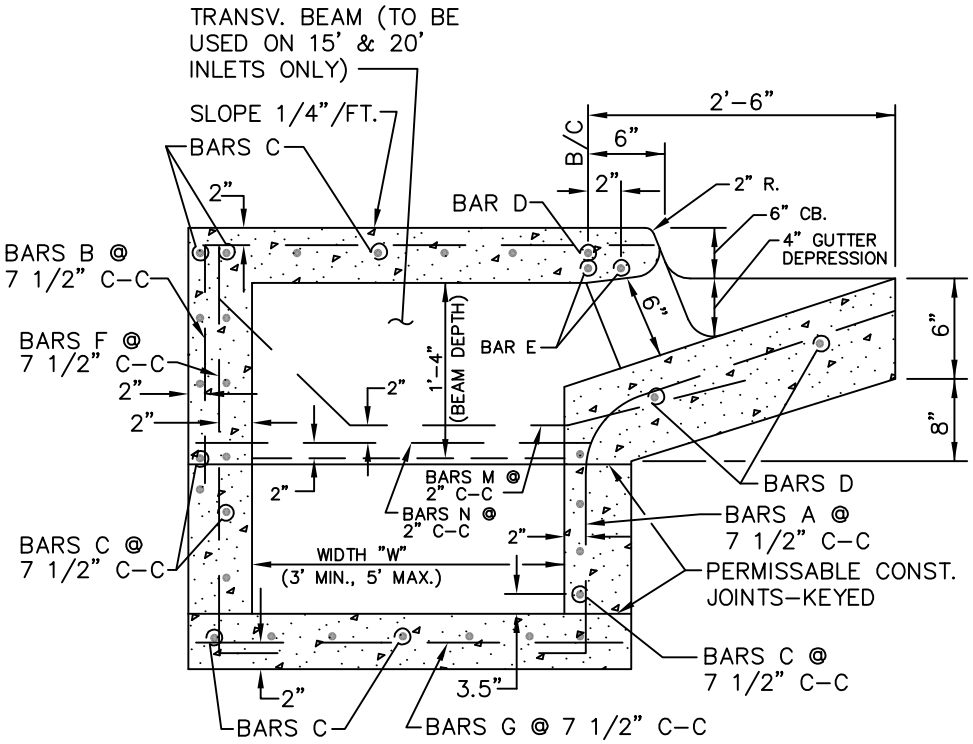
TRANVERSE BEAM DETAIL
(FOR USE WITH 15' & 20' INLETS)
N.T.S.

NOTE:
1. LOCATION OF MANHOLE LIDS TO BE LOCATED ON EACH SIDE OF TRANSVERSE BEAM.
2. TOPS AND THROATS MUST BE ONE POUR.
3. ONE MANHOLE LID IS REQUIRED FOR EVERY 10' OF INLET.
4. 30' INLETS NEED 2 BEAMS OVER, 3 LIDS REQUIRED.

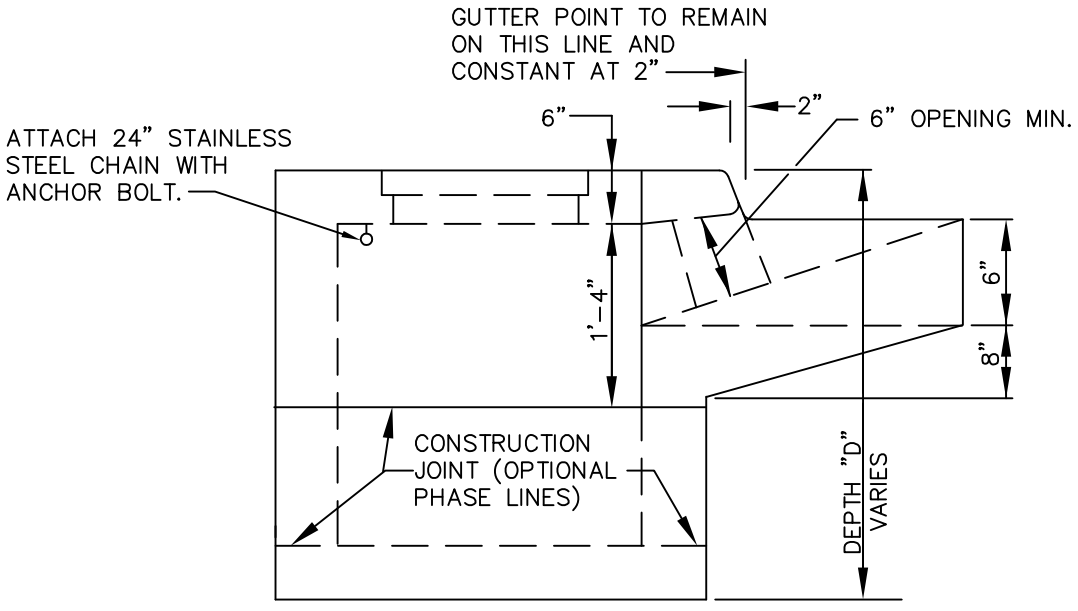
STANDARD CURB INLET

NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 16D-1



SECTION "B-B"
N.T.S.



SECTION "A-A"
N.T.S.

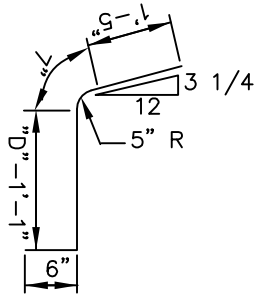
NOTES:

1. ALL CONCRETE SHALL BE 3000 P.S.I. COMPRESSIVE STRENGTH CONCRETE AT 28 DAYS.
2. REINFORCING BARS SHALL BE STANDARD, BILLET STEEL, DEFORMED REINFORCING BARS OF A DIAMETER AND LENGTH AS SHOWN.
3. CHAMFER ALL EXPOSED CORNERS 3/4" EXCEPT WHERE OTHERWISE NOTED.
4. DIMENSIONS RELATING TO REINF. STEEL ARE TO CENTERS OF BARS.
5. FIELD CUT & BEND BARS AS NECESSARY TO ACCOMMODATE STORM SEWER PIPE.
6. CAST IRON CASTINGS SHALL CONFORM TO T.H.D. ITEM 471.
7. RING AND COVER SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR.
8. DURING STAGE 1 CONSTRUCTION, INLETS WILL NOT BE CONSTRUCTED ABOVE SUBGRADE ELEVATION.
9. A TEMPORARY WOOD COVER SHALL BE INSTALLED AFTER STAGE 1 IS COMPLETED AND WILL REMAIN IN PLACE UNTIL STAGE 2 IS BEGUN.
10. INLET TOPS TO BE INSTALLED AFTER PAVING IS COMPLETE.
11. THROATS AND TOPS MUST BE ONE POUR.

STANDARD CURB INLET

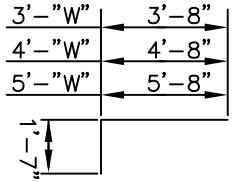
NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 16D-2



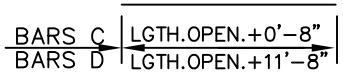
#4 BARS A

N.T.S.



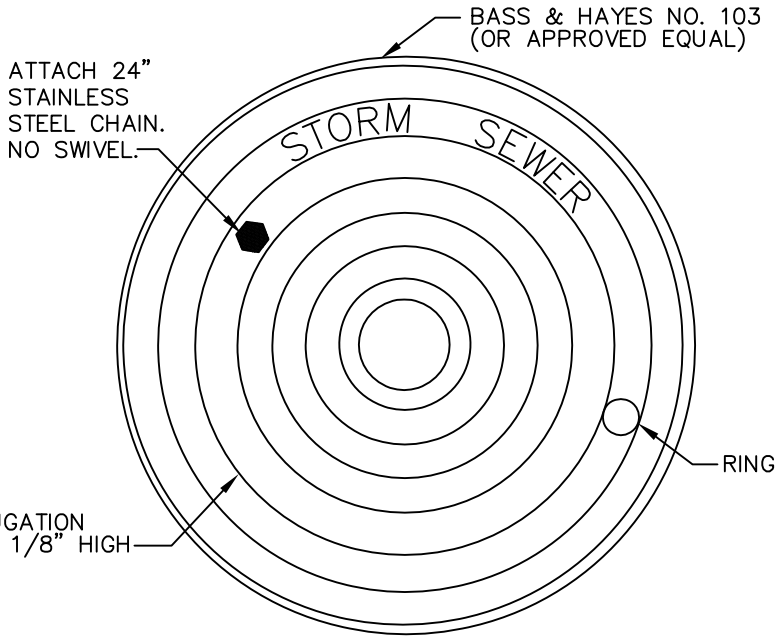
#4 BARS B

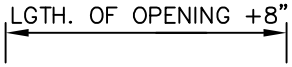
N.T.S.



#4 BARS C & D

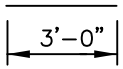
N.T.S.





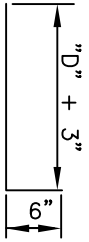
#6 BARS E

N.T.S.



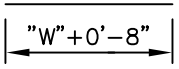
#4 BARS J

N.T.S.



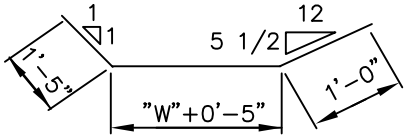
#4 BARS F

N.T.S.



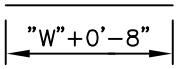
#4 BARS G

N.T.S.



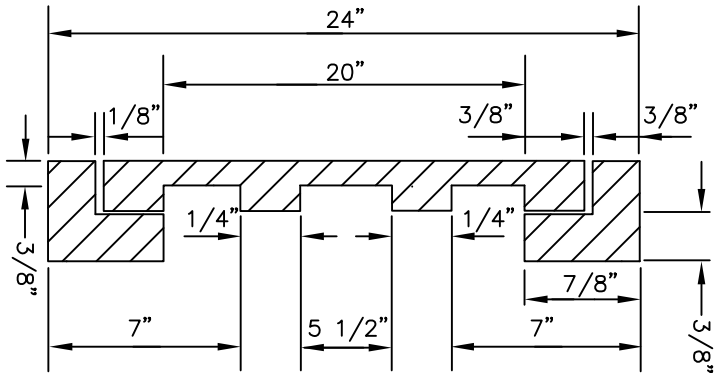
#3 BARS M

N.T.S.



#5 BARS N

N.T.S.



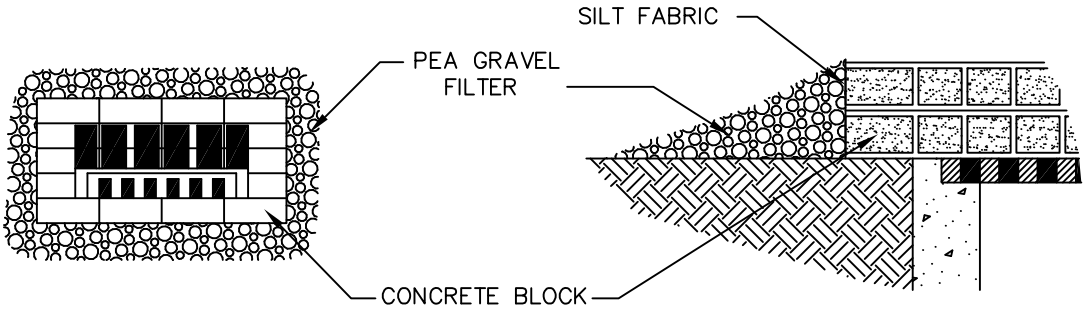
DETAIL OF CAST IRON
RING AND COVER

N.T.S.

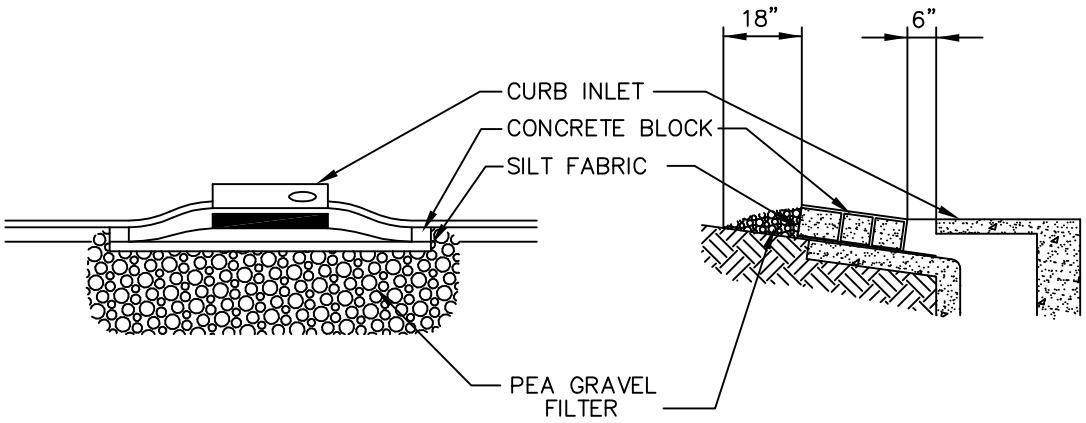
NORTH RICHLAND HILLS

STANDARD CURB INLET

R 07-01-2009 FIGURE 16D-3



DROP INLET PROTECTION
N.T.S.

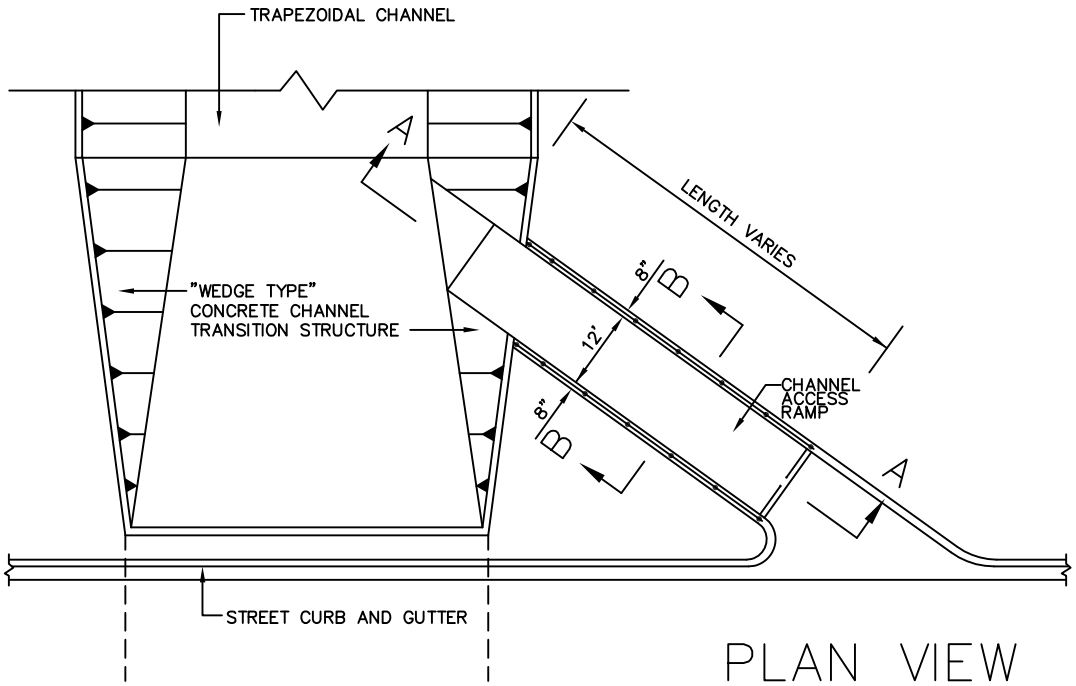


CURB INLET PROTECTION
N.T.S.

INLET PROTECTION
BLOCK AND GRAVEL

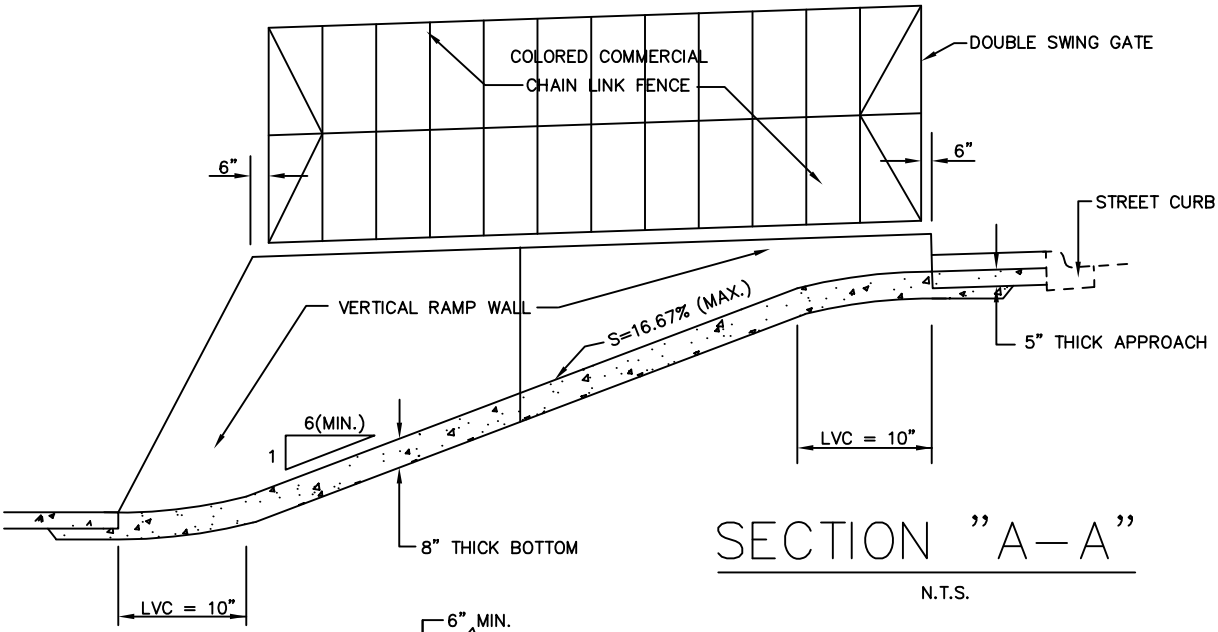
NORTH
RICHLAND
HILLS

R 07-01-2009 FIGURE 17D



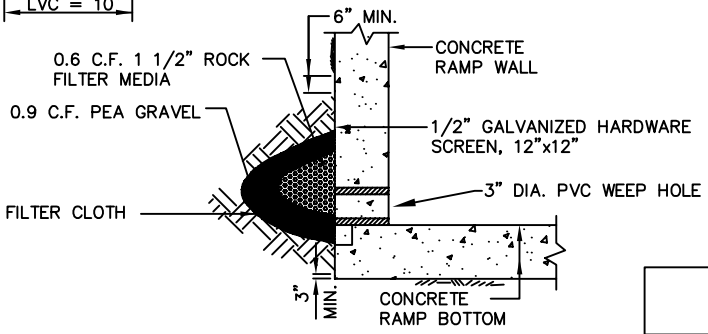
PLAN VIEW

N.T.S.



SECTION "A–A"

N.T.S.



WEEP HOLE DETAIL AT BOTTOM OF CONCRETE RAMP WALL

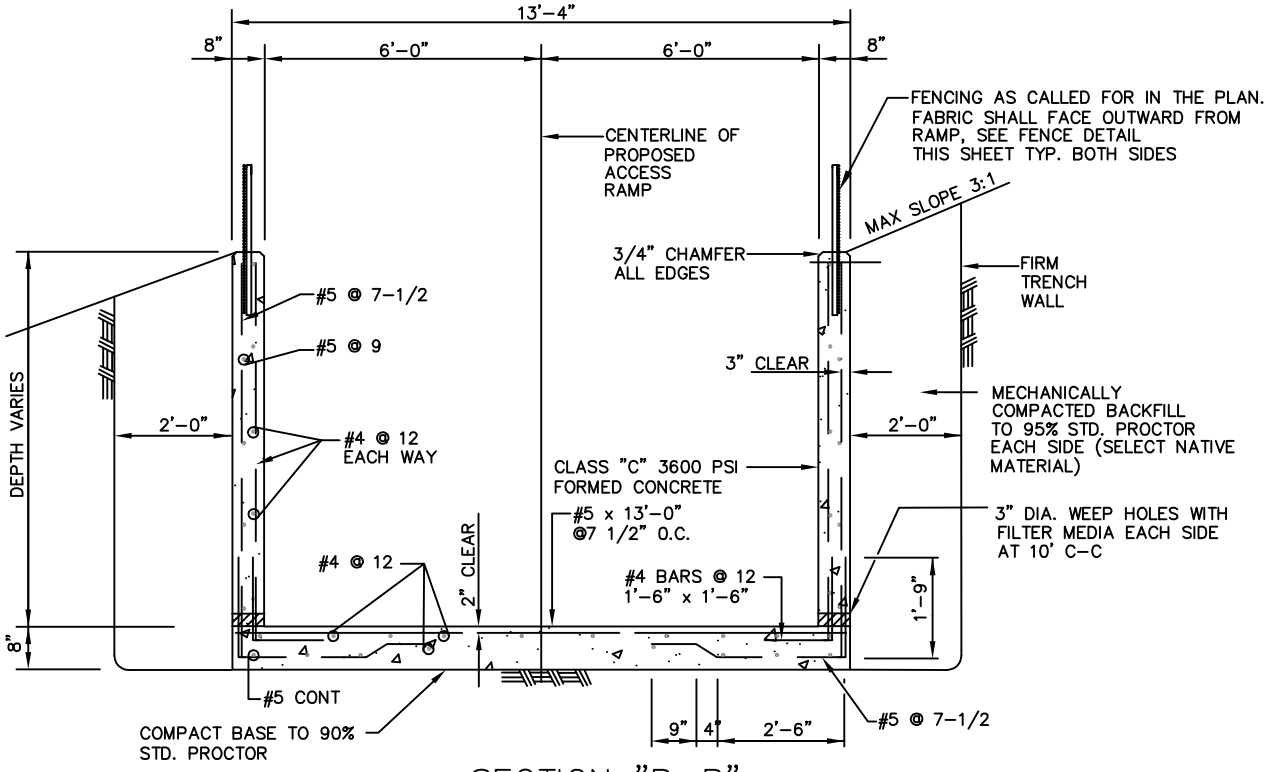
N.T.S.

NOTE: 3" DIA. WEEP HOLES WITH TWO C.F. EACH OF SAND, PEA GRAVEL AND 1 1/2" ROCK FILTER MEDIA SHALL BE SPACED AT 10' C.C EACH SIDE ALONG BOTTOM OF RAMP WALL OR AS DIRECTED BY OWNERS RESIDENT PROJECT REPRESENTATIVE.

CHANNEL ACCESS RAMP

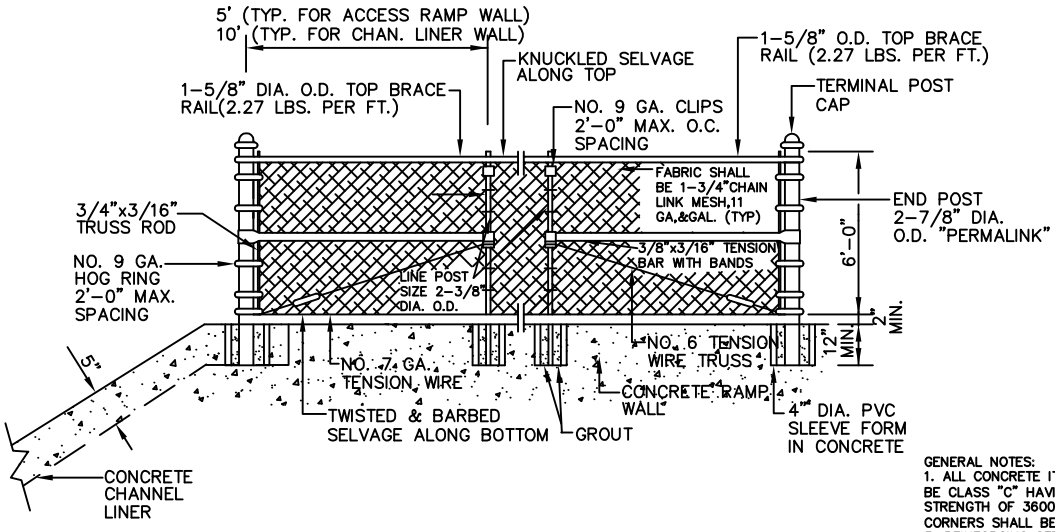
NORTH RICHLAND HILLS

R 07–01–2009 FIGURE 18D–1

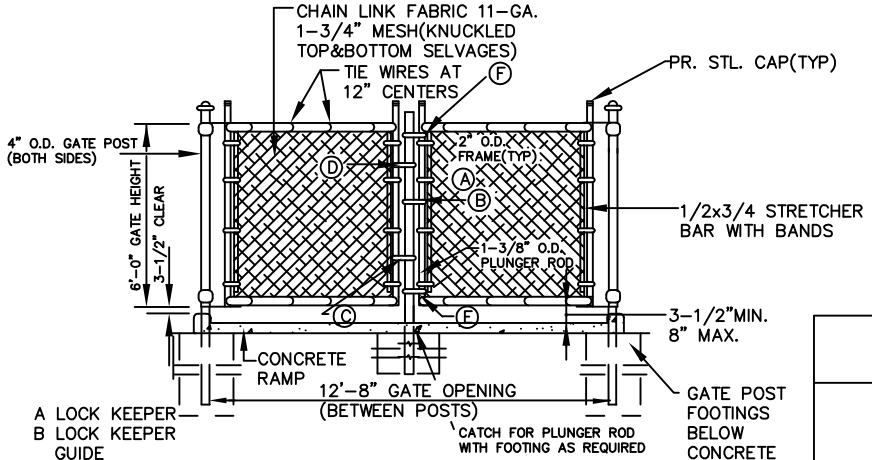


SECTION "B-B"

N.T.S.



GENERAL NOTES:
1. ALL CONCRETE ITEMS SHOWN ON THIS SHEET SHALL BE CLASS "C" HAVING A MINIMUM COMPRESSIVE STRENGTH OF 3600 PSI AT 28 DAYS. 2. ALL EXPOSED CORNERS SHALL BE CHAMFERED 3/4".
3. REINFORCING STEEL SHALL BE PLACED WITH CENTERS OF THE OUTSIDE LAYER OF BARS 2" FROM THE SURFACE OF THE CONCRETE UNLESS OTHERWISE SHOWN.
4. DIMENSIONS OF REINFORCING BARS ARE TO CENTER OF BARS.
5. EXPANSION JOINTS ALONG ACCESS RAMP SHALL NOT EXCEED 40' LENGTHS.
6. SHOP DRAWINGS WILL BE REQUIRED FOR GATE INSTALLATION FOR REVIEW AND APPROVAL BY ENGINEER AND CITY REPRESENTATIVE.
7. CONSTRUCTION OF 6' HIGH CHAIN LINK FENCE OTHER THAN ALONG PROPOSED CHANNEL LINER OR ACCESS RAMP SHALL INCLUDE FOOTINGS AS FOLLOWS: LINE POSTS - 8"DIA.x2'-6" FOOTING TERMINAL POSTS - 1'-0"DIA.x3'-0" FOOTING.
8. ALL MESH, POSTS AND FITTINGS ARE GALVANIZED STEEL.
9. A COATING SHALL BE APPLIED IN ACCORDANCE TO ASTM F 1083-96 SPECIFICATIONS.
10. CITY OF NORTH RICHLAND HILLS WILL SELECT THE COLOR OF COATING FOR THE CHAIN LINK FENCE.



CHAIN LINK FENCE DETAILS

N.T.S.

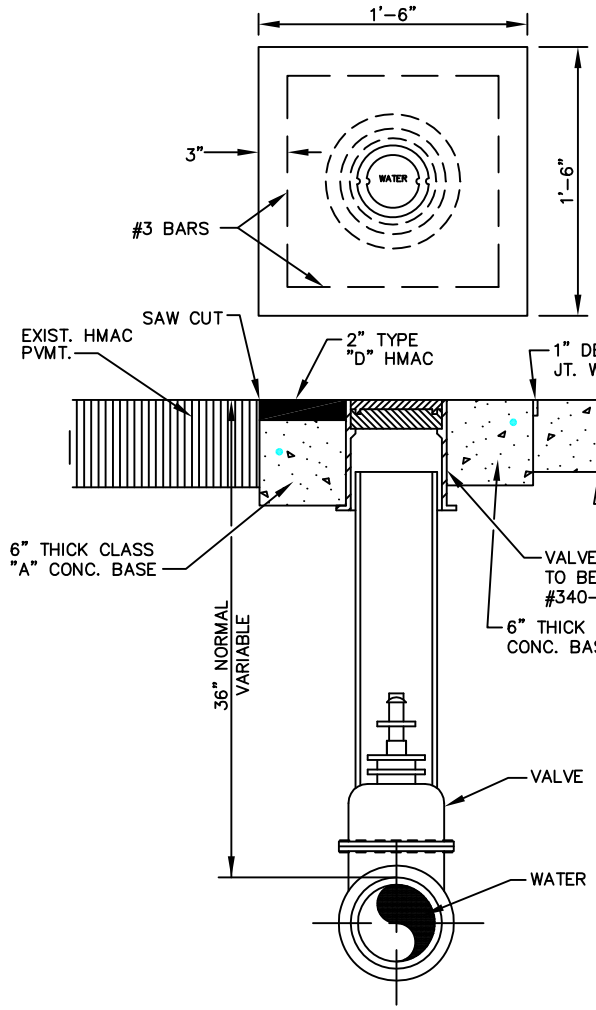
CHANNEL ACCESS RAMP

NORTH RICHLAND HILLS

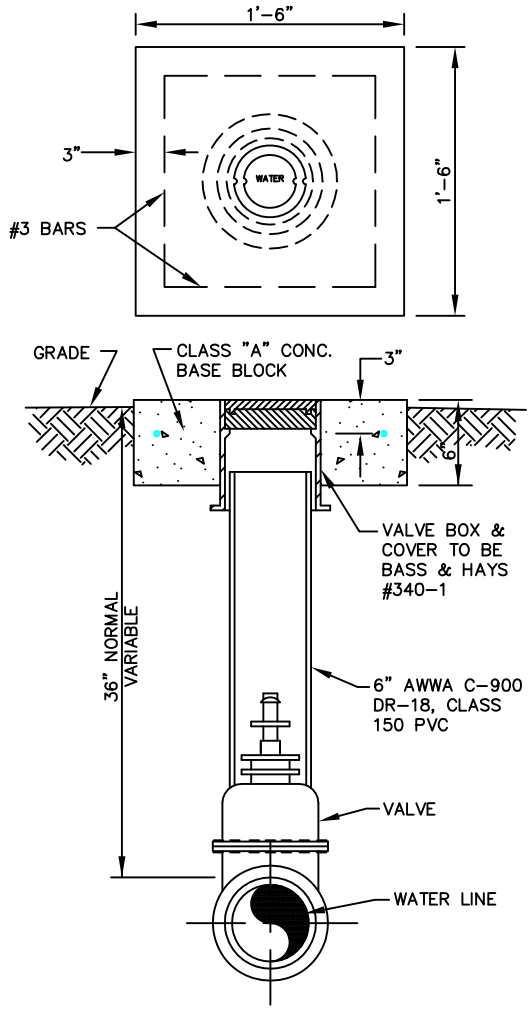
R 07-01-2009 FIGURE 18D-2

Water

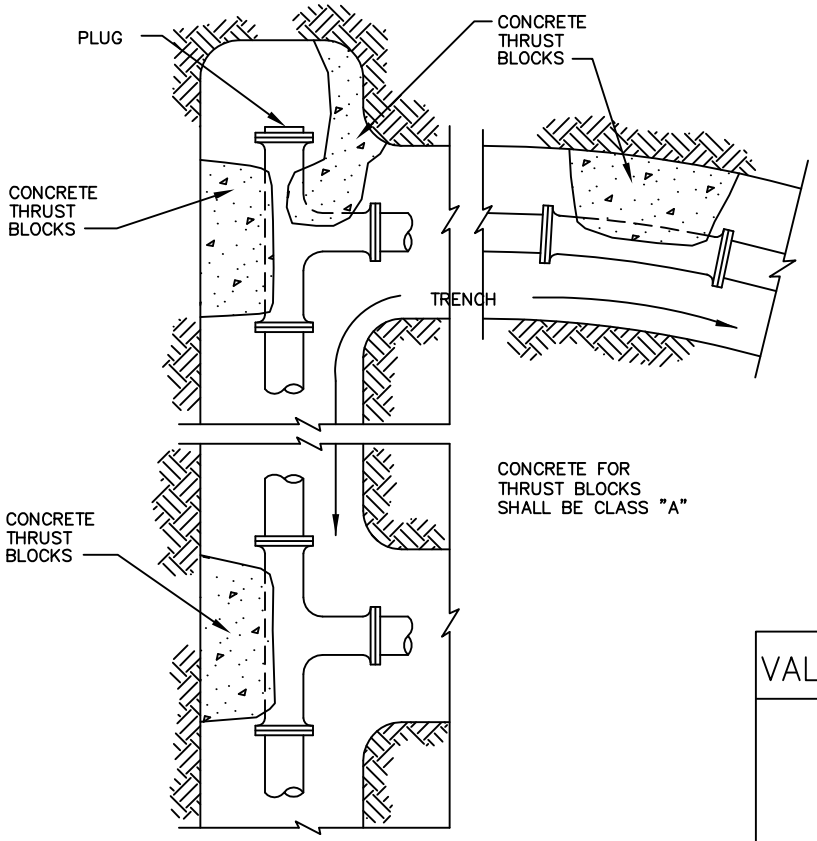
1W	Valve and Thrust Block Details
2W	Detail of Valve Locations at Street Intersections
3W-1	Fire Hydrant Details
3W-2	Fire Hydrant and Water Meters
4W	Water Service Connection Details Single and Double
5W	2" Water Service
6W	Domestic 4" Meter Installation
7W	Irrigation 4" Meter Installation
8W	Detector Check Installation Details
9W	Blow-Off Hydrant



VALVES WITHIN ROADWAYS
OR OTHER PAVED OR SURFACED AREAS



VALVES IN YARDS OR OTHER AREAS
NOT SUBJECT TO TRAFFIC



TYPICAL THRUST BLOCK DETAILS

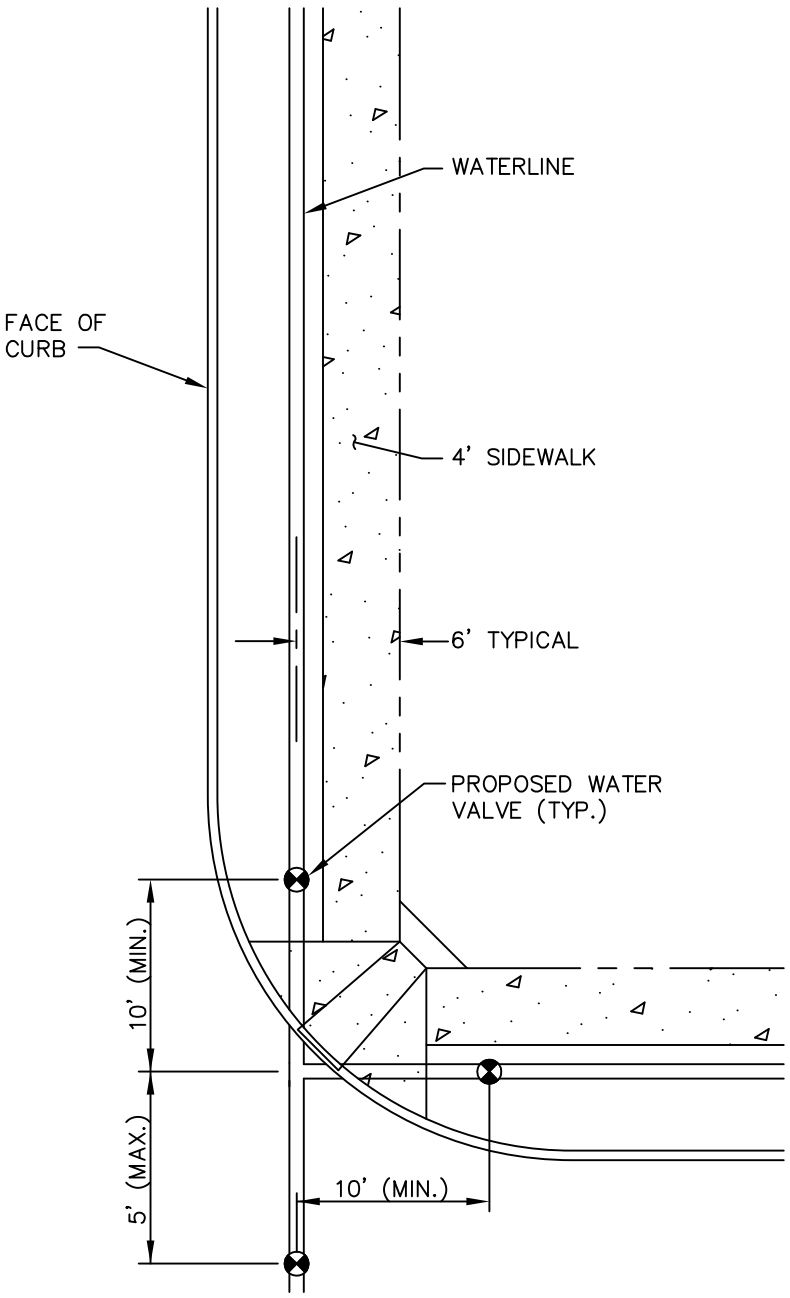
NOTES:

1. CLASS "A" CONCRETE SHALL SHALL HAVE 5 SACKS OF CEMENT/C.Y., MAXIMUM SLUMP OF 5 INCHES, AND A 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS.
2. ALL ITEMS SHOWN INCLUDED IN VALVE & BOX UNIT PRICE, COMPLETE IN PLACE.
3. ALL WATER VALVES SHALL MEET THE MINIMUM REQUIREMENTS OF AWWA C509 AND SHALL BE MUELLER, U.S. PIPE OR WATEROUS.
4. MEGA LUGS ON ALL FITTINGS.
5. USE VALVE BOX STABILIZER FOR VALVES IN PAVEMENT OR AS SPECIFIED BY CITY REPRESENTATIVE.

VALVE & THRUST BLOCK DETAILS

NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 1W



TYPICAL VALVE LOCATIONS
N.T.S.

GENERAL NOTES:

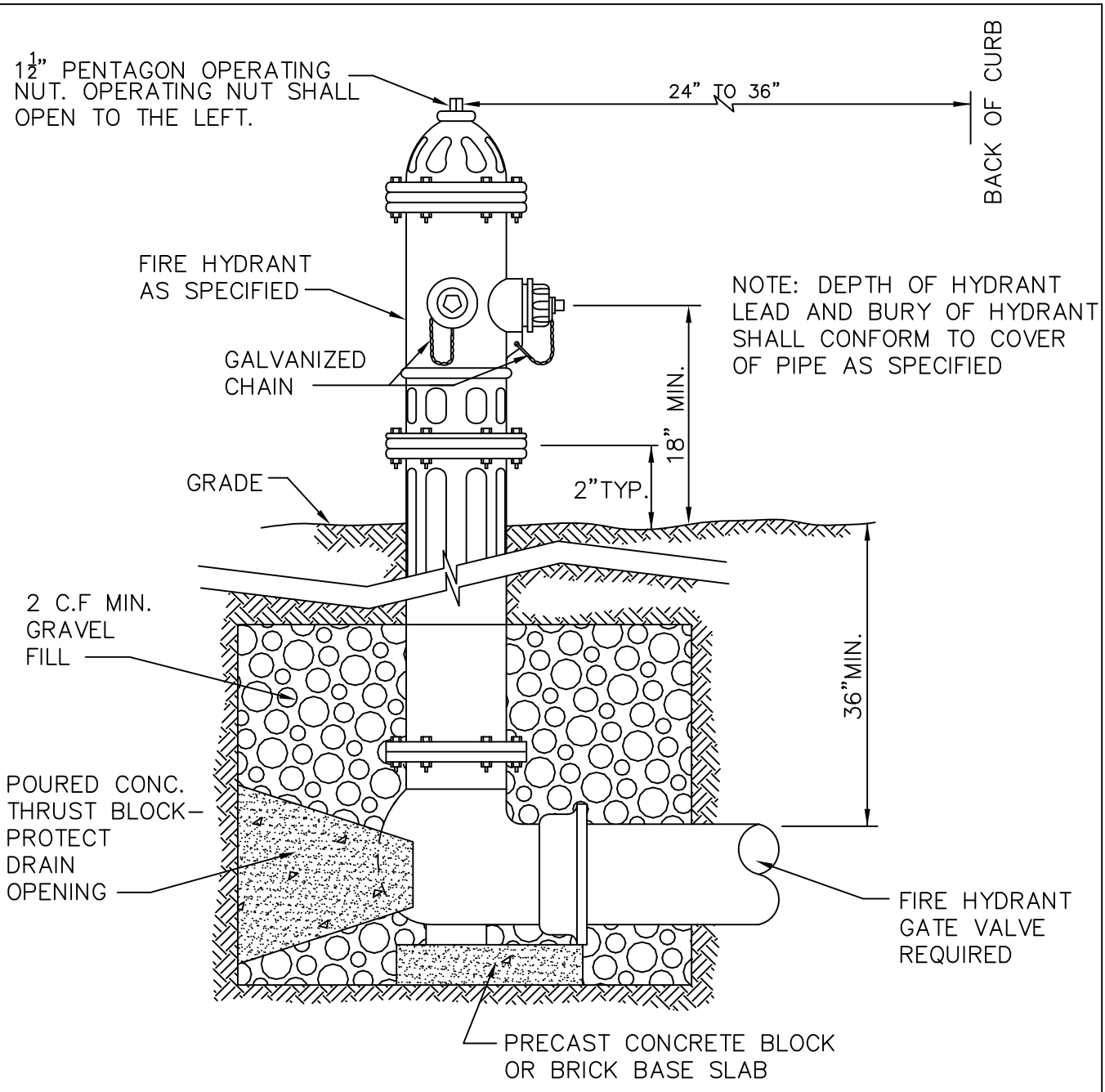
1. ALL TEE INTERSECTIONS OF PUBLIC WATER MAINS SHALL INCLUDE AT LEAST 2 GATE VALVES.

3 ALL CROSS INTERSECTIONS OF PUBLIC WATER MAINS SHALL INCLUDE AT LEAST 3 GATE VALVES

DETAIL OF VALVE LOCATIONS AT STREET INTERSECTIONS

NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 2W



FIRE HYDRANT DETAIL

N.T.S.

GENERAL NOTES:

1. CONCRETE SHALL BE PLACED OR POURED AGAINST UNDISTURBED SOIL.

2. ALL FIRE HYDRANTS SHALL CONFORM TO NORTH RICHLAND HILLS SPECIFICATIONS AND SHALL BE MUELLER/CENTURION, M&H MODEL 129 OR WATEROUS PACER MODEL WB-67-250.

3. NO SEPARATE PAY FOR EXTENSIONS TO FINISHED GRADE.

4. ALL PORTIONS (EXCLUDING CHAINS) OF FIRE HYDRANT ABOVE GRADE SHALL BE PAINTED WITH TNEMEC SERIES 02H HI-BUILD TNEME-GLOSS. COLOR: CHILEAN RED.

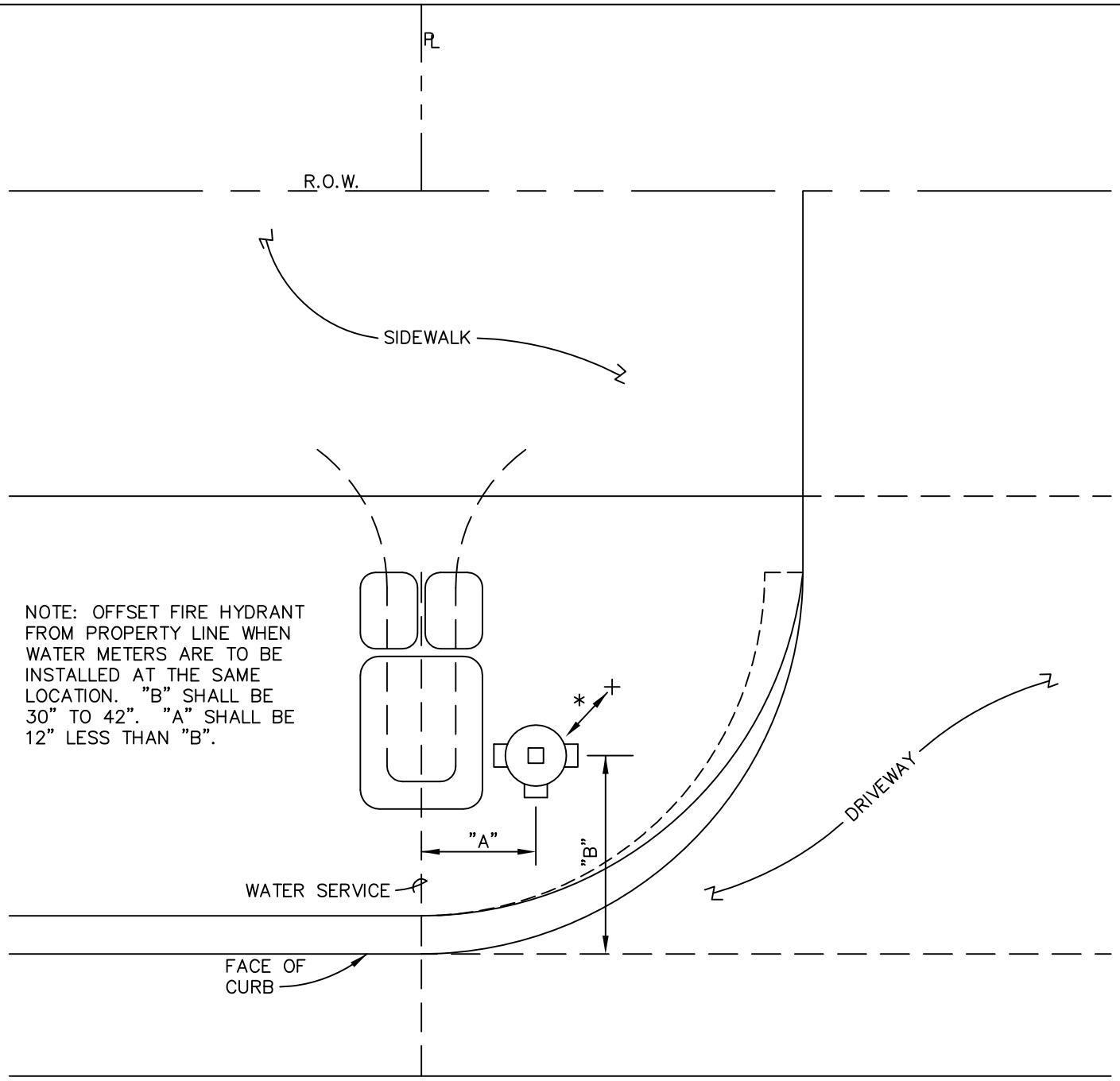
5. ALL FIRE HYDRANT GATE VALVES SHALL BE ANCHORED TO THE MAIN AS DIRECTED BY THE CITY REPRESENTATIVE.

6. MEGA LUGS ON ALL FITTINGS.

FIRE HYDRANT DETAILS

NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 3W-1



FIRE HYDRANT AND WATER METERS

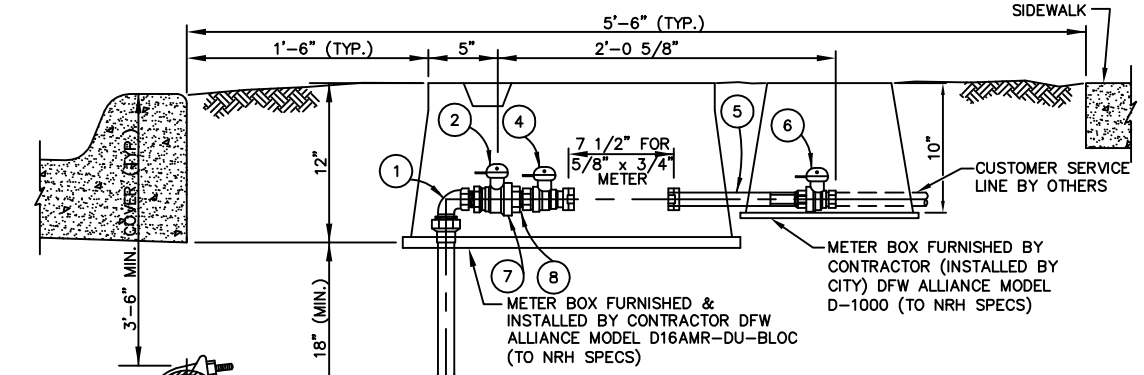
NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 3W-2

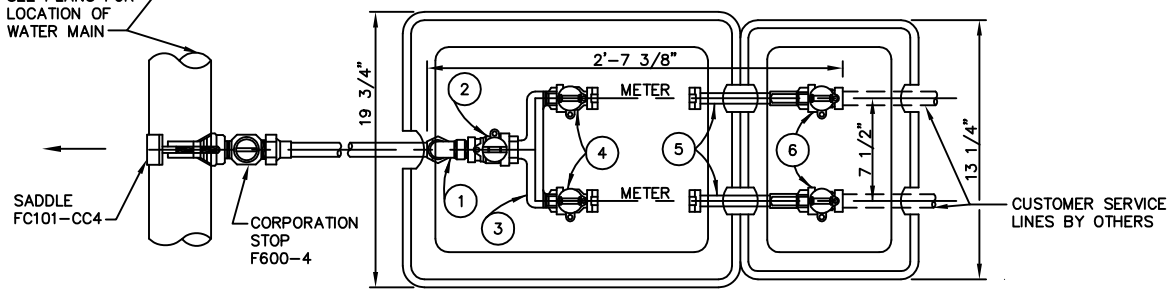
ITEM NO.	QUANTITY		SIZE	DESCRIPTION	PART NUMBER	
	SINGLE	DOUBLE			FORD	MUELLER
1.	1	1	1"	90° BRASS ELBOW, FLARE COPPER X M.I.P., (QTR. BEND)	L-28-44	330 H 15530
2.	1	1	1"	BALLVALVE CB. STOP, F.I.P. X F.I.P.	B11-444WR	330 B 20200
3.		1	1"x3/4"x7 1/2"	U-BRANCH	U88-43	H 15362
4.	1	2	3/4"	BALLVALVE CB. STOP, F.I.P. X METER YOLK	B13-332W B13-332W	250 B 24351-3
5.	1	2	3/4"x8 1/2"	METER COUPLING BALLVALVE CB. STOP, F.I.P. X F.I.P.	C38-23-8.5	215 H 10890-99029
6.	1	2	3/4"	BALLVALVE CB. STOP, F.I.P. X F.I.P.	B11-333WR	B-20245-60-3
7.	1		1"x3/4"	BRASS REDUCER BUSHING (REDUCING SPUD MIP X MIP)	-	502464
8.	1		3/4"	ALL THREAD BRASS NIPPLE	-	-

NOTES:

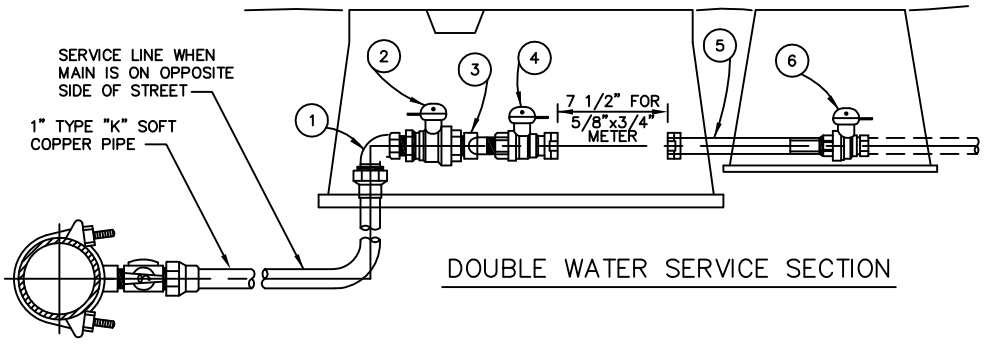
1. IF SERVICE IS INSTALLED AHEAD OF CURB AND GUTTER, CUT AND SHAPE PIPE TO FIT POSITION SHOWN BUT BEND DOWN ABOUT 5 INCHES TO MINIMIZE CHANCES OF DAMAGE DURING CONSTRUCTION OF CURB AND GUTTER. SERVICE LINE COVER MINIMUM 24 INCHES, UNDER STREET SUBGRADE AND MINIMUM 12 INCHES UNDER BOTTOM OF CURB AND GUTTER.
2. CONTRACTOR FURNISHES ALL PARTS LISTED AT HIS EXPENCE. ALL ITEMS SHALL BE INSTALLED BY CONTRACTOR EXCEPT ITEMS 5 AND 6 WHICH WILL BE INSTALLED BY CITY FORCES.
3. RECESSED AMR HOLE IN METER BOX SHALL BE PLACED NEAREST THE BACK OF CURB.



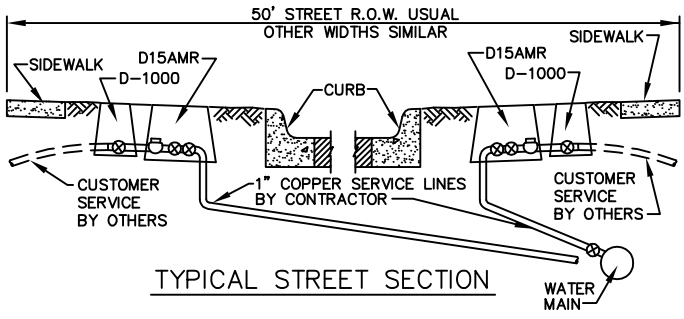
SINGLE WATER SERVICE SECTION



DOUBLE WATER SERVICE PLAN



DOUBLE WATER SERVICE SECTION

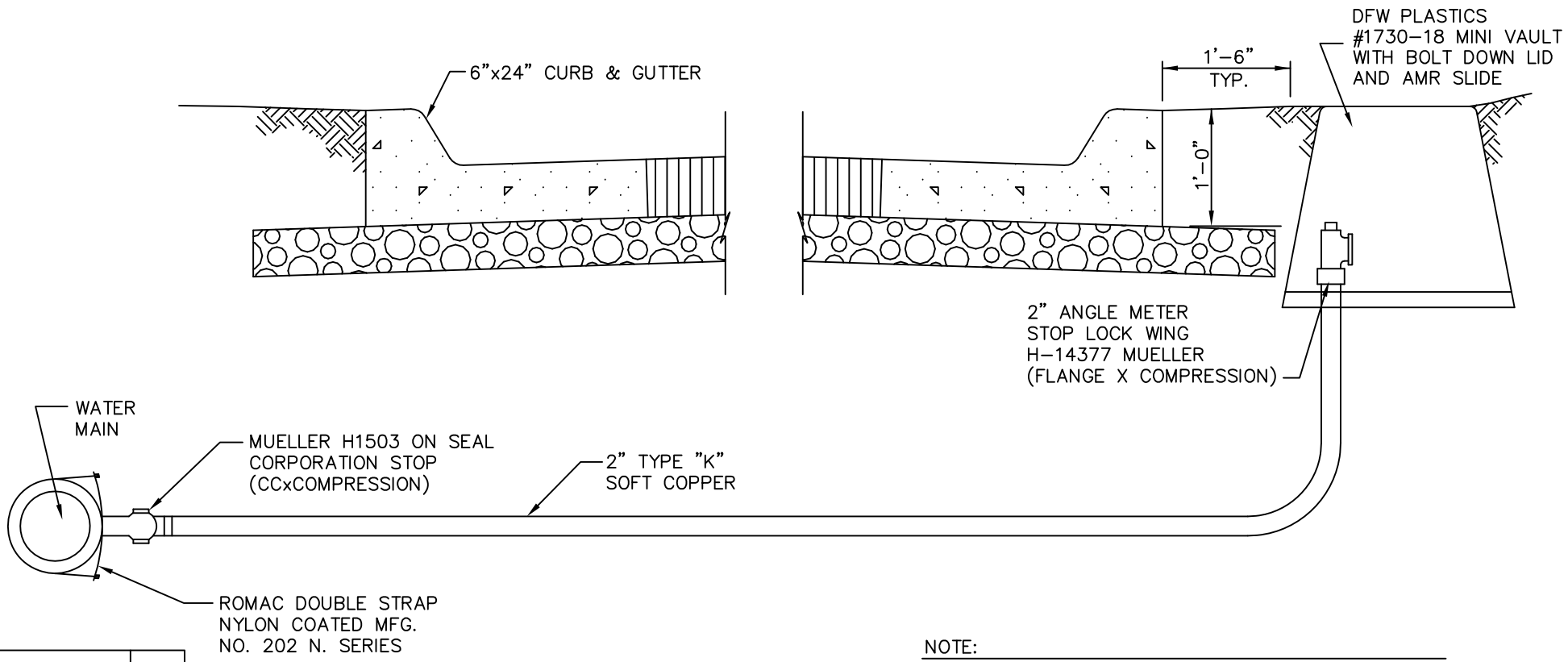


TYPICAL STREET SECTION

WATER SERVICE CONNECTION DETAILS
SINGLE AND DOUBLE

NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 4W



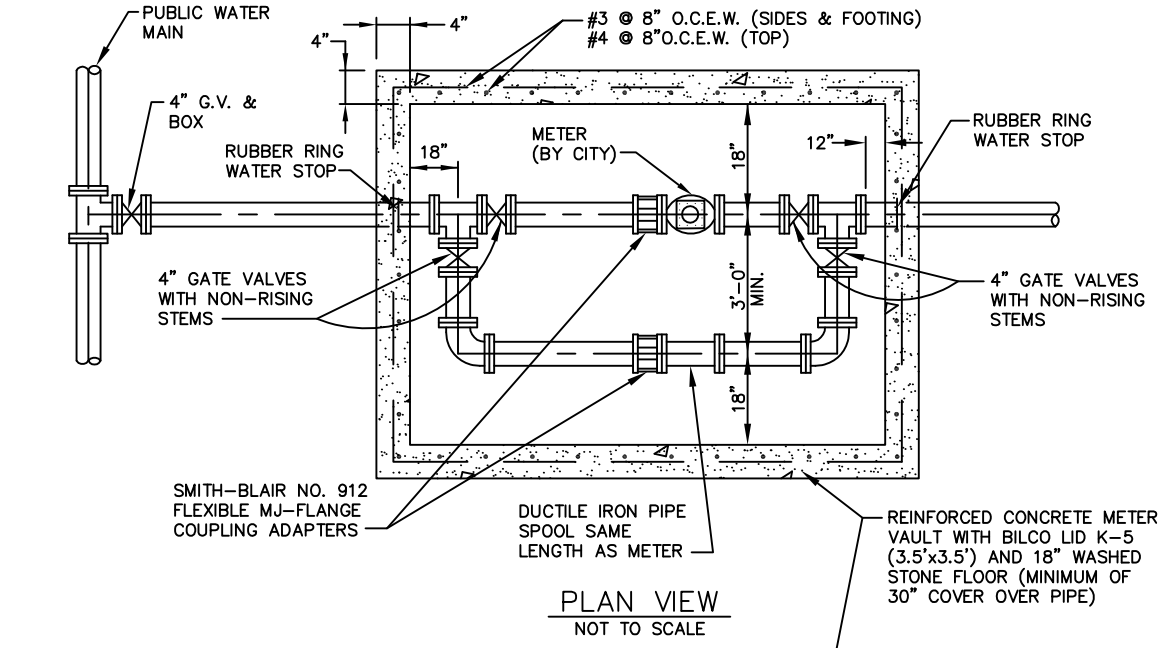
NOTE:
IF SERVICE IS INSTALLED AHEAD OF CURB & GUTTER, CUT AND SHAPE PIPE TO FIT POSITION SHOWN BUT BEND DOWN ABOUT 5 INCHES TO MINIMIZE CHANCES OF DAMAGE DURING CONSTRUCTION OF CURB AND GUTTER. SERVICE LINE COVER MINIMUM 24 INCHES, UNDER STREET SUBGRADE.

DETAIL FOR 2" WATER SERVICE

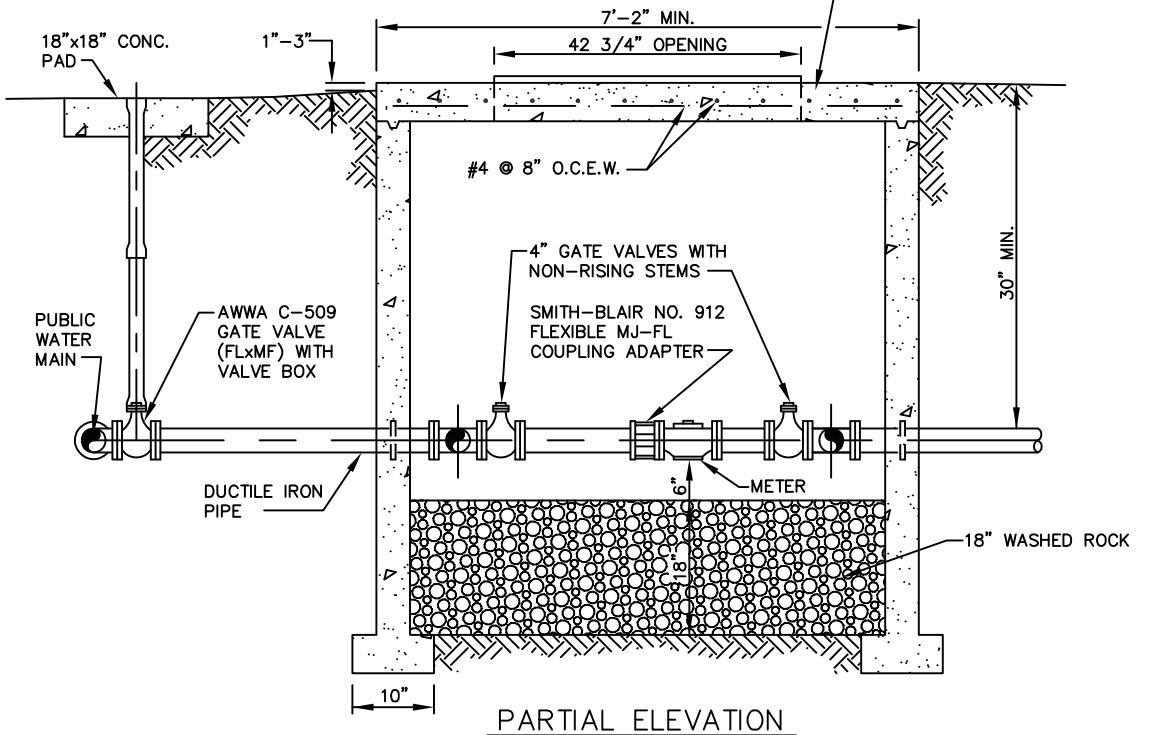
NORTH RICHLAND HILLS

2" WATER SERVICE

R 07-01-2009 FIGURE 5W



PLAN VIEW
NOT TO SCALE



PARTIAL ELEVATION
NOT TO SCALE

NOTES:

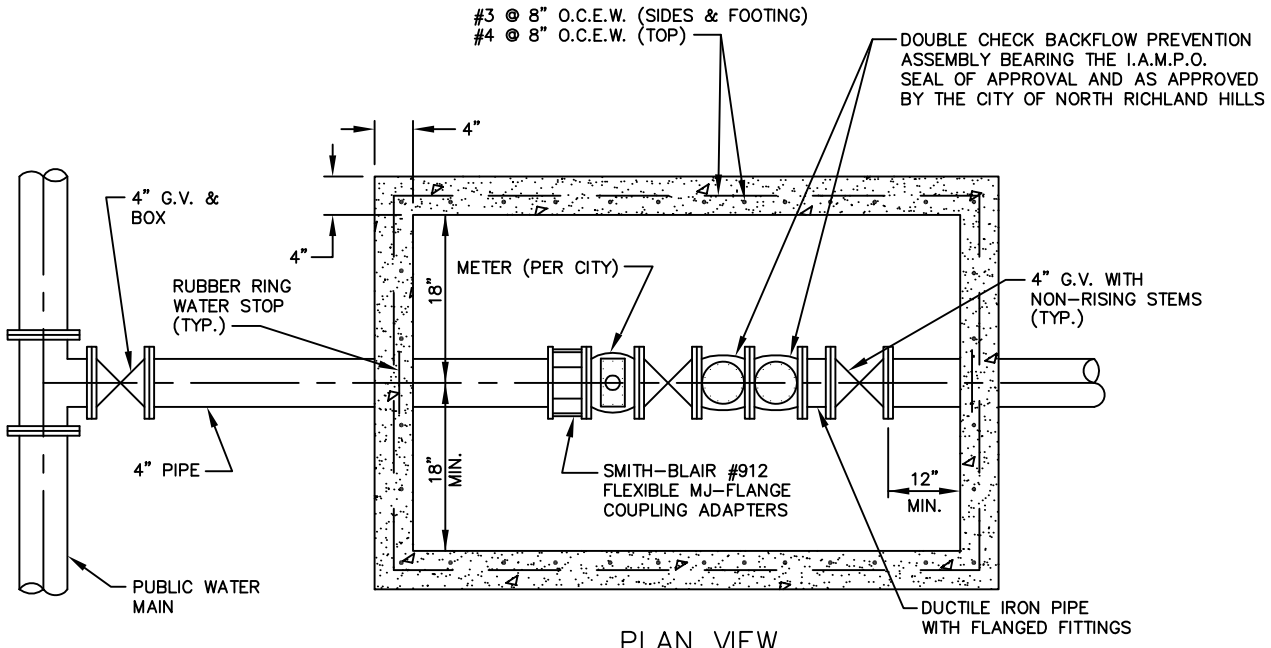
1. ALL CONSTRUCTION TO BE IN ACCORDANCE WITH THE CITY OF NORTH RICHLAND HILLS' STANDARDS AND SPECIFICATIONS.
2. CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS WITH A MAXIMUM SLUMP OF 4 INCHES.
3. ALL REINFORCING STEEL WILL BE CONTINUOUS AROUND CORNERS WITH MIN. LAP OF 24 INCHES.
4. BILCO LID K-5 (3.5'x3.5') OR APPROVED EQUAL SHALL BE INSTALLED IN TOP. CONTRACTOR SHALL FURNISH TWO (2) BILCO KEY WRENCHES WITH EACH INSTALLATION.
5. ALL DUCTILE IRON WATER PIPE SHALL MEET SPECIFICATION ANSI/AWWA-C150/A21,50 CLASS 50 WITH 8 MIL POLYETHYLENE TUBE WRAP AND CEMENT LINING ACCORDING TO ANSI/AWWA-C104/A21.4.
6. FAILURE TO OBTAIN PROPER INSPECTION WILL RESULT IN UNCOVERING ALL PIPE AND FITTINGS FOR REINSPECTION.

DOMESTIC 4" METER INSTALLATION

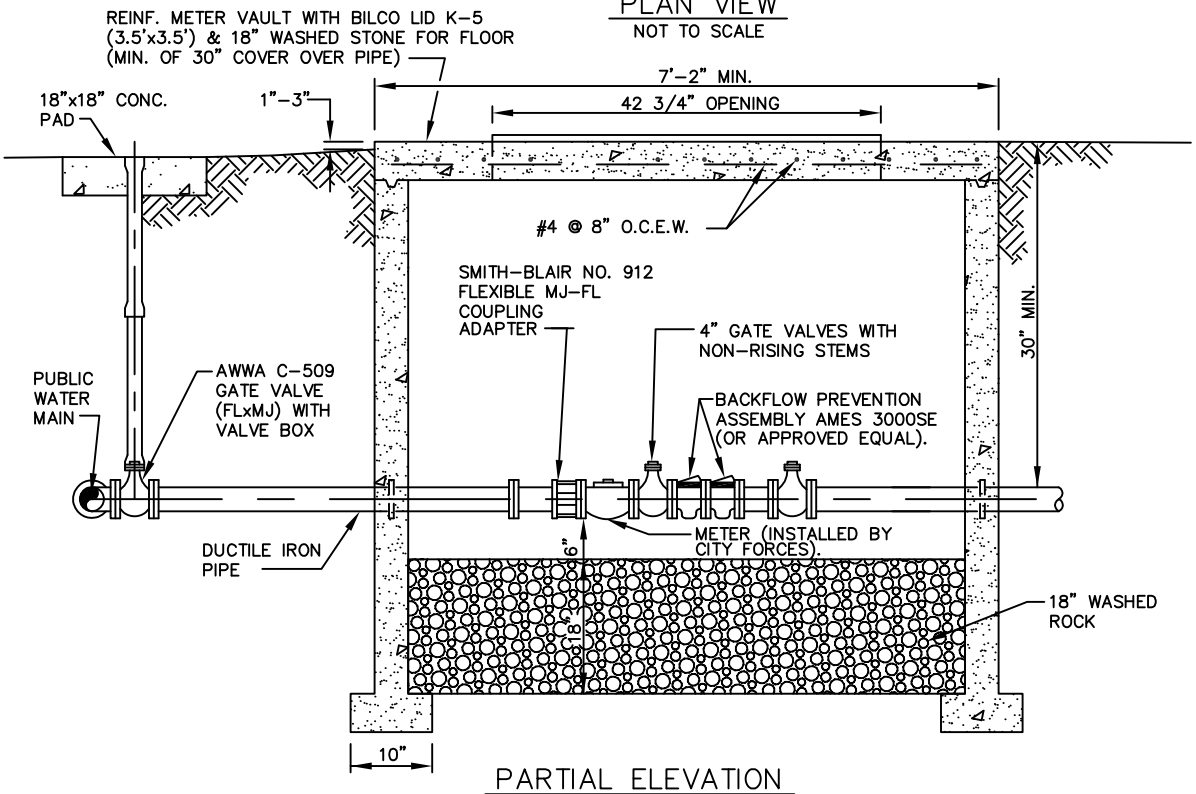
NORTH RICHLAND HILLS

R 07-01-2009

FIGURE 6W



PLAN VIEW
NOT TO SCALE



PARTIAL ELEVATION
NOT TO SCALE

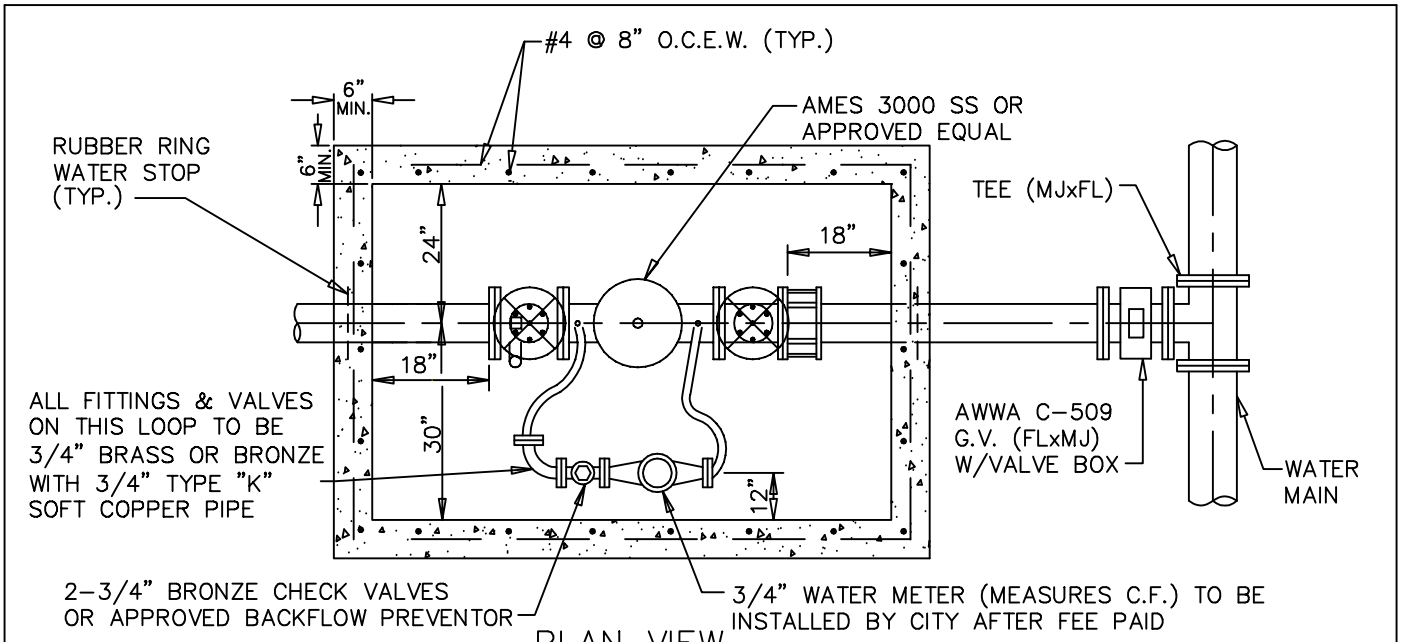
NOTES:

1. ALL CONSTRUCTION TO BE IN ACCORDANCE WITH THE CITY OF NORTH RICHLAND HILLS' STANDARDS AND SPECIFICATIONS.
2. CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS WITH A MAXIMUM SLUMP OF 4 INCHES.
3. ALL REINFORCING STEEL WILL BE CONTINUOUS AROUND CORNERS WITH MINIMUM LAP OF 24 INCHES.
4. BILCO LID K-5 (3.5'x3.5') OR APPROVED EQUAL SHALL BE INSTALLED IN TOP. CONTRACTOR SHALL FURNISH TWO (2) BILCO KEY WRENCHES WITH EACH INSTALLATION.
5. ALL DUCTILE IRON WATER PIPE SHALL MEET SPECIFICATION ANSI/AWWA-C150/A21,50, CLASS 50 WITH 8 MIL POLYETHYLENE TUBE WRAP AND CEMENT LINING ACCORDING TO ANSI/AWWA-C104/A21.4.
6. FAILURE TO OBTAIN PROPER INSPECTION WILL RESULT IN UNCOVERING ALL PIPE AND FITTINGS FOR REINSPECTION.

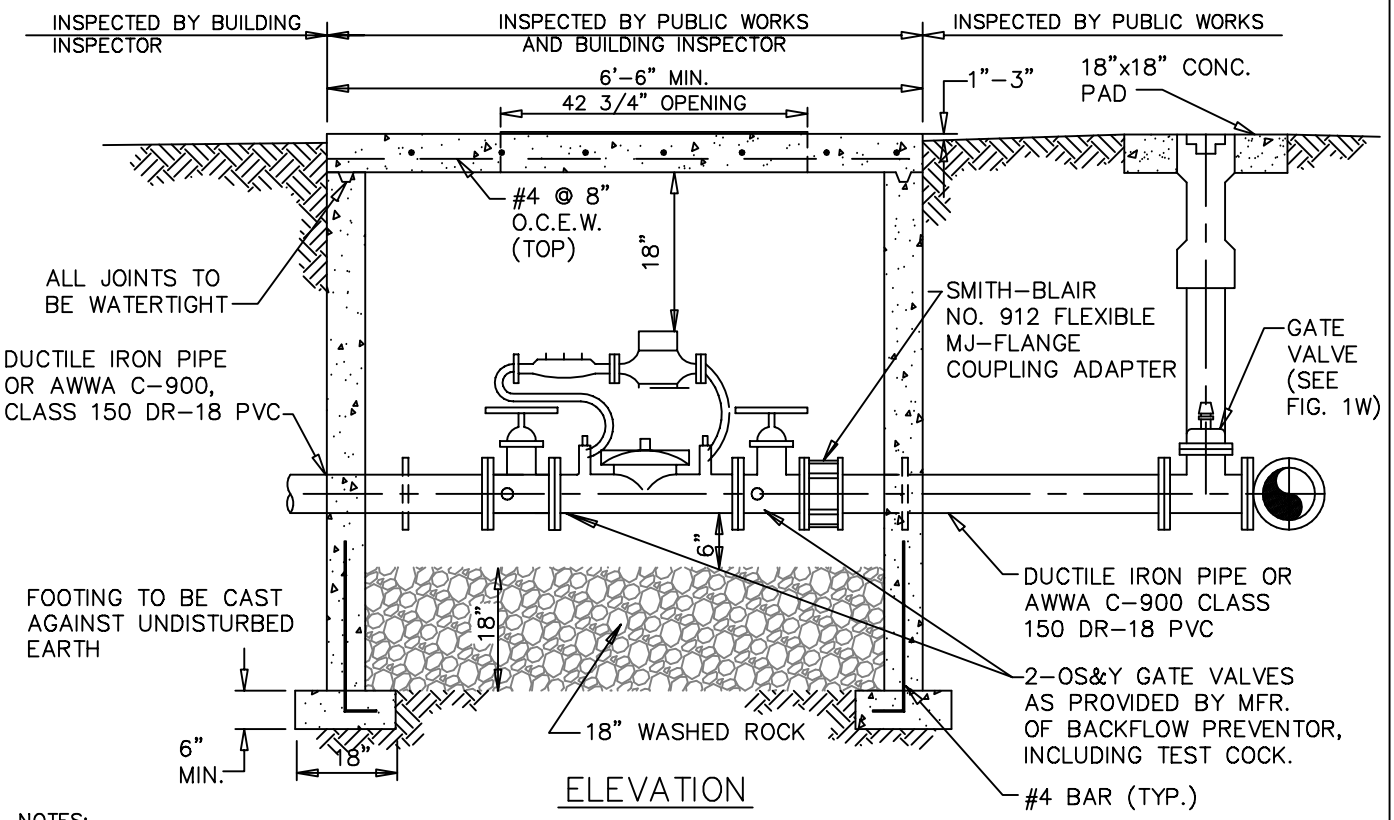
IRRIGATION 4" METER INSTALLATION

NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 7W



PLAN VIEW



ELEVATION

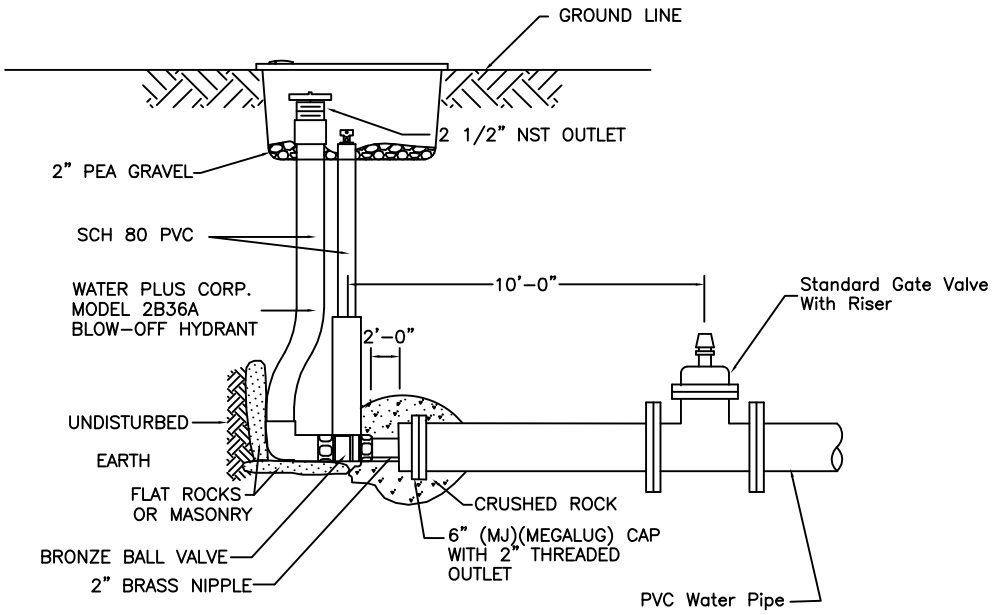
NOTES:

1. CONTRACTOR SHALL NOTIFY CITY FIRE INSPECTOR AT (817) 427-6900 AT LEAST 48 HOURS PRIOR TO BEGINNING INSTALLATION.
2. ALL UNDERGROUND PIPE AND FITTINGS FOR FIRE LINE TO BE VISUALLY INSPECTED BY CITY FIRE INSPECTOR AND PRESSURE TESTED PRIOR TO BEING BACKFILLED.
3. ALL PROPOSED TAPS ON THE EXISTING WATER MAINS FOR PROPOSED FIRE LINES SHALL BE COORDINATED WITH THE PUBLIC WORKS INSPECTOR AT (817) 427-6440.
4. CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS WITH A MAXIMUM SLUMP OF 4 INCHES.
5. ALL REINFORCING STEEL WILL BE CONTINUOUS AROUND CORNERS WITH MINIMUM LAP OF 24 INCHES.
6. BILCO LID K-5 (3.5'X3.5') OR APPROVED EQUAL SHALL BE INSTALLED IN TOP. CONTRACOR SHALL FURNISH 2 BILCO KEY WRENCHES WITH EACH INSTALLATION. TRAFFIC RATED LIDS (WHEN REQUIRED) MUST BE CERTIFIED AS SUCH BY THE MANUFACTURER.
7. ALL DUCTILE IRON WATER PIPE SHALL MEET SPECIFICATION ANSI/AWWA-C150/A21.50, CLASS 50 WITH 8 MIL POLYETHELENE TUBE WRAP AND CEMENT LINING ACCORDING TO ANSI/AWWA-C104/A21.4.
8. FAILURE TO OBTAIN PROPER INSPECTION WILL RESULT IN UNCOVERING ALL PIPE AND FITTINGS FROM MAIN LINE TO BUILDING FOR REINSPECTION AND POSSIBLE RECONSTRUCTION.
9. PRECAST VAULTS OF EQUIVALENT SIZE AND SPECIFICATIONS MAY BE USED IF APPROVED BY THE PUBLIC WORKS INSPECTOR. PRECAST VAULTS MUST BE PLACED ON A 12" CRUSHED STONE FOUNDATION ¾'-1" IN SIZE COMPACTED TO 95% STD. PROCTOR DRY DENSITY (ASTM D-698).

DETECTOR CHECK INSTALLATION DETAILS

NORTH RICHLAND HILLS

R 07-01-2009 FIGURE 8W



* EXHIBIT FOR ILLISTRATION PURPOSES ONLY. REFER TO MANUFACTURER DETAILS FOR MATERIAL SPECIFICATIONS.

BLOW-OFF HYDRANTS SHALL BE MODEL 2B36A WITH AUTO DRAIN AS MANUFACTURED BY WATER PLUS CORPORATION, PENSACOLA, FLORIDA.

HYDRANTS SHALL BE AUTOMATIC-DRAINING, NON-FREEZING, COMPRESSION TYPE WITH 2 3/16" MAIN VALVE OPENING. INLET CONNECTION SHALL BE 2" AND OUTLET SIZE SHALL BE 2 1/2 " NATIONAL STANDARD THREAD.

HYDRANTS SHALL HAVE A PLASTIC METER BOX WITH A PLASTIC LOCKING LID. THE TOP OF HYDRANT SHALL BE 6-8 INCHES BELOW THE TOP OF METER BOX.

HYDRANTS SHALL BE SET IN 4 CUBIC FEET OF CRUSHED STONE TO ALLOW FOR PROPER DRAINAGE OF THE HYDRANT. RECOMMENDATIONS OF THE AWWA SHOULD BE FOLLOWED FOR INSTALLATION OF THE HYDRANTS.

BLOW-OFF HYDRANT

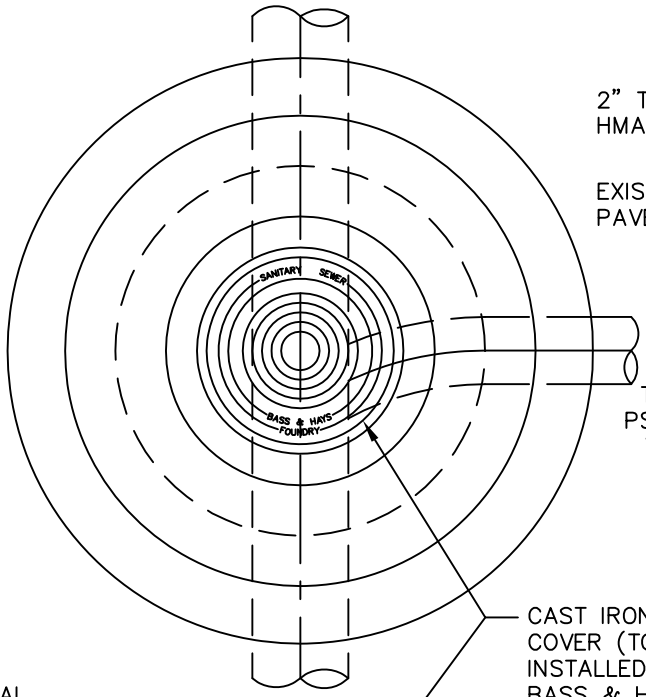
NORTH RICHLAND HILLS

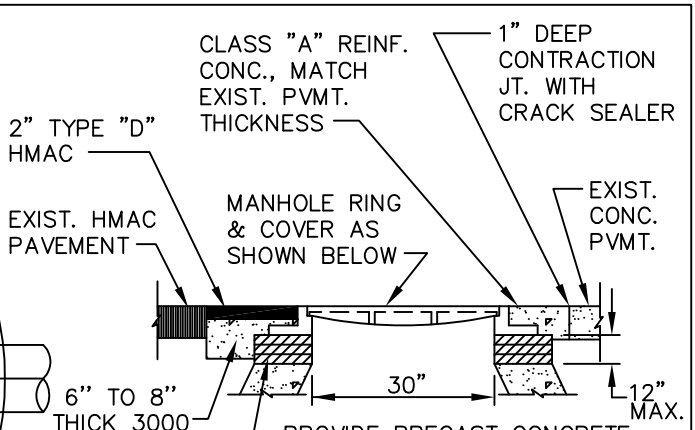
R 07-01-2009

FIGURE 9W

Sewer

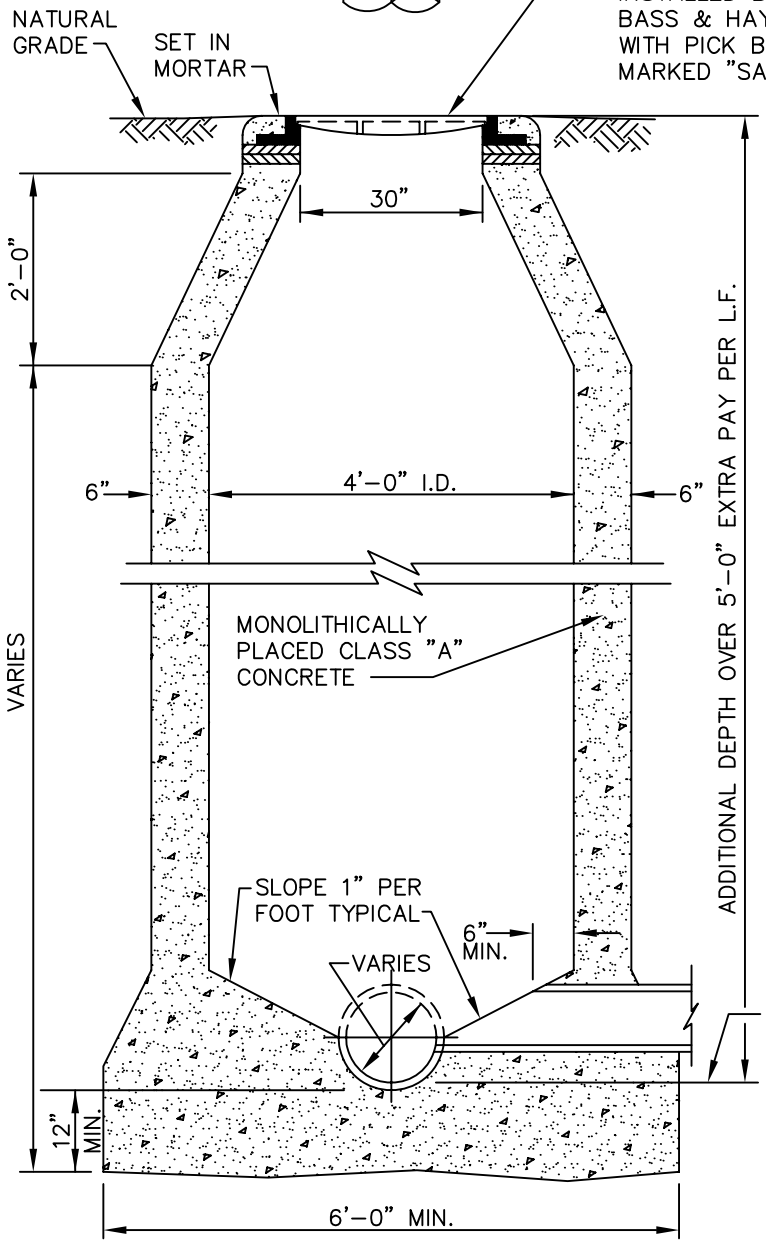
1S	Sanitary Sewer Manhole Details
2S	Precast Concrete Manhole Details
3S	Sanitary Sewer Drop Manhole Details
4S	Sewer Service Connection Details





MANHOLE TOP FOR STREET INSTALLATION

CAST IRON MANHOLE FRAME AND COVER (TO BE FURNISHED AND INSTALLED BY CONTRACTOR). BASS & HAYS PATTERN #VRM30 WITH PICK BARS OR EQUAL MARKED "SANITARY SEWER"



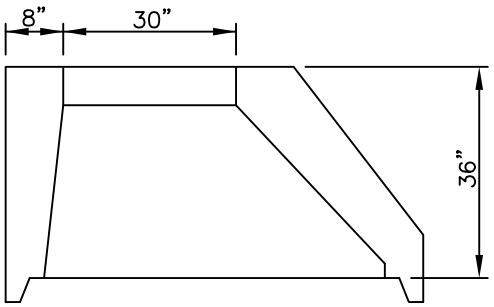
NOTES:

1. STANDARD CAST-IN-PLACE CONCRETE MANHOLE TO BE USED WITH SEWERS 6" THROUGH 36" IN DIAMETER WHERE SPECIFIED.
2. THE CONNECTION OF THE SEWER PIPE TO THE MANHOLE SHALL BE ACCOMPLISHED BY USING MANHOLE COUPLING OR RUBBER RING WATER STOPS AS RECOMMENDED BY THE PIPE MANUFACTURER.
3. CLASS "A" CONCRETE SHALL HAVE 5 SACKS CEMENT/C.Y., MAXIMUM SLUMP OF 5", AND A 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS.
4. SERVICES WHICH ARE CONNECTED TO MANHOLES SHALL BE INSTALLED A MINIMUM OF 8 INCHES ABOVE THE MAIN FLOWLINE.
5. EXISTING SANITARY SEWER MANHOLE SHALL BE CORED 1" LARGER THAN PIPE.

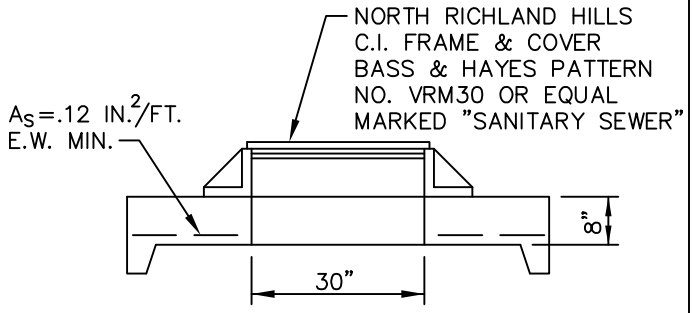
SANITARY SEWER MANHOLE DETAILS

NORTH RICHLAND HILLS

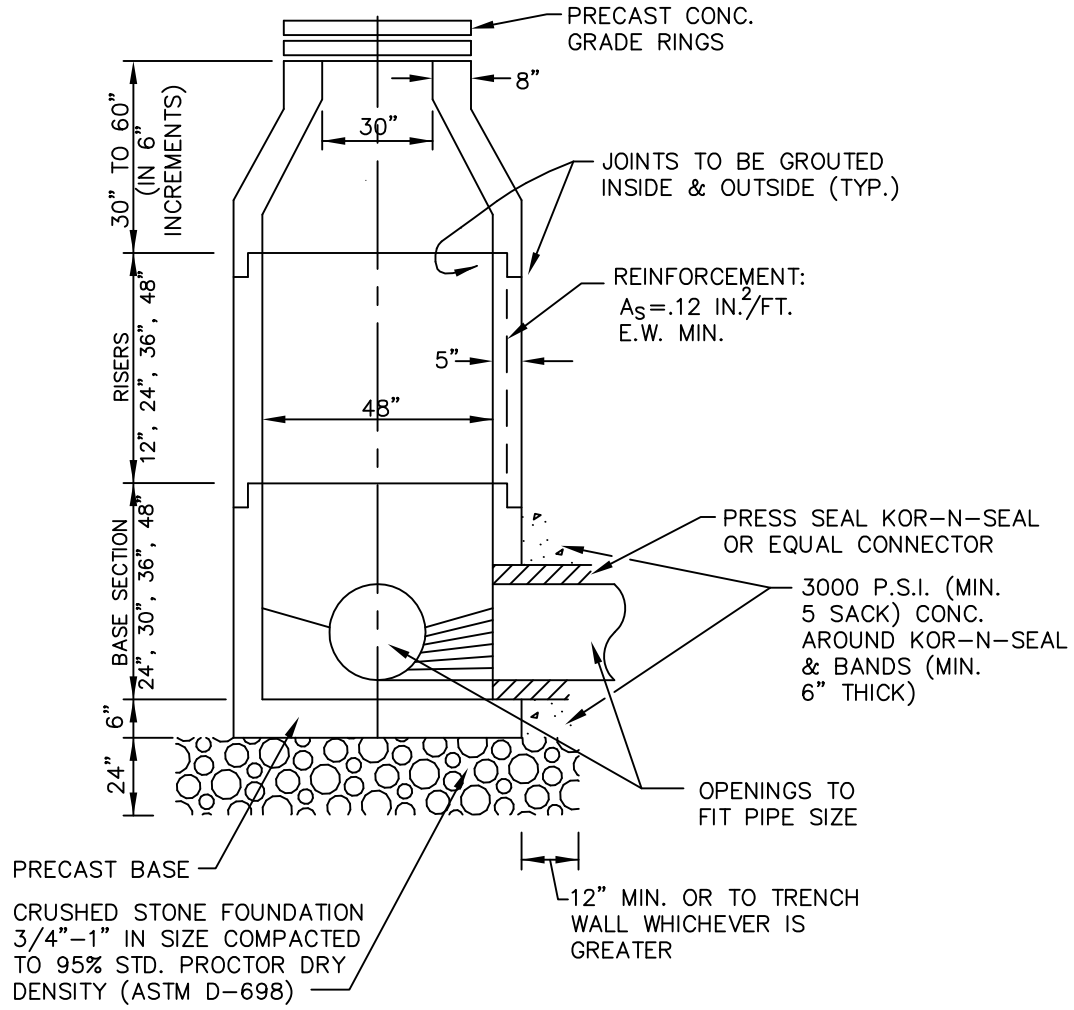
R 07-01-2009 FIGURE 1S



ECCENTRIC CONE



FLAT TOP
(USED IN PLACE OF CONE)
(OFF-SET HOLE ALSO AVAILABLE)



TYPICAL 48" DIA. MANHOLE
(WITH PRECAST BASE & FACTORY INVERT)

N.T.S.

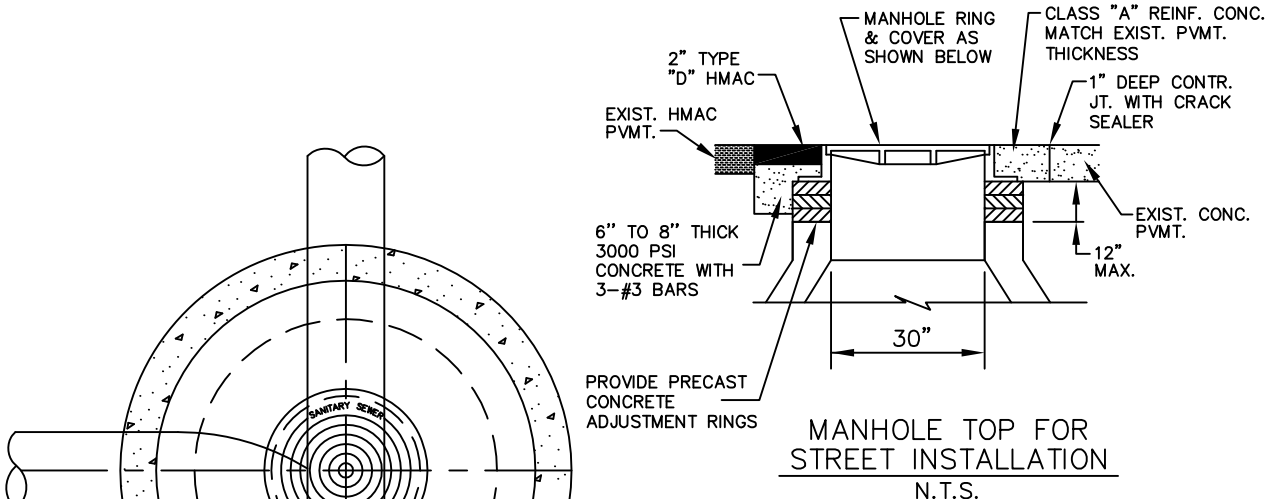
NOTES:

1. PRECAST MANHOLE TO MEET ALL REQIREMENTS OF ASTM C-478.
2. O'RING GASKET JOINT REQUIRED IN ACCORDANCE WITH ASTM C-443.
3. SERVICES WHICH ARE CONNECTED TO MANHOLES SHALL BE INSTALLED A MINIMUM OF 8 INCHES ABOVE THE MAIN FLOWLINE.
4. EACH INDIVIDUAL SECTION OF THE PRECAST MANHOLE WILL NEED TO BE STAMPED WITH THE ASTM SPECIFICATION NUMBER, THE MANUFACTURER'S NAME, AND DATE MANUFACTURED

PRECAST CONCRETE MANHOLE DETAILS

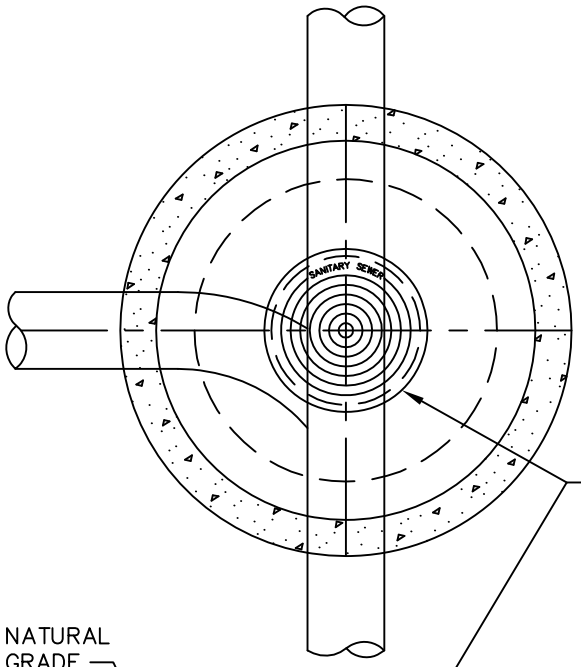
NORTH
RICHLAND
HILLS

R 07-01-2009 FIGURE 2S

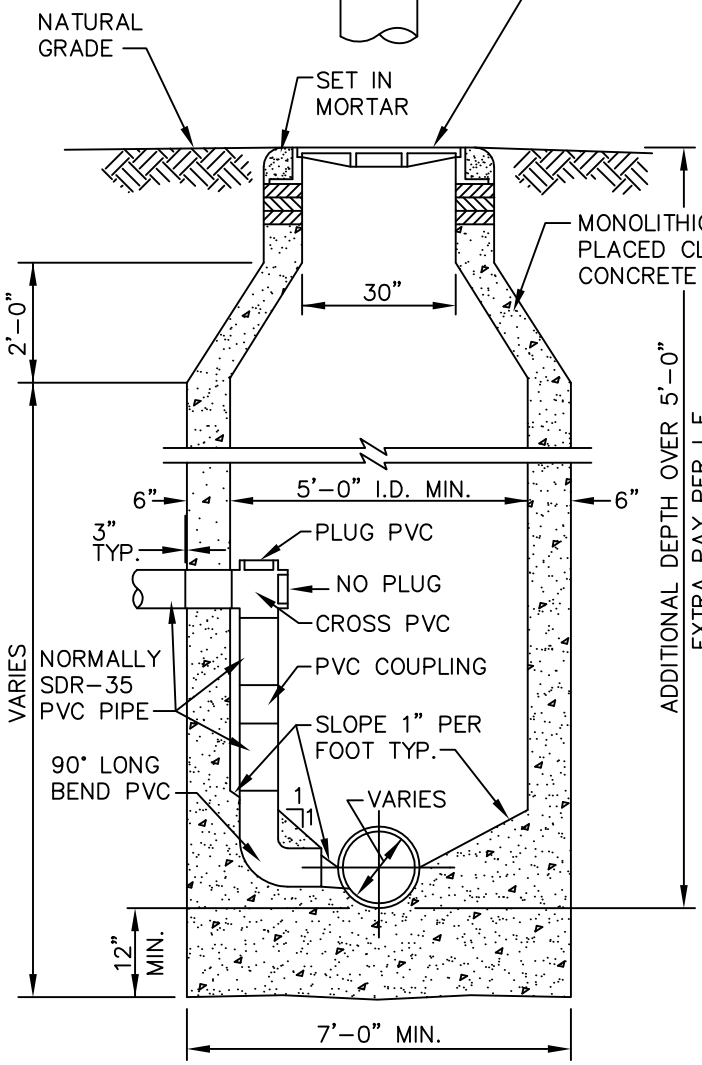


MANHOLE TOP FOR STREET INSTALLATION

N.T.S.

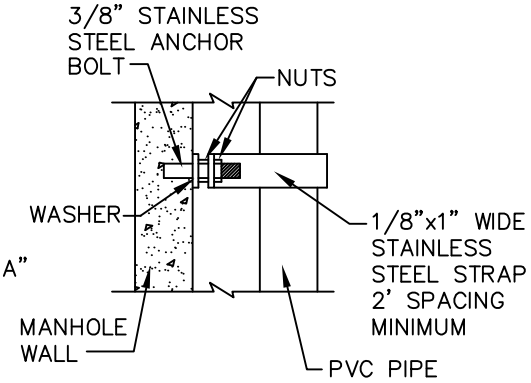


CAST IRON MANHOLE FRAME AND COVER (TO BE FURNISHED AND INSTALLED BY CONTRACTOR). BASS & HAYS PATTERN #VRM30 WITH PICK BARS OR EQUAL MARKED "SANITARY SEWER".



STANDARD CAST-IN-PLACE CONCRETE DROP MANHOLE

N.T.S.



BOLT DETAIL

N.T.S.

NOTES:

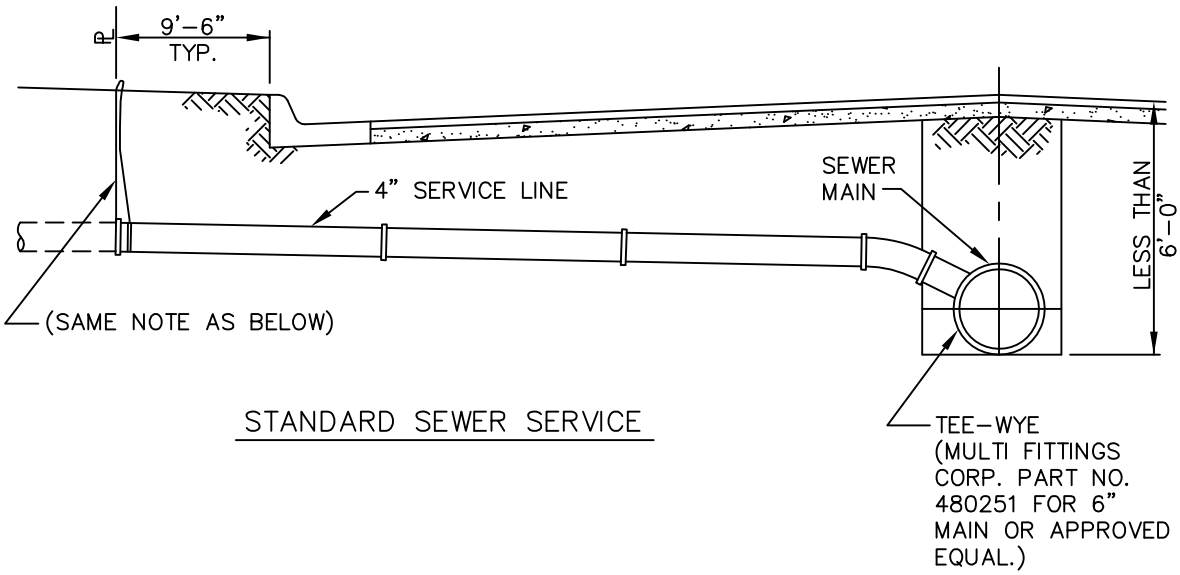
1. STANDARD CAST-IN-PLACE MANHOLE TO BE USED WITH SEWERS 6" THROUGH 8" DIA. WHERE SPECIFIED.
2. THE CONNECTION OF THE SEWER PIPE TO THE MANHOLE SHALL BE ACCOMPLISHED BY USING MANHOLE COUPLING OR RUBBER RING WATER STOPS AS RECOMMENDED BY THE PIPE MANUFACTURER.
3. CLASS "A" CONCRETE SHALL HAVE 5 SACKS CEMENT/C.Y., MAXIMUM SLUMP OF 5", AND A 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS.
4. SANITARY SEWER MANHOLES WITH MORE THAN ONE INTERNAL DROP ARE TO BE 6-FOOT IN DIAMETER.

SANITARY SEWER
DROP MANHOLE DETAILS

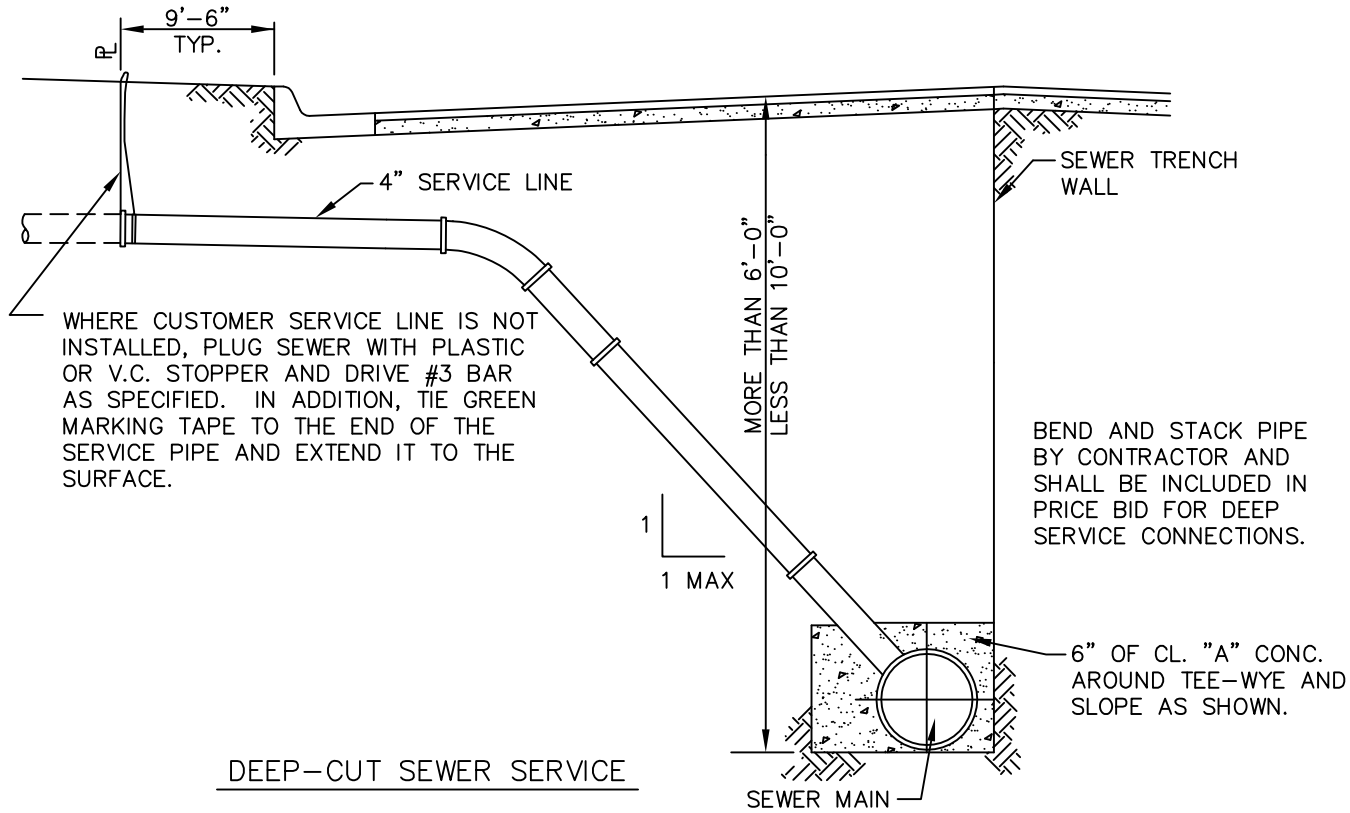
NORTH
RICHLAND
HILLS

R 07-01-2009

FIGURE 3S



STANDARD SEWER SERVICE



DEEP–CUT SEWER SERVICE

SEWER SERVICE CONNECTIONS

NOTES:

1. TOP OF SERVICE SHALL BE SUFFICIENT DEPTH TO PROVIDE ADEQUATE FALL FROM THE FACILITY TO BE SERVED.
2. CLASS "A" CONCRETE SHALL HAVE 5 SACKS OF CEMENT, MAXIMUM SLUMP OF 5 INCHES, AND 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS.

SEWER SERVICE CONNECTION DETAILS

NORTH
RICHLAND
HILLS

R 07–01–2009 FIGURE 4S