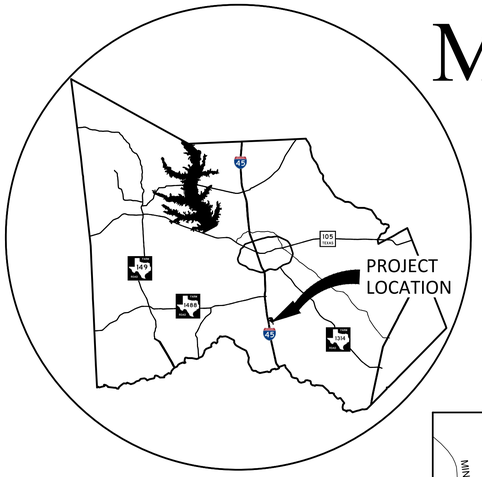
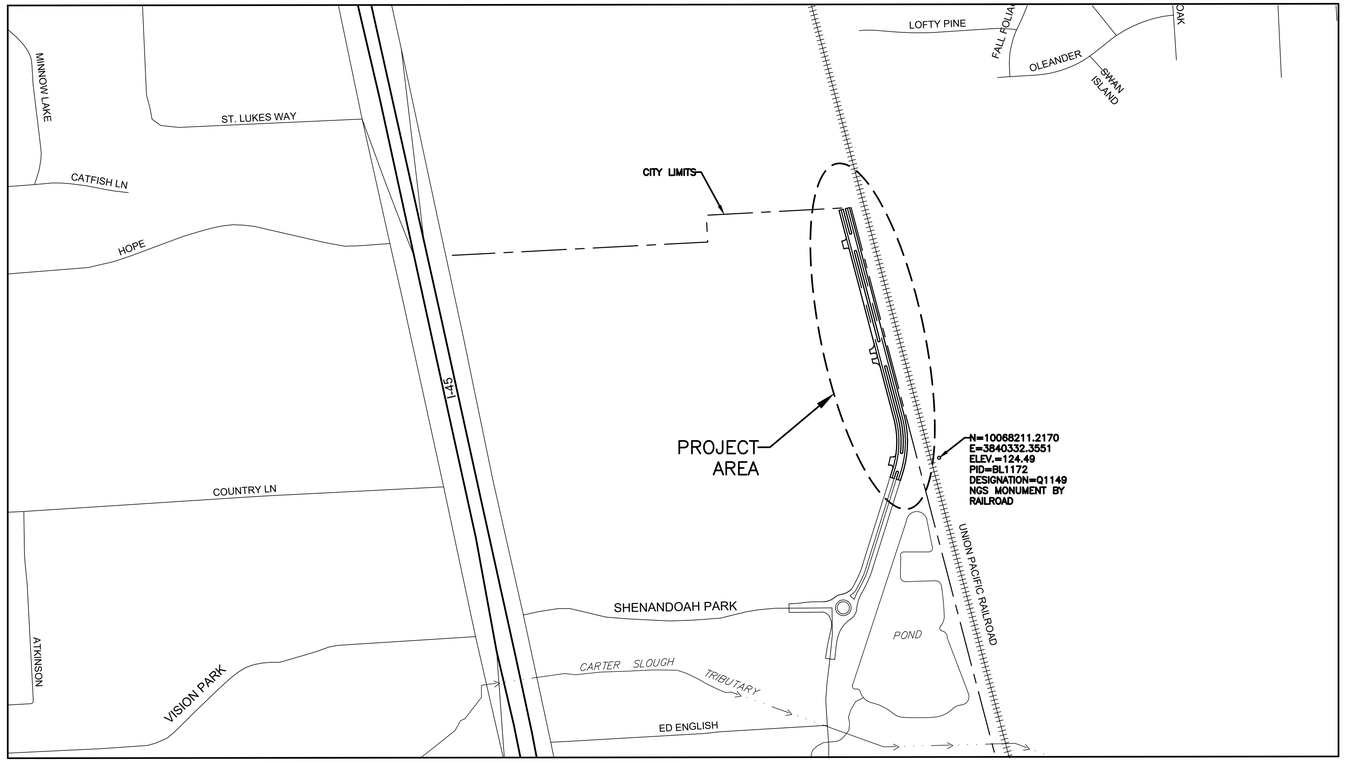
CONSTRUCTION DRAWINGS FOR
DAVID MEMORIAL EXTENSION
PHASE II

MONTGOMERY COUNTY, TEXAS
JUNE 2017
JOB NO. 11991



VICINITY MAP

SCALE : NONE
MONTGOMERY COUNTY
KEY MAP PANEL NO. 218-W



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0 100 200 400
SCALE 1" = 200'

FLOOD PLAIN: THIS PROJECT DOES LIE PARTIALLY WITHIN THE 100 YEAR FLOOD PLAIN IN ACCORDANCE WITH FEMA MAP PANEL NO. 530, COMMUNITY MAP PANEL NO.48339C0530 G, MONTGOMERY COUNTY, TEXAS EFFECTIVE DATE AUGUST 18, 2014. BFE= 125.0'

LOCATION AND ELEVATION OF EXISTING IMPROVEMENTS SHOWN HEREIN ARE PROVIDED BY OTHERS. CONTRACTOR SHALL FIELD VERIFY LOCATION AND ELEVATION OF EXISTING UTILITIES AT ALL CROSSINGS AND CONNECTION POINTS PRIOR TO ANY TRENCHING OR EXCAVATION OPERATIONS. ANY DISCREPANCIES BETWEEN THESE PLANS AND ACTUAL FIELD CONDITIONS SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER.

BENCHMARK:
THE ELEVATIONS SHOWN HEREON ARE REFERENCED TO NGS MONUMENT – 124.49' (NAVD88), PID–BL1172, DESIGNATION–Q1149 (NAD83 TEXAS STATE PLANES, CENTRAL ZONE, US FOOT)

CITY OF SHENANDOAH
TEXAS

MAYOR
RITCH WHEELER

COUNCIL MEMBER POSITION 1
RON RAYMAKER

COUNCIL MEMBER POSITION 2
TED FLETCHER

COUNCIL MEMBER POSITION 3
BYRON L. BEVERS

COUNCIL MEMBER POSITION 4
CHARLIE BRADT

COUNCIL MEMBER POSITION 5
MICHAEL MCLEOD

CITY ADMINISTRATOR
GREG SMITH

DIRECTOR OF PUBLIC WORKS
JOSEPH PEART

DIRECTOR OF CAPITAL PROJECTS
KENNY EICKELBERG

REV	DATE	BY	APP	COMMENT

PREPARED FOR:
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AUSTIN BRYAN CONROE HOUSTON SAN ANGELO

COVER SHEET
DAVID MEMORIAL EXTENSION
PHASE II

THIS SET OF PLANS WAS PREPARED UNDER THE DIRECTION OF JONNY GREEN, P.E., SEAL No.120300 ON JUNE 01, 2017. THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW ONLY AND NOT TO BE USED FOR CONSTRUCTION.

DESIGN: JONNY GREEN	
CAD: WSW	REV: JG
PROJECT NO: 11991	
SHEET: 1	OF:

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6/1/2017 4:10:34 PM
F:\119005\11991 DAVID MEMORIAL EXENSION PHASE II\CAD\CD-11991\1 COVER SHEET.DWG

ABBREVIATIONS

AE	ACCESS EASEMENT
ASPH	ASPHALT
BL	BUILDING LINE
CL	CENTERLINE
CONC	CONCRETE
DGFL	DEPRESSED GUTTER FLOW LINE
DIA	DIAMETER
DA	DRAINAGE AREA
DE	DRAINAGE EASEMENT
DWY	DRIVEWAY
EA	EACH
ESMT	EASEMENT
EP	EDGE OF PAVEMENT
EXIST	EXISTING
EXT	EXTENSION
FF	FINISHED FLOOR
FG	FINISHED GRADE
FH	FIRE HYDRANT
FL	FLOW LINE
FND.	FOUND
FP	FLOODPLAIN
FW	FLOODWAY
GV	GATE VALVE
GV & B	GATE VALVE AND BOX
GFL	GUTTER FLOW LINE
GW or GUY	GUY WIRE
HDPE	HIGH DENSITY POLYETHYLENE PIPE
INT	INTERSECTION
I.P. or IP	IRON PIPE
I.R. or IR	IRON ROD
JB	JUNCTION BOX
LT	LEFT
LF	LINEAR FEET
MH	MANHOLE
MEP	MATCH EXISTING PAVEMENT
MAX	MAXIMUM
MIN	MINIMUM
M.C.D.R.	MONTGOMERY COUNTY DEED RECORDS
M.C.M.R.	MONTGOMERY COUNTY MAP RECORDS
R.P.R.M.C.	MONTGOMERY COUNTY OFFICIAL PUBLIC RECORDS OF REAL PROPERTY
NG	NATURAL GROUND
PVMT	PAVEMENT
P.O.B.	POINT OF BEGINNING
P.O.C.	POINT OF COMMENCEMENT
PVI	POINT OF VERTICAL INTERSECTION
PVC	POLYVINYL CHLORIDE PIPE
PP	POWER POLE
PROP	PROPOSED
RED	REDUCER
RT	RIGHT
ROW	RIGHT OF WAY
SAN SWR	SANITARY SEWER
SHT	SHEET
SHLDR	SHOULDER
SNGL	SINGLE
SF	SQUARE FEET
STA	STATION
TEMP	TEMPORARY
TC	TOP OF CURB
TG	TOP OF GRATE
TP	TOP OF PAVEMENT
TRC	TOP OF RIBBON CURB
TW	TOP OF WALK/SIDEWALK
TPE	TREE PRESERVATION EASEMENT
TPZ	TREE PRESERVATION ZONE
TYP	TYPICAL
UE	UTILITY EASEMENT
WL	WATER LINE
WTR	SVC WATER SERVICE
WSE	WATER SURFACE ELEVATION

CAUTION!! BEFORE YOU DIG – CALL

DIG TESS	(800) 344-8377
ENTERGY	(800) 368-3749
TXU COMMUNICATIONS	(800) 526-2699
LONE STAR NOTIFICATION CENTER	(800) 669-8344
RELIANT ENERGY ENTEX	

GENERAL SITE NOTES

1. CONTRACTOR MUST SECURE ALL NECESSARY PERMITS PRIOR TO STARTING WORK.
2. IF THE CONTRACTOR, IN THE COURSE OF WORK, FINDS ANY DISCREPANCIES BETWEEN THE PLANS AND FIELD CONDITIONS, OR ANY ERRORS OR OMISSIONS IN THE PLANS OR IN THE LAYOUT AS GIVEN BY THE ENGINEER, IT SHALL BE HIS DUTY TO IMMEDIATELY INFORM THE ENGINEER, IN WRITING, AND THE ENGINEER WILL PROMPTLY VERIFY THE SAME. ANY WORK DONE AFTER SUCH A DISCOVERY, UNTIL AUTHORIZED, WILL BE AT THE CONTRACTOR'S RISK.
3. ALL CONSTRUCTION MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE LATEST SPECIFICATIONS AND DETAILS FOR STATE AND LOCAL GOVERNMENT AGENCIES.
4. ALL ACCESSIBILITY FEATURES SHALL BE CONSTRUCTED TO MEET ALL FEDERAL, STATE, AND LOCAL REQUIREMENTS.
5. THE CONTRACTOR SHALL PRESERVE BENCHMARKS, REFERENCE POINTS, AND STAKES.
6. ARCHITECTURAL PLANS SHALL BE USED FOR BUILDING LAYOUT.
7. CONTRACTOR SHALL MAINTAIN THE SITE IN A MANNER SO THAT WORKMEN AND PUBLIC SHALL BE PROTECTED FROM INJURY, AND ADJOINING PROPERTY OWNERS FROM DAMAGE,
8. CONTRACTOR IS RESPONSIBLE FOR DAMAGE TO ANY EXISTING ITEM AND/OR MATERIAL DUE TO CONSTRUCTION WORK.
9. ALL PAVED SURFACES, DRIVEWAYS, CULVERTS, AND DRAINAGE STRUCTURES THAT ARE DISTURBED OR DAMAGED IN ANY MANNER AS A RESULT OF CONSTRUCTION SHALL BE REPLACED OR REPAIRED IN ACCORDANCE WITH THE SPECIFICATIONS.
10. CONTRACTOR SHALL ACCESS THE SITE AS DIRECTED BY THE OWNERS REPRESENTATIVE.
11. CONTRACTOR SHALL KEEP AREAS OUTSIDE THE WORK AREA CLEAR OF DIRT AND DEBRIS. DAILY INSPECTION AND CLEANUP IS REQUIRED.
12. CONTRACTOR IS RESPONSIBLE FOR PLANNING, PREPARING AND MAINTAINING TEMPORARY SITE IMPROVEMENTS INCLUDING PLACEMENT OF CONSTRUCTION TRAILER, EMPLOYEE PARKING, AND LAYDOWN AREA. UNLESS OTHERWISE APPROVED, THESE ITEMS SHALL BE LOCATED IN THE PROPOSED PARKING AREA.
13. REVISIONS TO THESE ENGINEERING PLANS MUST BE APPROVED BY BLEYL AND ASSOCIATES PRIOR TO CONSTRUCTION.
14. CONTRACTOR SHALL ARRANGE FOR REQUIRED INSPECTIONS WITH PROPER AUTHORITY 24 HOURS IN ADVANCE.
15. UTILITIES PRESENTED ON THESE DRAWINGS ARE SHOWN BASED ON THE BEST AVAILABLE INFORMATION. CONTRACTOR SHALL VERIFY THE EXACT LOCATIONS IN THE FIELD PRIOR TO COMMENCING CONSTRUCTION. CONTRACTOR SHALL NOTIFY TEXAS ONE CALL AT 713-223-4567/800-245-4545 AND LONE STAR ONE CALL AT 800-669-8344 AT LEAST 48 HOURS BEFORE PROCEEDING WITH ANY EXCAVATION.
16. CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGES TO EXISTING WATER, WASTEWATER, STORM WATER LINES AND TRAFFIC CONTROL DEVICES. DAMAGES SHALL BE REPAIRED IN ACCORDANCE WITH THE CITY OF HOUSTON, OR MONTGOMERY COUNTY STANDARDS AT NO ADDITIONAL COST.
17. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIME DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO EXISTING CONDITIONS OR BETTER.
18. CONTRACTOR SHALL COMPLY WITH LATEST EDITION OF OSHA REGULATIONS AND THE STATE OF TEXAS LAWS CONCERNING EXCAVATION.

STANDARD NOTES

1. THE CONTRACTOR SHALL ADHERE TO ALL CITY OF SHENANDOAH STANDARD DETAILS AND SPECIFICATIONS FOR PROPOSED SANITARY SEWER, PAVING, AND DRAINAGE IMPROVEMENTS.
2. REVISIONS TO THESE ENGINEERING PLANS MUST BE AUTHORIZED BY BLEYL & ASSOCIATES PRIOR TO CONSTRUCTION. BLEYL & ASSOCIATES – (936) 441-7833
3. THE CONTRACTOR SHALL:
   a. NOTIFY BLEYL & ASSOCIATES (936) 441-7833, AND CITY OF SHENANDOAH (281) 298-5522, A MINIMUM OF 48 HRS PRIOR TO COMMENCEMENT OF WORK.
   b. NOTIFY ALL APPROPRIATE UTILITY COMPANIES 48 HOURS PRIOR TO ANY EXCAVATION.
   c. NOTIFY THE CITY AND ENGINEER OF ALL DESIRED FIELD CHANGES. THE ENGINEER'S APPROVAL MAY BE REQUIRED.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SECURITY AND SAFETY PROVISIONS REQUIRED TO PROTECT INDIVIDUALS, EQUIPMENT, MATERIALS AND WORKMANSHIP NECESSARY FOR THIS PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STORAGE OF MATERIALS IN SAFE AND WORKMANLIKE MANNER TO PREVENT INJURIES DURING AND AFTER WORKING HOURS UNTIL PROJECT COMPLETION.
5. THE CONTRACTOR SHALL ADVISE THE ENGINEER OF ANY APPARENT OR SPECIAL NEEDS TO COMPLETE THE SCOPE OF WORK INCLUDED IN THIS PROJECT. THESE MAY INCLUDE THE NEED FOR OWNER PROVIDED SERVICES SUCH AS WATER, STAFF AVAILABILITY, ETC.
6. ACCURATE RECORDS SHOWING THE INSTALLED LOCATIONS OF ALL IMPROVEMENTS SHALL BE MAINTAINED DURING CONSTRUCTION AND PROVIDED TO THE ENGINEER AS PART OF THE PROJECT COMPLETION.
7. THE CONTRACTOR SHALL MAKE EVERY EFFORT TO MAINTAIN ACCESS DURING THE CONSTRUCTION PERIOD. SCHEDULING OF ACTIVITIES SHOULD EMPHASIZE ACCESSIBILITY TO THE PROJECT SITE. EXTENDED PERIODS OF RESTRICTED ACCESS MUST BE LIMITED.
8. THE CONTRACTOR SHALL PROTECT EXISTING MONUMENTS, YARDS, PRIVATE UTILITIES, DRIVES, CURBS, MAIL BOXES, SIGNS, IMPROVEMENTS, CULVERTS, AND OWNER'S FACILITIES FROM DAMAGE DURING CONSTRUCTION. DAMAGE DONE TO THESE ITEMS SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL MOVE AND REPLACE SUCH MOVABLE ITEMS AS MAIL BOXES, TRAFFIC CONTROL, BUSINESS SIGNS, AND STREET SIGNS AS NECESSARY FOR CONSTRUCTION. FENCES OR STRUCTURES WHICH REQUIRE DISMANTLING OR REMOVAL SHALL BE RECONSTRUCTED OR REPLACED TO EQUAL OR BETTER THAN ORIGINAL CONDITION.
9. CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING THE MUD AND/OR DIRT DEPOSITED ON EXISTING PAVEMENT DUE TO HIS CONSTRUCTION ACTIVITY DAILY. ALL EQUIPMENT AND DEBRIS FROM CONSTRUCTION TO BE MOVED AT END OF PROJECT
10. AFTER DISTURBED AREAS HAVE BEEN COMPLETED TO THE LINES, GRADES, AND CROSS-SECTIONS SHOWN ON THE PLANS, SEEDING SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS TO ESTABLISH ADEQUATE VEGETATION COVERAGE TO ELIMINATE EROSION. IF NO PROVISION FOR PLANTING GRASS IS INCLUDED IN THE PLANS OR SPECIFICATIONS, THE MINIMUM REQUIREMENT FOR THIS ITEM WILL BE IN ACCORDANCE WITH THE TEXAS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR "SODDING OR SEEDING FOR EROSION CONTROL."
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE AND PROTECTION OF CONSTRUCTION ACTIVITIES DURING THE CONTRACT PERIOD. THIS SHALL INCLUDE ANY EROSION CONTROL MEASURES AND RE-GRADING NECESSARY TO ACHIEVE THE LINES AND GRADES SET FORTH BY THESE PLANS.
12. SIGNING, BARRICADING AND LIGHTING FOR CONSTRUCTION WITHIN HIGHWAY RIGHT-OF-WAY SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND OTHER APPLICABLE STATE OR LOCAL STANDARDS. SIGNS, BARRICADES AND LIGHTS SHALL BE KEPT CLEAN, OPERATIONAL AND PROPERLY POSITIONED TO ASSURE PROPER SAFETY PRECAUTIONS.
13. ALL TESTING PROCEDURES USED ON THIS PROJECT SHALL CONFORM TO THE TCEQ, AWWA, NSF OR APPLICABLE STANDARDS. THE TESTING EXPENSE SHALL BE BORNE BY THE CONTRACTOR UNLESS OTHERWISE SPECIFIED.
14. TEXAS LAW ARTICLE 1436C, PROHIBITS ALL ACTIVITIES IN WHICH PERSONS OR EQUIPMENT MAY COME WITHIN 6 FEET OF ENERGIZED OVERHEAD POWER LINES, AND FEDERAL REGULATION, TITLE 29, PART 1910.130 (1) AND PART 1926.440 (A) (15) REQUIRE A MINIMUM CLEARANCE OF 10 FEET FROM THESE FACILITIES. THE ABOVE LAWS CARRY BOTH CRIMINAL AND CIVIL LIABILITIES, WITH CONTRACTORS AND OWNERS BEING LEGALLY RESPONSIBLE FOR THE SAFETY OF WORKERS UNDER THESE LAWS. IF YOU OR YOUR COMPANY MUST WORK NEAR OVERHEAD POWER LINES, CALL THE POWER COMPANY FOR THE LINES TO BE DE-ENERGIZED AND/OR MOVED AT YOUR EXPENSE.
15. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES WITH FACILITIES IN THE PROJECT LOCATION NOT LESS THAN 48 HOURS PRIOR TO CONSTRUCTION ACTIVITIES IN THE RESPECTIVE WORK AREAS. ADEQUATE PROVISIONS FOR PROTECTING EXISTING FACILITIES SHOULD BE EMPLOYED.
16. ALL UNDERGROUND UTILITY LINES, SIZES, AND MATERIAL TYPES SHOWN ON THE PLANS ARE FOR THE PURPOSE OF MAKING THE CONTRACTOR AWARE THAT THEY EXIST. NEITHER THE OWNER, NOR THE ENGINEER GUARANTEES THE ACCURACY THEREOF. ALSO, THE LOCATIONS OF SOME EXISTING UTILITY LINES ARE NOT KNOWN AND THE CONTRACTOR SHALL VERIFY THE LOCATION, SIZE AND MATERIAL TYPES OF ALL UNDERGROUND UTILITIES PRIOR TO BEGINNING CONSTRUCTION. THE FINAL ALIGNMENT OF THE PROPOSED MAIN LINES ARE SUBJECT TO MODIFICATION PENDING THE ESTABLISHMENT OF EXISTING UTILITY LOCATIONS.
17. THE CONTRACTOR SHALL UNCOVER EXISTING UTILITIES AT ALL "POINTS OF CROSSING" TO DETERMINE IF CONFLICTS EXIST BEFORE COMMENCING ANY CONSTRUCTION. NOTIFY THE ENGINEER AT ONCE OF ANY CONFLICTS.
18. THE LATEST TCEQ REGULATIONS MUST BE FOLLOWED FOR CROSSINGS OF SANITARY SEWER MAINS AND WATER MAINS. IT IS THE INTENT THAT THE MOST ECONOMICALLY ACCEPTABLE ALTERNATIVE BE ELECTED. ACCORDINGLY, FIELD VERIFICATION OF EXISTING UTILITY GRADES IS IMPERATIVE.
19. FINAL COVER OF INSTALLED LINES SHALL NOT BEGIN PRIOR TO OBSERVATION AND ACCEPTANCE BY THE OWNER OR ENGINEER. THE CONTRACTOR SHALL CONTACT THE OWNER BY 4:00 P.M. REGARDING THE SCHEDULING OF THESE MONITORING VISITS.
20. CONNECTIONS TO EXISTING LINES SHALL INCLUDE ALL REQUIRED FITTINGS, MATERIALS REQUIRED TO MAKE A SUCCESSFUL TIE IN MEETING ALL APPLICABLE STANDARDS.
21. THE LOADING AND UNLOADING OF ALL MATERIALS AND EQUIPMENT SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDED PRACTICES AND SHALL AT ALL TIMES BE PERFORMED WITH CARE TO AVOID ANY DAMAGE TO THE MATERIAL. THE CONTRACTOR SHALL LOCATE AND PROVIDE THE NECESSARY STORAGE AREAS FOR MATERIALS AND EQUIPMENT.
22. ALL MATERIALS AND EQUIPMENT SHALL BE BOTH FURNISHED AND INSTALLED UNLESS OTHERWISE NOTED.
23. CONSTRUCTION SHALL COMPLY WITH THE LATEST REVISIONS OF OSHA REGULATIONS AND STATE OF TEXAS LAW CONCERNING TRENCHING AND SHORING. CONTRACTOR SHALL PROVIDE A TRENCH SAFETY SYSTEM TO MEET, AS A MINIMUM, THE REQUIREMENTS OF OSHA SAFETY AND HEALTH REGULATION, PART 1926, SUB-PART P AS PUBLISHED IN THE FEDERAL REGISTER, VOLUME 54, NO. 209, DATED OCTOBER 31, 1989, AND LATEST REVISIONS.
24. DETAILS PREPARED DO NOT EXTEND TO OR INCLUDE DESIGNS OR SYSTEMS PERTAINING TO THE SAFETY OF THE CONTRACTOR OR ITS EMPLOYEES, AGENTS OR REPRESENTATIVES IN THE PERFORMANCE OF THE WORK. THE CONSTRUCTION CONTRACTOR SHALL PREPARE OR OBTAIN THE APPROPRIATE SAFETY SYSTEMS, INCLUDING THE PLANS AND SPECIFICATIONS REQUIRED BY CHAPTER 756, SUBCHAPTER "C" OF THE TEXAS HEALTH AND SAFETY CODE.
25. CONTRACTOR SHALL COVER OPEN EXCAVATIONS WITH ANCHORED STEEL PLATES DURING NON-WORKING HOURS, ALONG EXISTING ROADWAYS AND TRAFFIC AREAS
26. ALL TRENCHES, INCLUDING TRENCHES FOR LEADS AND STUBS UNDER PAVEMENT AND TO A POINT ONE (1) FOOT BACK OF ALL PAVEMENT SHALL BE BACKFILLED WITH CEMENT STABILIZED SAND AS PER SPECIFICATION TO A POINT IMMEDIATELY BELOW THE SUBGRADE. TRENCHES OTHER THAN UNDER PAVEMENT SHALL BE BACKFILLED WITH SUITABLE EARTH MATERIAL IN 6 INCH LAYERS AND MECHANICALLY COMPACTED TO A DENSITY OF NOT LESS THAN 95 PERCENT OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR COMPACTION TEST (ASTM DESIGNATION D-698/AASHTO T99). MOISTURE CONTENT OF BACKFILL SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CEMENT STABILIZED SAND SPECIFICATIONS. SEE DETAIL SHEETS FOR BEDDING AND OTHER DESIGN REQUIREMENTS.
27. CONTRACTOR SHALL VERIFY ALL EXISTING SITE CONDITIONS, AND CONFIRM POINTS OF CONNECTIONS TO EXISTING IMPROVEMENTS, INCLUDING CONFIRMATION OF ELEVATIONS AND GRADES OF EXISTING FACILITIES AND UTILITIES PRIOR TO STARTING ANY GRADING, PAVING OR UTILITY INSTALLATION. VERIFICATION OF LOCATIONS AND FUNCTIONS OF EACH EXISTING STRUCTURE OR SYSTEM AND ALL EXISTING UTILITY GRADES AND INVERT ELEVATIONS IS THE CONTRACTOR'S RESPONSIBILITY. NOTIFY THE ENGINEER OF ANY DISCREPANCIES IMMEDIATELY. ANY CONFLICTS OR ERRORS BETWEEN EXISTING FIELD CONDITIONS AND ENGINEERING PLANS MUST BE RESOLVED PRIOR TO STARTING EXCAVATION OR SETTING ANY GRAVITY SEWER (STORM OR SANITARY) AND APPURTENANCES. CONTRACTOR IS RESPONSIBLE FOR COMPLETING CERTIFICATION FORM 006293 IN THE BID PACKAGE PRIOR TO START OF CONSTRUCTION.
28. ALL UNSATISFACTORY AND/OR WASTE MATERIALS INCLUDING VEGETATION, ROOTS, CONCRETE AND DEBRIS SHALL BE HAULED OFF-SITE BY THE CONTRACTOR. INCLUDE COST OF THIS WORK, INCLUDING HAUL, IN OTHER ITEMS OF THIS PROJECT. CONTRACTOR SHALL MAINTAIN ADEQUATE DRAINAGE AT ALL TIMES DURING CONSTRUCTION OF PROPOSED FACILITIES.
29. CONTRACTOR SHALL CONFINE ALL WORK EFFORTS WITHIN THE DESIGNATED RIGHT-OF-WAY OR EASEMENTS UNLESS SPECIFICALLY AUTHORIZED BY THE OWNER. EXTREME CARE SHOULD BE EXERCISED WITHIN ADJACENT PROPERTY TO PROTECT THE EXISTING TREES AND FENCES.

GRADING NOTES

1. GENERAL CONTRACTOR AND ALL SUBCONTRACTORS SHALL VERIFY THE SUITABILITY OF ALL EXISTING AND PROPOSED SITE CONDITIONS INCLUDING GRADES AND DIMENSIONS BEFORE STARTING CONSTRUCTION. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES.
2. BEFORE STARTING CONSTRUCTION, CONTRACTOR SHALL VERIFY BENCHMARK ELEVATION AND NOTIFY ENGINEER IF ANY DISCREPANCY AND/OR CONFLICT IS FOUND.
3. CONTRACTOR SHALL ENSURE THERE IS POSITIVE DRAINAGE AND NO PONDING IN PAVED AREAS, AND SHALL NOTIFY ENGINEER IF ANY GRADING DISCREPANCIES ARE FOUND IN THE EXISTING AND PROPOSED GRADES PRIOR TO PLACEMENT OF PAVEMENT OR UTILITIES.
4. CONTRACTOR SHALL PROTECT ALL MANHOLE COVERS, VALVE COVERS, VAULT LIDS, FIRE HYDRANTS, POWER POLES, GUY WIRES, AND TELEPHONE BOXES THAT ARE TO REMAIN IN PLACE AND UNDISTURBED DURING CONSTRUCTION.
5. ALL EXISTING CONCRETE PAVING, SIDEWALK, AND CURB DEMOLITION SHALL BE REMOVED AND DISPOSED OF BY CONTRACTOR. DISPOSAL SHALL BE AT AN APPROVED OFF-SITE, LAWFUL LOCATION, UNLESS DIRECTED OTHERWISE BY THE OWNER.

STORM SEWER NOTES

1. STORM SEWER AND LEADS SHALL BE REINFORCED CONCRETE PIPE, ASTM C-76, CLASS III, WITH O-RING RUBBER GASKET JOINT, AND SHALL BE INSTALLED, BEDDED AND BACKFILLED IN ACCORDANCE WITH CITY OF WILLIS STANDARD DETAILS.
2. ALL PROPOSED PIPE STUB OUTS FROM MANHOLES OR INLETS ARE TO BE PLUGGED WITH 8 INCH BRICK WALLS UNLESS OTHERWISE NOTED.
3. STORM SEWER MANHOLES SHALL BE STANDARD PRE-CAST, UNLESS OTHERWISE NOTED.
4. ALL INLETS TO BE CITY OF HOUSTON TYPE "B-B" UNLESS OTHERWISE STATED ON PLANS. INLETS TO BE STANDARD DEPTH UNLESS OTHERWISE NOTED.
5. ALL STORM SEWER LEADS SHALL BE 18 INCH MINIMUM UNLESS OTHERWISE INDICATED.
6. WHEN MANHOLE FRAME AND COVER IS REQUIRED, USE EAST JORDAN IRON WORKS HEAVY-DUTY FRAME AND COVER (OR EQUAL) WITH THE CITY OF SHENANDOAH LOGO EMBEDDED IN LID.
7. FOR ADJUSTMENT OF MANHOLE LIDS USE STANDARD CONCRETE RINGS. ADJUSTMENT WITH CONCRETE RINGS SHALL NOT EXCEED ONE FOOT IN HEIGHT
8. CONCRETE USED FOR ALL POURED-IN-PLACE MANHOLES, INLETS, WINGWALLS, HEADWALLS AND OTHER APPURTENANCES TO BE CLASS "A" CONCRETE WITH 3,000 P.S.I. STRENGTH AT 28 DAYS.
9. ALL EXPOSED CORNERS TO BE CHAMFERED 3/4".

PAVEMENT CONSTRUCTION NOTES

1. ALL PAVING SHALL BE IN ACCORDANCE WITH CITY OF SHENANDOAH REGULATIONS.
2. GUIDELINES SET FORTH IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" SHALL BE OBSERVED.
3. EXPOSE 15 INCHES OF REINFORCING STEEL AT ALL PROPOSED SAWED JOINTS. IF NO REINFORCING STEEL EXISTS, USE HORIZONTAL DOWELS PER NOTE #4.
4. REQUIRE A ONE (1) INCH RED WOOD EXPANSION BOARD OR PRE-MOLDED NON-EXTRUDING JOINT BETWEEN SIDEWALK AND BACK OF CURB.
5. HORIZONTAL DOWELS SHALL BE NO. 6 BARS, 24 INCHES LONG, DRILLED AND EMBEDDED 8 INCHES INTO THE CENTER OF THE EXISTING SLAB WITH "PO ROC" OR EQUAL. DOWELS SHALL BE 24 INCHES CENTER TO CENTER, UNLESS OTHERWISE SPECIFIED.
6. WHEN PROPOSED PAVEMENT ENDS AT A CONSTRUCTION JOINT LEAVE 15 INCHES OF REINFORCING STEEL EXPOSED BEYOND PAVEMENT, COAT WITH ASPHALT, AND WRAP WITH BURLAP FOR FUTURE PAVEMENT TIE-IN. AT EXPANSION JOINTS, EXTEND DOWELS 5 INCHES COAT AND WRAP SAME AS CONSTRUCTION JOINT.
7. WHEN REQUIRED, PROVIDE WHEELCHAIR RAMP AND/OR SIDEWALKS IN ACCORDANCE WITH THE "TEXAS DEPARTMENT OF TRANSPORTATION STANDARD WHEELCHAIR RAMP AND SIDEWALK DETAILS".
8. ADJUST EXISTING MANHOLE FRAMES AND COVERS TO FIT NEW GRADE.
9. ADJUST EXISTING WATER VALVE BOXES TO NEW PAVING GRADE. REPLACE ALL MISSING OR DAMAGED VALVE BOXES AND COVERS.
10. PLACE WHITE OR YELLOW PLASTIC MARKER OR PAINT AS SHOWN BY THE UNIFORM TRAFFIC MANUAL FOR PAVEMENT MARKINGS.
11. PROVIDE A CONCRETE PAVING HEADER AT THE END OF THE PAVEMENT.
12. CURB RADII AT STREET INTERSECTIONS TO BE 24.50 FEET TO BACK OF CURB WITH A MINIMUM OF ONE (1) PERCENT GRADE UNLESS OTHERWISE NOTED.
13. GUIDELINES SET FORTH IN THE "TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES" WILL BE OBSERVED.
14. TRANSVERSE EXPANSION JOINTS SHALL BE INSTALLED AT ALL RADIUS RETURNS AND AT A MAXIMUM SPACING OF 60 FOOT INTERVALS.
15. CONTRACTOR WILL USE CONTINUOUS LONGITUDINAL REINFORCING BARS IN CURBS AS SHOWN ON DETAILS.
16. CYLINDER COMPRESSION TEST OR BEAM FLEXURAL TEST SHALL BE REQUIRED. TWO SAMPLES SHALL BE TAKEN FOR EACH 100 CUBIC YARDS OF CONCRETE POURED. FOR SMALLER QUANTITIES, TWO SAMPLES SHALL BE TAKEN REGARDLESS OF THE AMOUNT OF CONCRETE POURED EACH DAY. CONCRETE SHALL HAVE 5 SACKS CEMENT PER CUBIC YARD AND A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI IN 28 DAYS OR A MINIMUM FLEXURAL STRENGTH OF 600 PSI IN 28 DAYS. NO TRAFFIC SHALL BE ALLOWED ON CONCRETE FOR 28 DAYS. IF EXTRA TESTS ARE MADE AND 75% OF THE 28 DAY STRENGTH IS ACHIEVED THE CITY ENGINEER MAY ALLOW TRAFFIC ON THE PAVEMENT IF IT DEEMS NECESSARY.
17. SUBGRADE SHALL BE STABILIZED PER GEOTECHNICAL REPORT.
18. A CONCRETE MIX DESIGN BY THE CERTIFIED LAB SHALL BE SUBMITTED TO AND APPROVED BY THE CITY ENGINEER BEFORE ANY CONCRETE IS POURED.
19. A MINIMUM OF TWO (2) COMPACTION TESTS SHALL BE PERFORMED A MAXIMUM DISTANCE OF 500 FEET, AND FOR EACH 2-6" MAXIMUM THICK LAYERS OF FILL. IN AREAS WHERE NO FILL IS REQUIRE, TWO (2) SAMPLES SHALL BE TAKEN AT A MAXIMUM DISTANCE OF 500 FEET. ADDITIONAL TESTING SHALL BE PERFORMED IF SEEN NECESSARY BY THE ENGINEER. NO ADDITIONAL LAYERS OF FILL SHALL BE MADE WITHOUT HAVING THE LAB'S WRITTEN APPROVAL OF COMPLETED LAYERS. PROOF ROLLING SHALL BE REQUIRED BY THE INSPECTOR ON EACH LAYER PLACED AND ANY "PUMPING" AREAS SHALL BE REMOVED IMMEDIATELY AND REPLACED OR STABILIZED AND RE-COMPACTED TO A PASSING DENSITY.
20. CONSTRUCTION OF ITEMS THAT ARE NOT SPECIFICALLY ADDRESSED TO BE IN ACCORDANCE WITH THE TEXAS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS (LATEST REVISION).
21. RIGHT-OF-WAY & ROADSIDE DITCHES SHALL BE SLOPED AS DIRECTED BY PLANS AND SHALL HAVE A MINIMUM 75% ESTABLISHED TURF BY MEANS OF HYDROMULCHING OR SODDING BEFORE FINAL ACCEPTANCE BY THE CITY.
22. MEMBRANE CURING TYPE 2, WHITE PIGMENTED, SHALL BE USED FOR CURING ALL CONCRETE SURFACES IMMEDIATELY AFTER FINISHING OF SURFACES AND SHALL BE IN ACCORDANCE WITH THE TEXAS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS ITEM #526.
23. ALL FIRST STAGE INLET CONSTRUCTION SHALL BE PROTECTED WITH 3 INCH THICK BOARDS AT ALL TIMES.
24. ALL SUBGRADE AND EMBANKMENT AREAS SHALL BE STRIPPED OF ALL ORGANIC AND UNSUITABLE MATERIAL BEFORE STABILIZATION OR FILLING IS BEGUN. MATERIAL USED FOR FILL SHALL BE CERTIFIED BY A LAB TO HAVE A PLASTICITY INDEX BETWEEN 10 AND 20.
25. FORMS SHALL BE SET TO THE PROPER GRADE AND PROPERLY SUPPORTED SO THAT NO DISPLACEMENT OCCURS WITH THE PAVING ACTIVITIES. ALL CONCRETE SHALL BE VIBRATED BY MECHANICAL MEANS TO INSURE PROPER COMPACTION AND NO HONEY COMBS.
26. CONCRETE SHALL NOT BE PLACED WHEN THE TEMPERATURE IS BELOW 40 DEG F. AND FALLING, BUT MAY BE PLACED WHEN TEMPERATURE IS ABOVE 35 DEG F. AND RISING. THE TEMPERATURE SHALL BE TAKEN IN THE SHADE AND AWAY FROM ARTIFICIAL HEAT.
27. THE CONTRACTOR SHALL ERECT AND MAINTAIN BARRICADES TO ADEQUATELY PROTECT THE PAVEMENT. THE CONTRACTOR SHALL HAVE PERSONNEL ON SITE UNTIL THE PAVEMENT HAS REACHED SUFFICIENT STRENGTH AS NOT TO BE DAMAGED BY ANIMALS OR FOOT TRAFFIC.
28. JOINT SEALING MATERIAL SHALL BE A HOT POURED RUBBER TYPE AND SHALL MEET THE REQUIREMENTS IN ACCORDANCE WITH TEST METHOD TEX-525-C, OR AN APPROVED EQUAL. TAR WILL NOT BE ALLOWED.
29. JOINTS SHALL BE CLEANED OF ALL SCALE, DIRT, DUST, CURING COMPOUND, AND CONCRETE TO THE WIDTH AND DEPTH OF THE JOINT AND SHALL BE DRY BEFORE SEALING IS PERFORMED.
30. REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM 615 GRADE 60 (GRADE 40 ONLY FOR BARS REQUIRING BENDING). REINFORCING STEEL SHALL BE SUPPORTED ON CHAIRS STRONG ENOUGH TO HOLD IT IN PLACE AND BE TIED.
31. CONCRETE FOR PAVEMENT SHALL MEET TEXAS DEPARTMENT OF HIGHWAY STANDARD SPECIFICATIONS AND SHALL BE A MINIMUM OF 5 SACK, 3,000 PSI UNLESS STATED SPECIFICALLY BY THE PLANS OR THE SPECIFICATIONS.
32. CONCRETE PAVEMENT SHALL BE CORED TO VERIFY THICKNESS OF CONCRETE AT INTERVALS OF 1,000 LINEAR FEET PER TRAFFIC LANE.

CENTERPOINT NOTES

CAUTION: UNDERGROUND GAS FACILITIES

LOCATIONS OF CENTERPOINT ENERGY MAIN LINES (TO INCLUDE CENTERPOINT ENERGY, INTRASTATE PIPELINE, LLC. WHERE APPLICABLE) ARE SHOWN IN AN APPROXIMATE LOCATION ONLY. SERVICE LINES ARE USUALLY NOT SHOWN. OUR SIGNATURE ON THESE PLANS ONLY INDICATES THAT OUR FACILITIES ARE SHOWN IN APPROXIMATE LOCATION. IT DOES NOT IMPLY THAT A CONFLICT ANALYSIS HAS BEEN MADE. THE CONTRACTOR SHALL CONTACT THE UTILITY COORDINATING COMMITTEE AT (713) 223-4567, 1-800-669-8344, OR 811 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE MAIN AND SERVICE LINES FIELD LOCATED.

- WHEN CENTERPOINT ENERGY PIPE LINE MARKINGS ARE NOT VISIBLE, CALL (713) 945-8036 OR (713) 967-8037 (7:00 A.M. TO 4:30 P.M.) FOR STATUS OF LINE LOCATION REQUEST BEFORE EXCAVATION BEGINS.
- WHEN EXCAVATING WITHIN EIGHTEEN INCHES (18") OF THE INDICATED LOCATION OF CENTERPOINT ENERGY FACILITIES, ALL EXCAVATION MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES.
- WHEN CENTERPOINT ENERGY FACILITIES ARE EXPOSED, SUFFICIENT SUPPORT MUST BE PROVIDED TO THE FACILITIES TO PREVENT EXCESSIVE STRESS ON THE PIPING.
- FOR EMERGENCIES REGARDING GAS LINES CALL (713) 659-3552 OR (713) 207-4200.

THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND FACILITIES.

WARNING: OVERHEAD ELECTRICAL LINES

OVERHEAD LINES MAY EXIST ON THE PROPERTY. THE LOCATION OF OVERHEAD LINES HAS NOT BEEN SHOWN ON THESE DRAWINGS AS THE LINES ARE CLEARLY VISIBLE, BUT YOU SHOULD LOCATE THEM PRIOR TO BEGINNING ANY CONSTRUCTION. TEXAS LAW, SECTION 752, HEALTH & SAFETY CODE FORBIDS ACTIVITIES THAT OCCUR IN CLOSE PROXIMITY TO HIGH VOLTAGE LINES, SPECIFICALLY:

- ANY ACTIVITY WHERE PERSON OR THINGS MAY COME
- WITHIN SIX(6) FEET OF LIVE OVERHEAD HIGH VOLTAGE
- LINES; AND
- OPERATING A CRANE, DERRICK, POWER SHOVEL, DRILLING
- RIG, PILE DRIVER, HOISTING EQUIPMENT, OR SIMILAR
- APPARATUS WITHIN 10 FEET OF LIVE OVERHEAD HIGH
- VOLTAGE LINES.

PARTIES RESPONSIBLE FOR THE WORK, INCLUDING CONTRACTORS ARE LEGALLY RESPONSIBLE FOR THE SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW. THIS LAW CARRIES BOTH CRIMINAL AND CIVIL LIABILITY. TO ARRANGE FOR LINES TO BE TURNED OFF OR REMOVED CALL CENTERPOINT ENERGY AT (713) 207-2222.

TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT ENERGY AT 713-207-2222

NOTICE:

For your safety, you are required by Texas Law to call 811 at least 48 hours before you dig so that underground line can be marked. This Verification does not fulfill your obligation to call 811.

VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy/Natural Gas Facilities Verification ONLY.

(This Signature verifies that you have shown CNP Natural Gas lines correctly - not to be used for conflict verification.) (Gas service lines are not shown.)

Signature Valid for six months.

Date

CenterPoint Energy/UNDERGROUND Electrical Facilities Verification ONLY.

(This signature verifies existing underground facilities - not to be used for conflict verification.)

Signature Valid for six months.

Revised August 1,2012

WATER CONSTRUCTION NOTES

1. Contractor shall provide adequate thrust blocking to withstand test pressure as specified.
2. Prior to installation of water meter, water meter lead or metered fire sprinkler line, the contractor shall contact the Permit Division.
3. Separation distances for all water main and sanitary sewer main construction shall be governed by the "Texas Commission on Environmental Quality" Chapter 290.
4. Twelve-inch (12") and smaller mains shall have a minimum cover of four feet (4') from the top of the curb or five feet (5') from the mean elevation of the bottom of the nearby ditch and nearby right-of-way elevation for open ditch sections.
5. Mains larger than twelve-inches (12") shall have a minimum cover of five feet (5') from the top of the curb or six feet (6') from the mean elevation for open ditch sections.
6. All water mains shall be hydrostatically tested before bacteriological testing in accordance with AWWA standard C-600.
7. All water piping shall be disinfected and bacteriologically tested prior to use in accordance with AWWA standard C-601.
8. All water mains 4" through 12" shall be C-900 (SDR-18). All water mains 14" through 36" shall be C-905 (SDR-I8).
9. Prior to backfilling of all underground water lines, install detector tape and a continuous #14 copper tracer wire, located directly over buried lines and accessible at each valve stack.

TCEQ WATER CONSTRUCTION NOTES

1. This water distribution system must be constructed in accordance with the current Texas Commission on Environmental Quality (TCEQ) Rules and Regulations for Public Water Systems 30 Texas Administrative Code (TAC) Chapter 290 Subchapter D. When conflicts are noted with local standards, the more stringent requirement shall be applied. Construction for public water systems must always, at a minimum, meet TCEQ's "Rules and Regulations for Public Water Systems.
2. An appointed engineer shall notify in writing the local TCEQ's Regional Office when construction will start. Please keep in mind that upon completion of the water works project, the engineer or owner shall notify the commission's Water Supply Division, in writing, as to its completion and attest to the fact that the work has been completed essentially according to the plans and change orders on file with the commission as required in 30 TAC §290.39(h)(3).
3. All newly installed pipes and related products must conform to American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 61-G and must be certified by an organization accredited by ANSI, as required by 30 TAC §290.44(a)(1).
4. Plastic pipe for use in public water systems must bear the National Sanitation Foundation Seal of Approval (NSF pw-G) and have an ASTM design pressure rating of at least 150 psi or a standard dimension ratio of 26 or less, as required by 30 TAC §290.44(a)(2).
5. No pipe which has been used for any purpose other than the conveyance of drinking water shall be accepted or relocated for use in any public drinking water supply, as required by 30 TAC §290.44(a)(3).
6. Water transmission and distribution lines shall be installed in accordance with the manufacturer's instructions. However, the top of the water line must be located below the frost line and in no case shall the top of the water line be less than 24 inches below ground surface, as required by 30 TAC §290.44(a)(4).
7. Pursuant to 30 TAC §290.44(a)(5), the hydrostatic leakage rate shall not exceed the amount allowed or recommended by the most current AWWA formulas for PVC pipe, cast iron and ductile iron pipe. Include the formulas in the notes on the plans.

o The hydrostatic leakage rate for polyvinyl chloride (PVC) pipe and appurtenances shall not exceed the amount allowed or recommended by formulas in America Water Works Association (AWWA) C-605 as required in 30 TAC §290.44(a)(5). Please ensure that the formula for this calculation is correct and most current formula is in use;

Where: $Q = \frac{LD\sqrt{P}}{148{,}000}$

- Q = the quantity of makeup water in gallons per hour,
- L = the length of the pipe section being tested, in feet,
- D = the nominal diameter of the pipe in inches, and
- P = the average test pressure during the hydrostatic test in pounds per square inch (psi).

Revised: January 10, 2014 2

o The hydrostatic leakage rate for ductile iron (DI) pipe and appurtenances shall not exceed the amount allowed or recommended by formulas in America Water Works Association (AWWA) C-600 as required in 30 TAC §290.44(a)(5). Please ensure that the formula for this calculation is correct and most current formula is in use;

Where: $L = \frac{SD\sqrt{P}}{148{,}000}$

- L = the quantity of makeup water in gallons per hour,
- S = the length of the pipe section being tested, in feet,
- D = the nominal diameter of the pipe in inches, and
- P = the average test pressure during the hydrostatic test in pounds per square inch (psi).

8. Projects constructed on or after January 4, 2014 must comply with changes to the Safe Drinking Water Act that reduce the maximum allowable lead content of pipes, pipe fittings, plumbing fittings, and fixtures to 0.25 percent.
9. The system must be designed to maintain a minimum pressure of 35 psi at all points within the distribution network at flow rates of at least 1.5 gallons per minute per connection. When the system is intended to provide firefighting capability, it must also be designed to maintain a minimum pressure of 20 psi under combined fire and drinking water flow conditions as required by 30 TAC §290.44(d).
10. The contractor shall install appropriate air release devices in the distribution system at all points where topography or other factors may create air locks in the lines. All vent openings to the atmosphere shall be covered with 16-mesh or finer, corrosion resistant screening material or an acceptable equivalent as required by 30 TAC §290.44(d)(1).
11. Pursuant to 30 TAC §290.44(d)(4), accurate water meters shall be provided. Service connections and meter locations should be shown on the plans.
12. Pursuant to 30 TAC §290.44(d)(5), sufficient valves and blowoffs to make repairs. The engineering report shall establish criteria for this design.
13. Pursuant to 30 TAC §290.44(d)(6), the system shall be designed to afford effective circulation of water with a minimum of dead ends. All dead-end mains shall be provided with acceptable flush valves and discharge piping. All dead-end lines less than two inches in diameter will not require flush valves if they end at a customer service. Where dead ends are necessary as a stage in the growth of the system, they shall be located and arranged to ultimately connect the ends to provide circulation.
14. The contractor shall maintain a minimum separation distance in all directions of nine feet between the proposed waterline and wastewater collection facilities including manholes and septic tank drainfields. If this distance cannot be maintained, the contractor must immediately notify the project engineer for further direction. Separation distances, installation methods, and materials utilized must meet 30 TAC §290.44(e)(1-4) of the current rules. Revised: January 10, 2014 3
15. Pursuant to 30 TAC §290.44(e)(5), the separation distance from a potable waterline to a wastewater main or lateral manhole or cleanout shall be a minimum of nine feet. Where the nine-foot separation distance cannot be achieved, the potable waterline shall be encased in a joint of at least 150 psi pressure class pipe at least 18 feet long and two nominal sizes larger than the new conveyance. The space around the carrier pipe shall be supported at five-foot intervals with spacers or be filled to the springline with washed sand. The encasement pipe shall be centered on the crossing and both ends sealed with cement grout or manufactured sealant.
16. Pursuant to 30 TAC §290.44(e)(6), fire hydrants shall not be installed within nine feet vertically or horizontally of any wastewater line, wastewater lateral, or wastewater service line regardless of construction.
17. Pursuant to 30 TAC §290.44(e)(7), suction mains to pumping equipment shall not cross wastewater mains, wastewater laterals, or wastewater service lines. Raw water supply lines shall not be installed within five feet of any tile or concrete wastewater main, wastewater lateral, or wastewater service line.
18. Pursuant to 30 TAC §290.44(e)(8), waterlines shall not be installed closer than ten feet to septic tank drainfields.
19. Pursuant to 30 TAC §290.44(f)(1), the contractor shall not place the pipe in water or where it can be flooded with water or sewage during its storage or installation.
20. Pursuant to 30 TAC §290.44(f)(2), when waterlines are laid under any flowing or intermittent stream or semi-permanent body of water the water main shall be installed in a separate watertight pipe encasement. Valves must be provided on each side of the crossing with facilities to allow the underwater portion of the system to be isolated and tested.
21. The contractor shall disinfect the new water mains in accordance with AWWA Standard C-651 and then flush and sample the lines before being placed into service. Samples shall be collected for microbiological analysis to check the effectiveness of the disinfection procedure which shall be repeated if contamination persists. A minimum of one sample for each 1,000 feet of completed water line will be required or at the next available sampling point beyond 1,000 feet as designated by the design engineer, in accordance with 30 TAC §290.44(f)(3).

ALL DISTURBED DITCHES SHALL BE REGRADED TO ALLOW POSITIVE DRAINAGE AND ALL DISTURBED AREAS SHALL BE HYDROMULCHED AND WATERED UNTIL A MIN OF 75% GROWTH IS ESTABLISHED.

LOCATION AND ELEVATION OF EXISTING UTILITIES SHOWN HEREIN ARE PROVIDED BY OTHERS. CONTRACTOR SHALL FIELD VERIFY LOCATION AND ELEVATION OF EXISTING UTILITIES AT ALL CROSSINGS AND CONNECTION POINTS PRIOR TO ANY WORK. ANY DISCREPANCIES BETWEEN THESE PLANS AND ACTUAL FIELD CONDITIONS SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER.

ALL CONSTRUCTION SHALL MEET CITY OF SHENANDOAH STANDARDS.

REV	DATE	BY	APP	COMMENT

PREPARED FOR:
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STANDARD NOTES AND ABREVIATIONS
DAVID MEMORIAL EXTENSION
PHASE II

THIS SET OF PLANS WAS PREPARED UNDER THE DIRECTION OF JONNY GREEN, P.E., SEAL No.120300 ON JUNE 01, 2017. THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW ONLY AND NOT TO BE USED FOR CONSTRUCTION.

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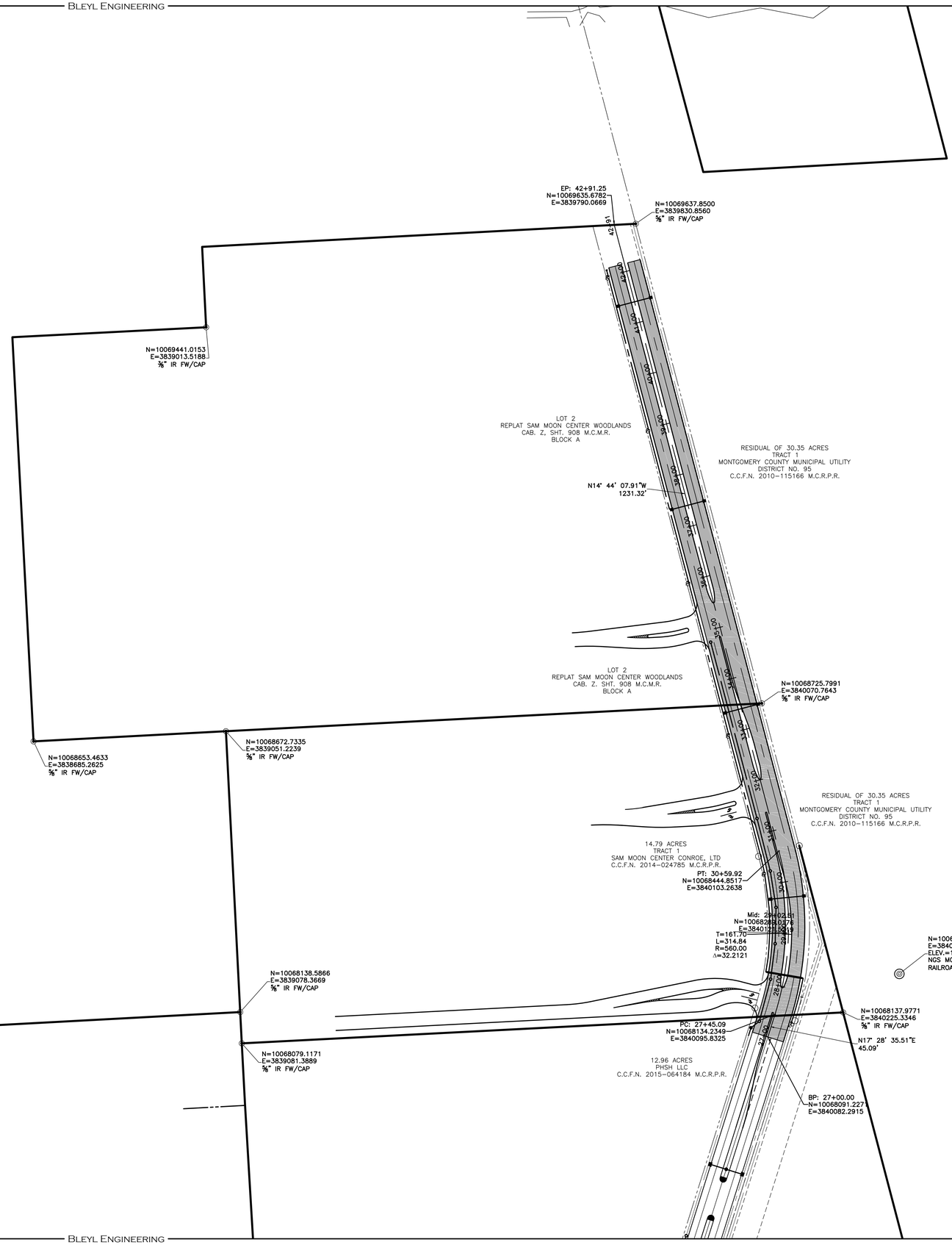

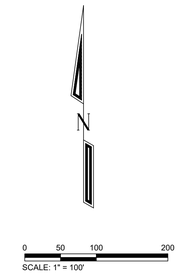

NOTE:
COORDINATES ARE NAD83 TEXAS STATE PLANE, CENTRAL ZONE, US FOOT

REV	DATE	BY	APP	COMMENT

PREPARED FOR:

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HORIZONTAL CONTROL PLAN

DAVID MEMORIAL EXTENSION PHASE II

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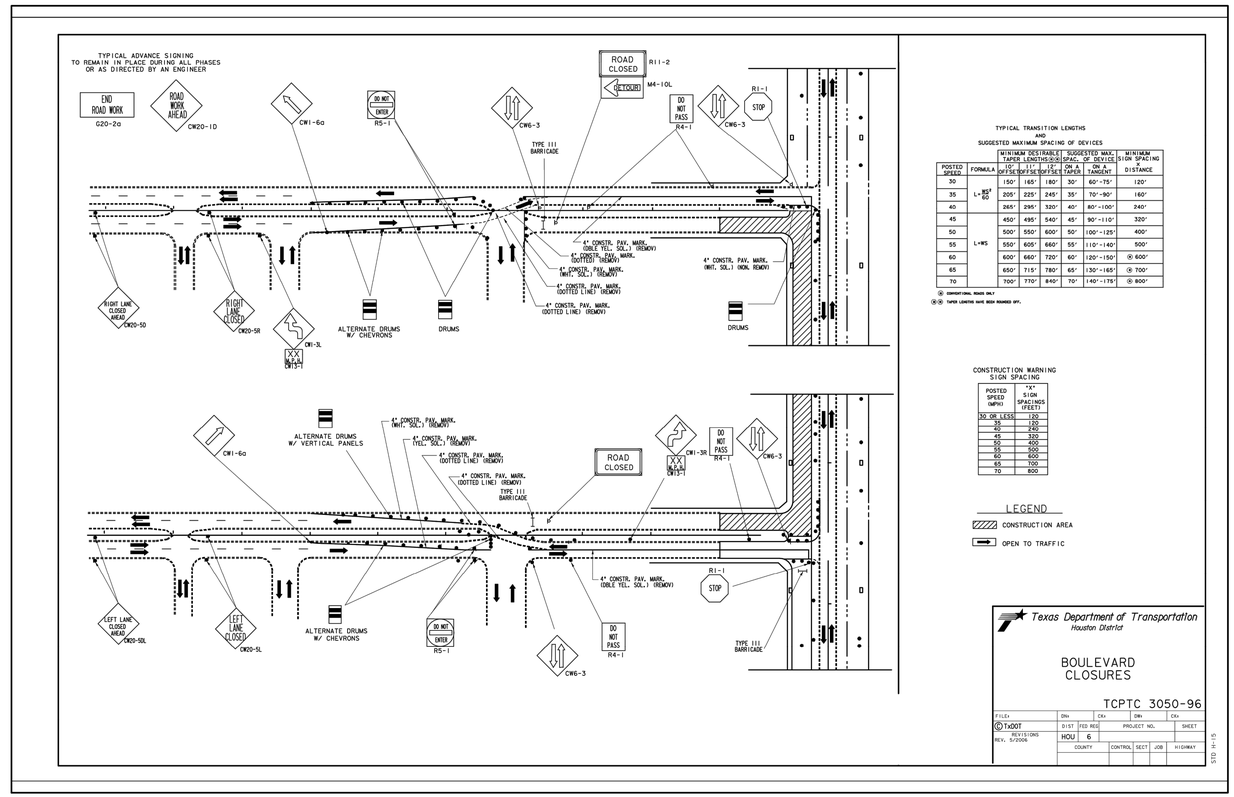
AREAS TO BE CLEARED FOR PAVING & UTILITIES

AVAILABLE STAGING AREA

CLEARING NOTE:
CONTRACTOR TO TAKE ALL NECESSARY PRECAUTIONS TO PROTECT AND PRESERVE EXISTING TREES. ANY CLEARING ACTIVITIES SHALL BE APPROVED BY THE ENGINEER AND OWNER PRIOR TO COMMENCEMENT OF WORK.

DEMOLITION NOTE:
DEMOLITION AND CONSTRUCTION SHALL BE COMPLETED IN PHASES. TWO WAY TRAFFIC/PUBLIC ACCESS SHALL BE MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT.



TYPICAL TRANSITION LENGTHS
AND
SUGGESTED MAXIMUM SPACING OF DEVICES

POSTED SPEED	FORMULA	MINIMUM DESIRABLE TAPER LENGTHS 10:30 1/3*L 1/2*L 1*L OFT.SE OFT.SE OFT.SE OFT.SE	SUGGESTED MAX. SPAC. OF DEVICES ON A TAPER	SUGGESTED MAX. SPAC. OF DEVICES ON A TANGENT	MINIMUM SIGN SPACING DISTANCE
30	$L=\frac{WS^2}{60}$	150' 165' 180' 30'	30'	60'-75'	120'
35		205' 225' 245' 35'	35'	70'-90'	160'
40		265' 295' 320' 40'	40'	80'-100'	240'
45		450' 495' 540' 45'	45'	90'-110'	320'
50	L=WS	500' 550' 600' 50'	50'	100'-125'	400'
55		550' 605' 660' 55'	55'	110'-140'	500'
60		600' 660' 720' 60'	60'	120'-150'	(*) 600'
65		650' 715' 780' 65'	65'	130'-165'	(*) 700'
70		700' 770' 840' 70'	70'	140'-175'	(*) 800'

(*) CONDITIONAL RANGE ONLY
(*) TAPER LENGTHS HAVE BEEN ROUNDED OFF.

CONSTRUCTION WARNING SIGN SPACING

POSTED SPEED (MPH)	"X" SIGN SPACINGS (FEET)
30 OR LESS	120
35	120
40	240
45	320
50	400
55	500
60	600
65	700
70	800

LEGEND
CONSTRUCTION AREA
OPEN TO TRAFFIC

Texas Department of Transportation
Houston District

BOULEVARD CLOSURES

TCPTC 3050-96

FILE=	DN=	CK=	DW=	CK=
TxDOT	DIST	FED.REG.	PROJECT NO.	SHEET
REVISIONS REV. 5/2006	HOU	6		
	COUNTY		CONTROL	SECT JOB HIGHWAY

STD. H-15

REV	DATE	BY	APP	COMMENT

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DEMOLITION AND CLEARING PLAN

DAVID MEMORIAL EXTENSION PHASE II

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OVERALL LAYOUT

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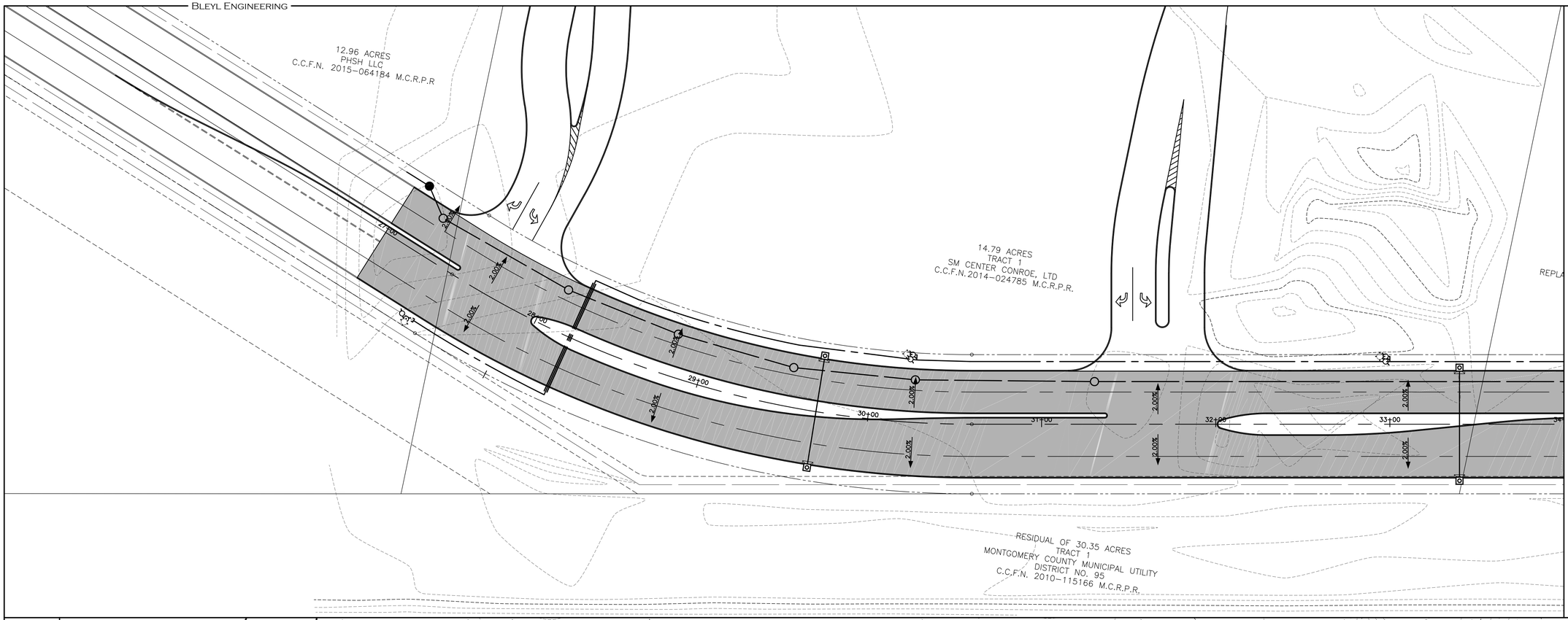

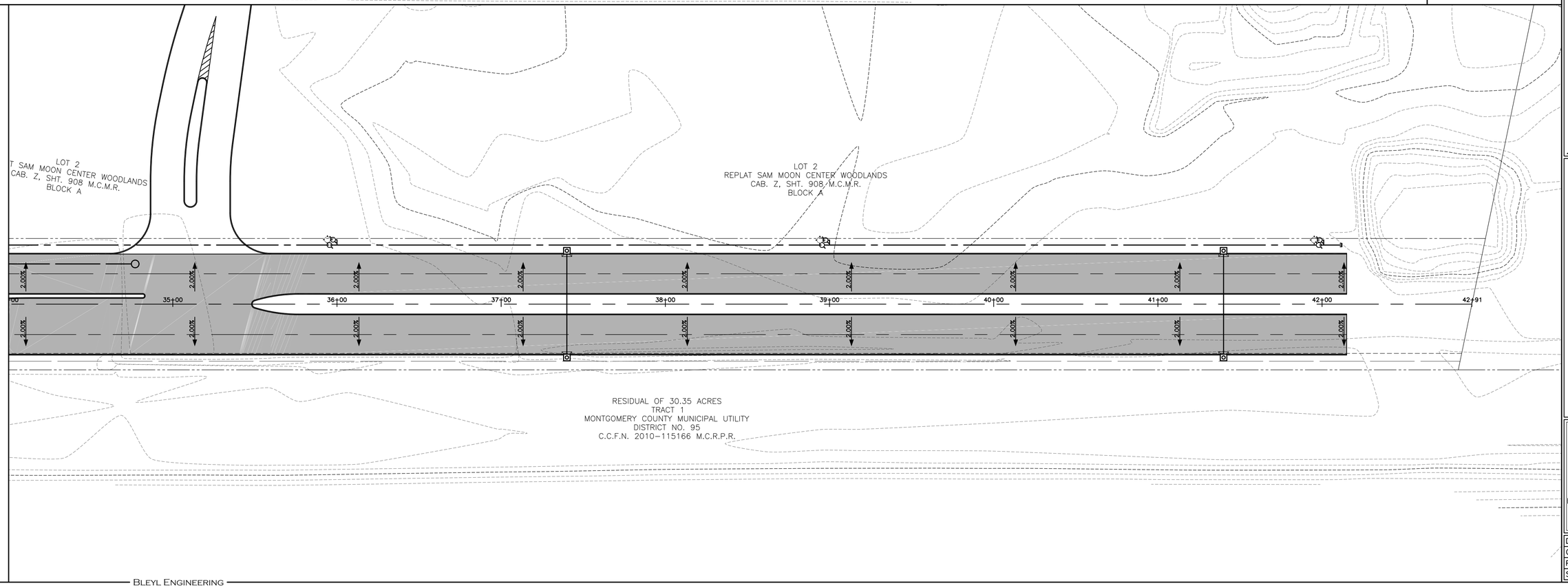

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GRADING PLAN

DAVID MEMORIAL EXTENSION PHASE II

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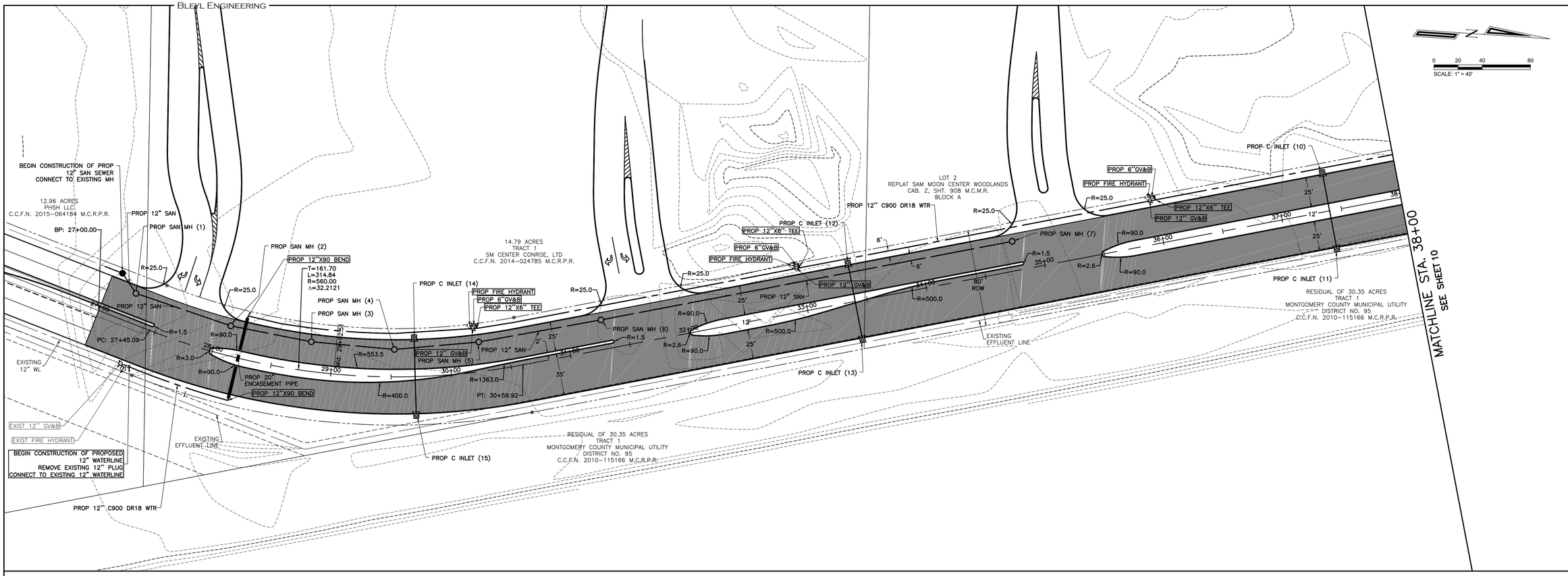

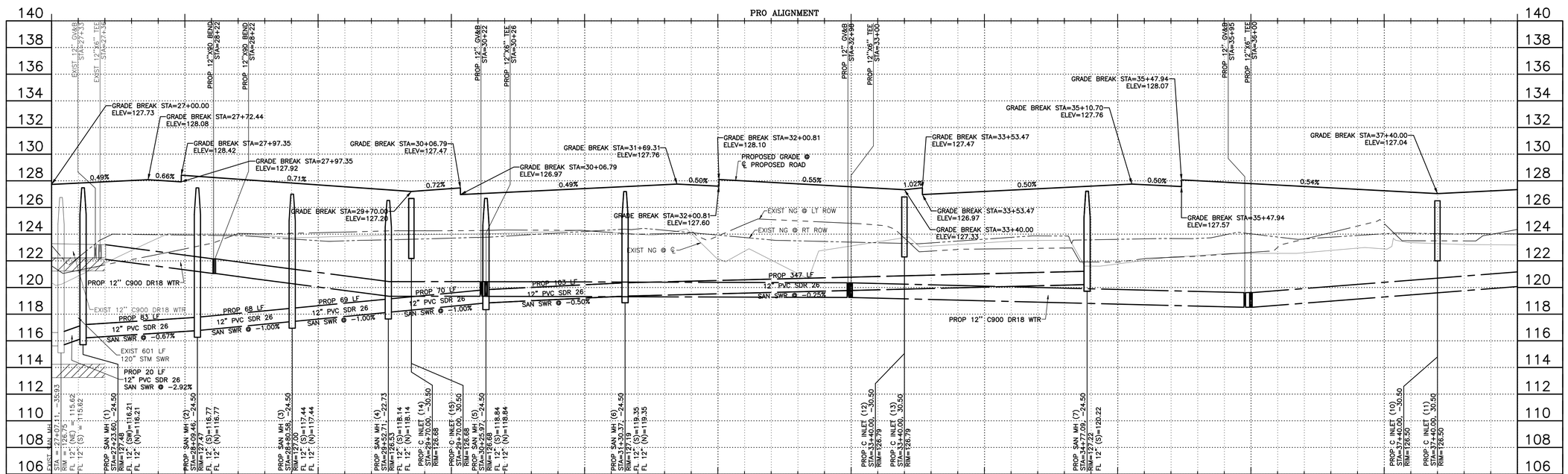

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6/1/2017 4:11:50 PM

REV	DATE	BY	APP	COMMENT

PREPARED FOR:
CITY OF SHENANDOAH
2995 I-45 NORTH
SHENANDOAH, TX. 77381
(281) 298-5522

BLEYL CONROE OFFICE
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AUSTIN BRYAN

PLAN AND PROFILE STA 27+00 TO STA 38+00
DAVID MEMORIAL EXTENSION PHASE II

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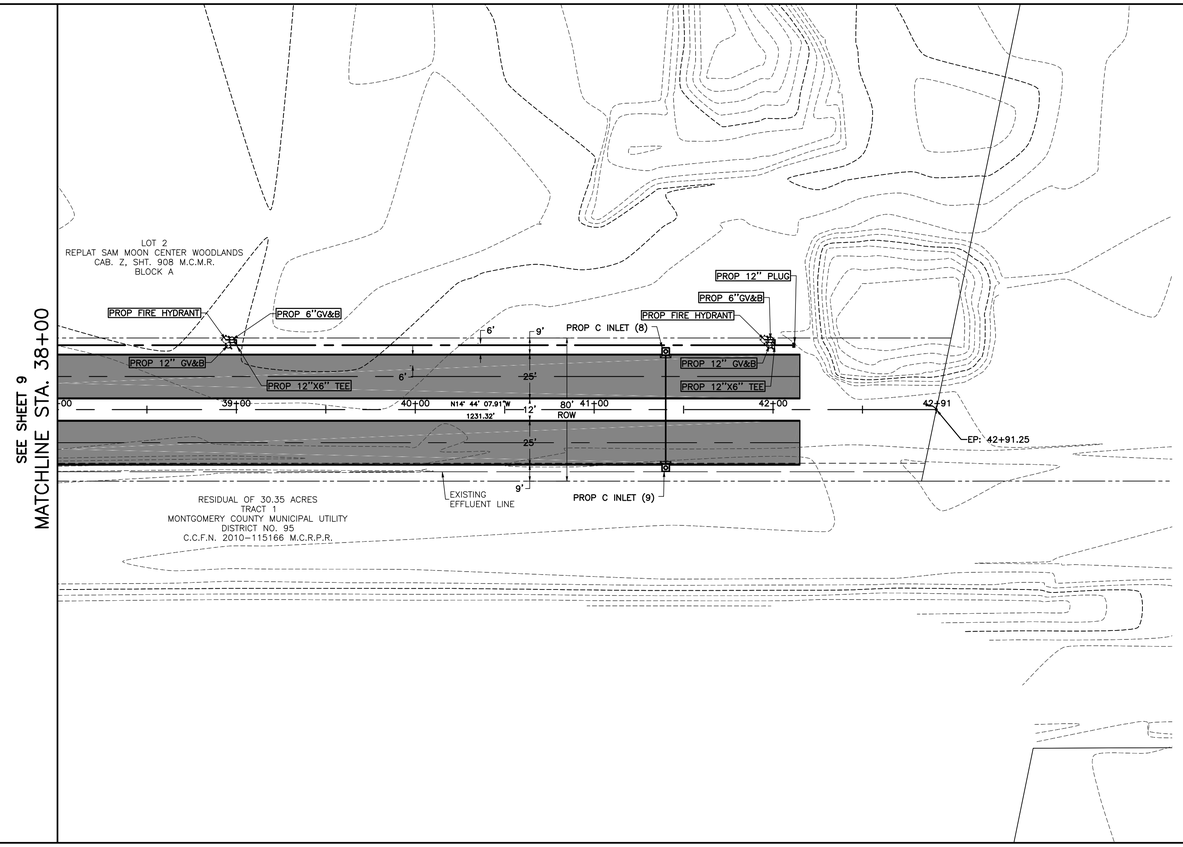
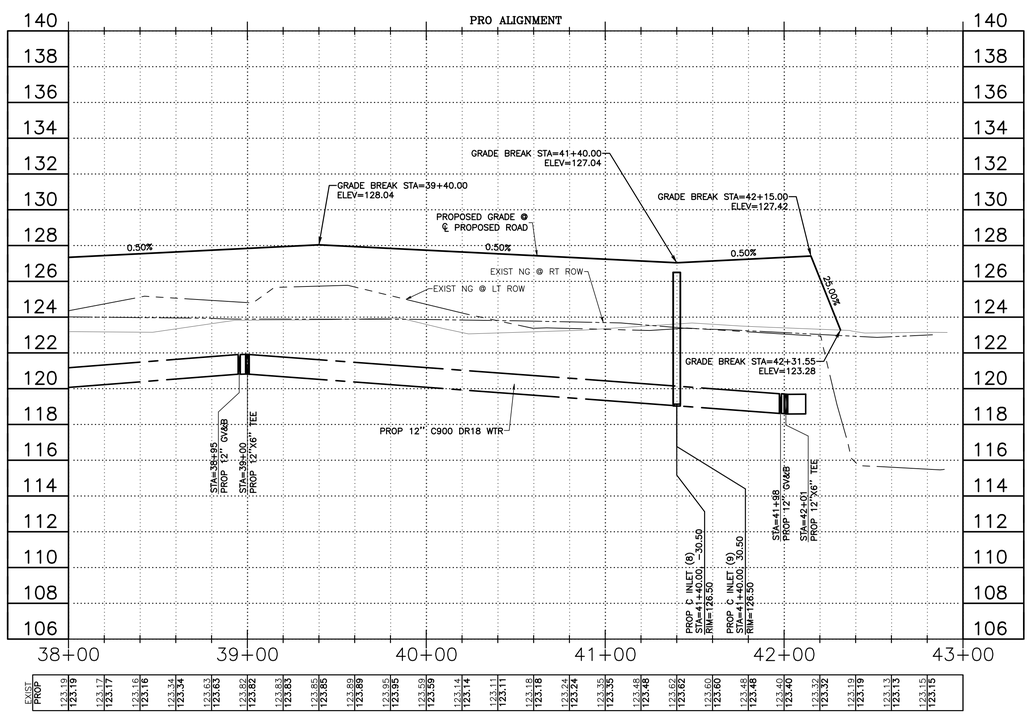
DESIGN: JONNY GREEN	
CAD: WSW	REV: JG
PROJECT NO: 11991	
SHEET: 9	OF:





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PLAN AND PROFILE
STA 38+00 TO STA 42+31.55
DAVID MEMORIAL EXTENSION
PHASE II

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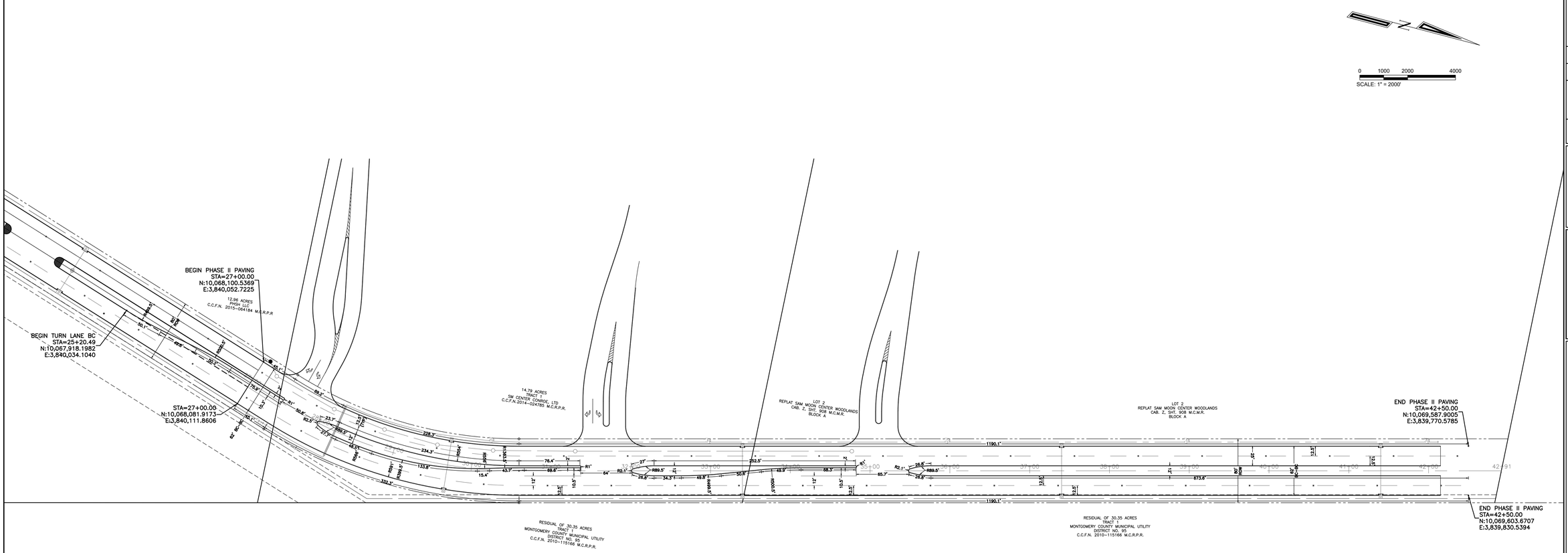

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DIMENSION PLAN

DAVID MEMORIAL EXTENSION PHASE II

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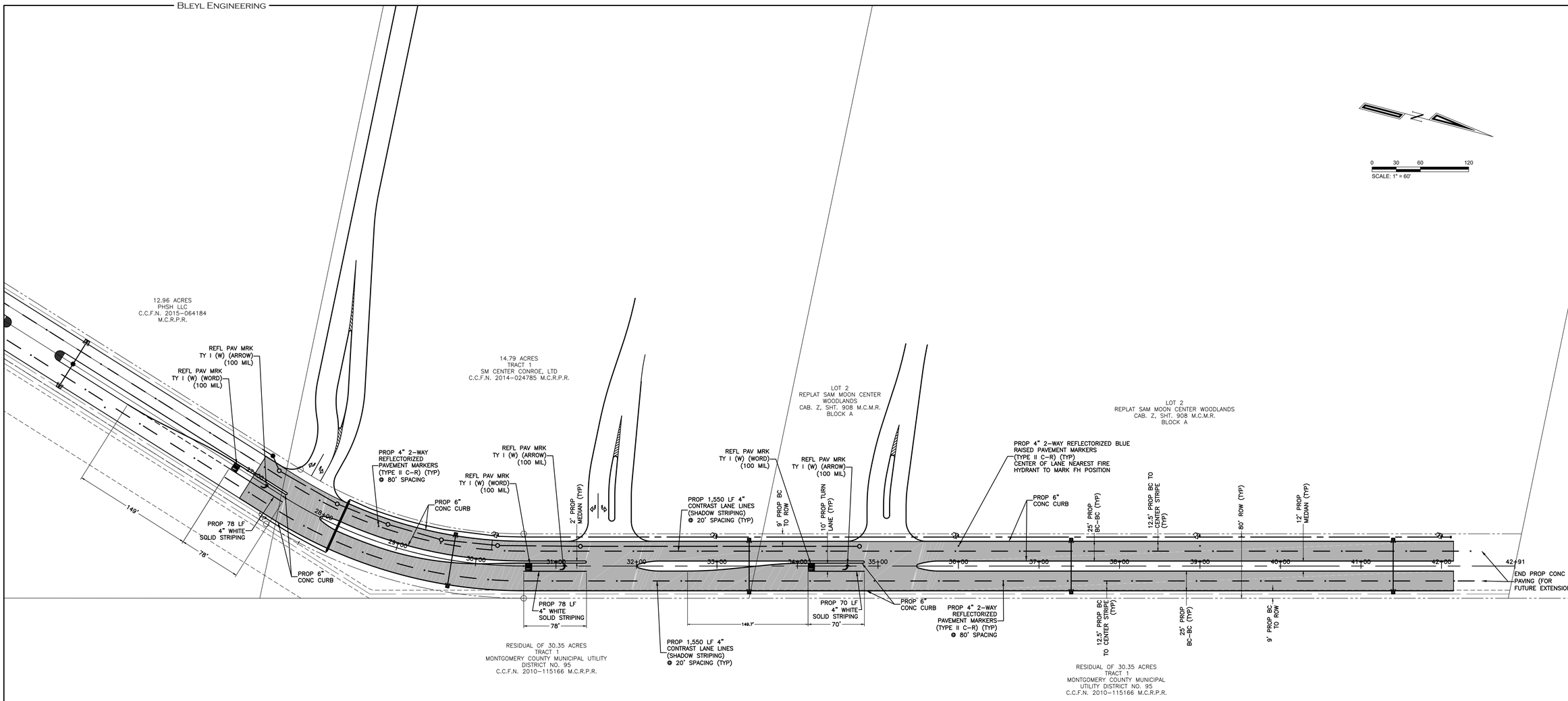

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PROPOSED STRIPING PLAN

DAVID MEMORIAL EXTENSION PHASE II

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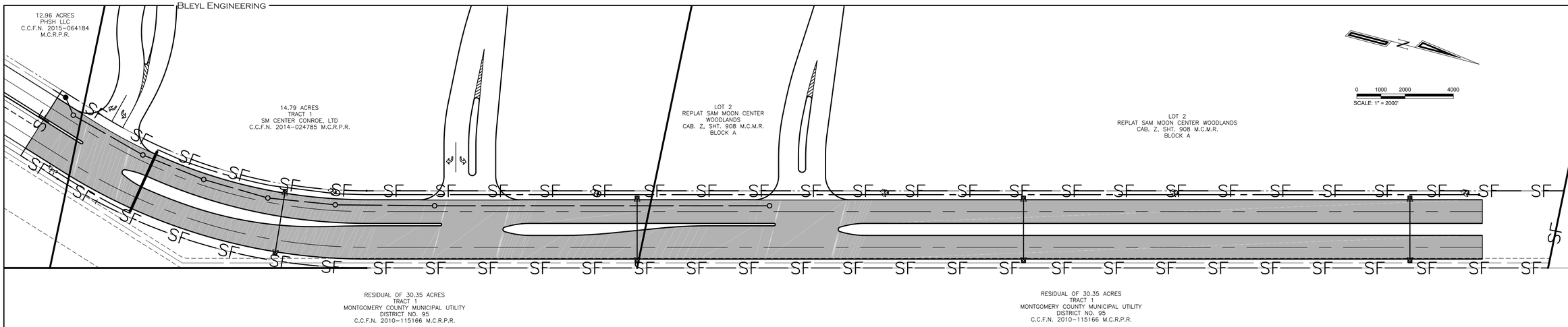
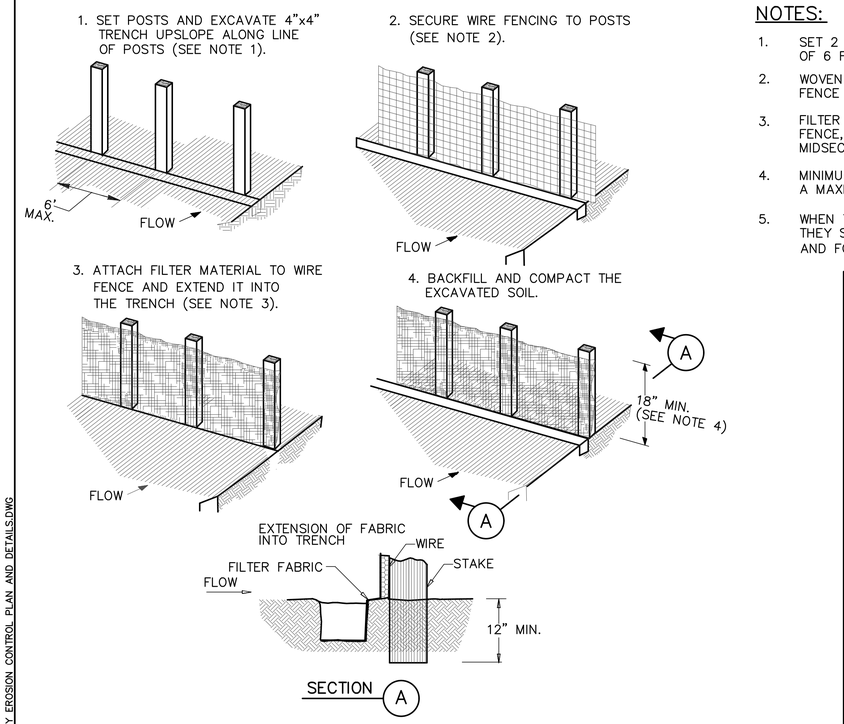
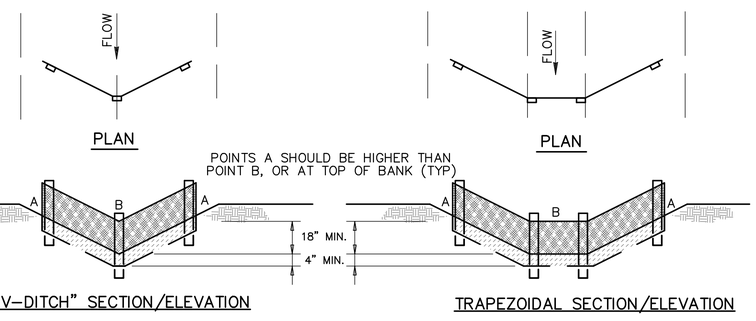




NOTES:

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

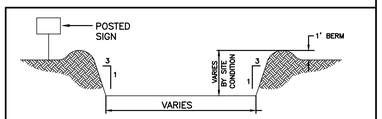


"V-DITCH" SECTION/ELEVATION

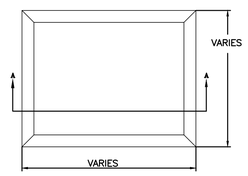
TRAPEZOIDAL SECTION/ELEVATION

REINFORCED FILTER FABRIC BARRIER —X— (RFB) —X—

SYMBOL



SECTION A–A
N.T.S.



PLAN VIEW
N.T.S.

GENERAL NOTES:

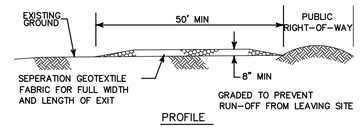
1. POST A SIGN READING "CONCRETE WASH OUT PIT" NEXT TO THE PIT.
2. VERBALLY INSTRUCT THE CONCRETE TRUCK DRIVERS WHERE THE PIT IS AND TO WASH OUT THEIR TRUCKS IN THE PIT AND NO WHERE ELSE.
3. UNPON THE CONCRETE SETTING UP (CURING, DRYING OUT), THE CONCRETE WASTE SHALL BE REMOVED FROM THE PROJECT SITE AND DISPOSED OF PROPERLY BY THE CONTRACTOR. AFTER REMOVAL OF THE CONCRETE WASTE, THE WASH OUT PIT SHALL BE FILLED WITH CLEAN FILL MATERIAL AND COMPACTED TO IN-SITU CONDITIONS, OR AS DIRECTED BY THE PROJECT SPECIFICATIONS.
4. CONCRETE WASH OUT PITS SHALL NOT BE LOCATED DIRECTLY ADJACENT TO, NOR AT ANY TIME DRAIN INTO THE STORM SEWER SYSTEM OR ANY OTHER SWALE, DITCH, OR WATERWAY.
5. CONSTRUCT ENTRY ROAD AND BOTTOM OF WASHOUT AREA TO SUPPORT EXPECTED LOADINGS FROM TRUCKS EQUIPMENT.

CONCRETE WASH OUT DETAIL

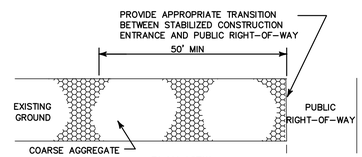
(NTS)

CTW

SYMBOL



PROFILE



PLAN VIEW

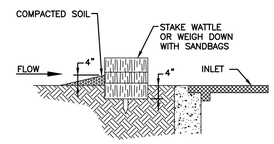
CONSTRUCTION NOTES:

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

STABILIZED CONSTRUCTION EXIT

SCE

SYMBOL



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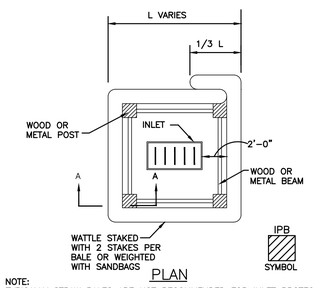


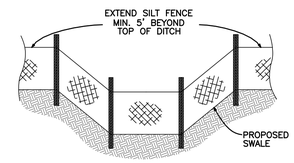
PLAN

IPB

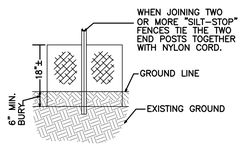
SYMBOL

NOTE:
TYPICALLY STRAW BALES ARE NOT RECOMMENDED FOR INLET PROTECTION BARRIERS.

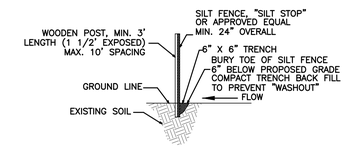
INLET PROTECTION BARRIERS FOR STAGE I INLETS



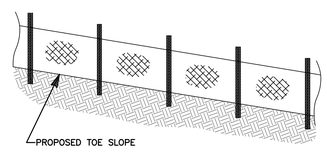
VIEW AT DITCH



FRONT VIEW



SIDE VIEW



SILT FENCE DETAILS

SCALE: NONE

SYMBOL

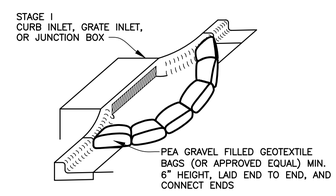
SF

SILT FENCING NOTES:

1. POST TO BE AT 3 ft. MAXIMUM SPACING. IF FACTORY PRE-ASSEMBLED FENCE WITH SUPPORT NETTING IS USED, SPACING OF POST MAY BE INCREASED TO 8 ft. MAXIMUM.
2. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHOULD BE OVERLAPPED 6 INCHES AT THE POSTS AND FOLDED.

EROSION CONTROL NOTES

1. CONTRACTOR SHALL IMPLEMENT INLET PROTECTION DEVICES AND REINFORCED FILTER FABRIC BARRIER ALONG DRIVE AND SIDE DITCHES AT LOCATIONS SHOWN ON THE TEMPORARY EROSION CONTROL PLAN TO KEEP SILT AND OR EXCAVATED MATERIALS FROM ENTERING INTO THE STORM WATER INLETS AND DITCHES EVENTUALLY POLLUTING THE RECEIVING STORM.
2. DURING THE EXCAVATION PHASE OF THE PROJECT, CONTRACTOR SHALL SCHEDULE THE WORK IN SHORT SEGMENTS SO THAT EXCAVATION MATERIAL CAN BE QUICKLY HAULED AWAY FROM THE SITE AND TO PREVENT IT FROM STAYING UNCOLLECTED ON THE EXISTING PAVEMENT. ANY LOOSE EXCAVATED MATERIAL WHICH FALLS ON PAVEMENTS OR DRIVEWAYS SHALL BE SWEPT BACK INTO THE EXCAVATED AREA.
3. CONTRACTOR SHALL CLEAN UP THE EXISTING STREET INTERSECTIONS AND DRIVEWAYS DAILY, AS NECESSARY, TO REMOVE ANY EXCESS MUD, SILT OR ROCK TRACKED FROM THE EXCAVATED AREA.
4. CONTRACTOR SHALL FOLLOW GOOD HOUSEKEEPING PRACTICES DURING THE CONSTRUCTION OF THE PROJECT, ALWAYS CLEANING UP DIRT AND LOOSE MATERIAL AS CONSTRUCTION PROGRESSES.
5. CONTRACTOR TO INSPECT AND MAINTAIN THE AREAS LISTED BELOW AT LEAST ONCE EVERY FOURTEEN (14) CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM EVENT OF 0.5 INCHES OR GREATER.
   - DISTURBED AREAS OF THE CONSTRUCTION SITE THAT HAVE NOT BEEN FINALLY STABILIZED.
   - AREAS USED FOR STORAGE OF MATERIALS THAT ARE EXPOSED TO PRECIPITATION.
   - STRUCTURAL CONTROL MEASURES.
   - LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE.
6. CONTRACTOR TO BE RESPONSIBLE TO MAINTAIN EXISTING DITCHES AND OR CULVERTS FOR UNOBSTRUCTED DRAINAGE AT ALL TIMES. WHERE SODDING IS DISTURBED BY EXCAVATION ON BACKFILLING OPERATIONS, SUCH AREAS SHALL BE REPLACED BY SEEDING OR SODDING. SLOPES 4:1 OR STEEPER SHALL BE REPLACED BY BLOCK SODDING.
7. THE SITE SUPERINTENDENT, OR HIS REPRESENTATIVE, SHALL MAKE A VISUAL INSPECTION OF ALL SILTATION CONTROLS AND NEWLY STABILIZED AREAS ON A DAILY BASIS, ESPECIALLY AFTER A RAINFALL TO INSURE THAT ALL CONTROLS ARE MAINTAINED AND PROPERLY FUNCTIONING. ANY DAMAGED CONTROLS SHALL BE REPAIRED PRIOR TO THE END OF THE WORK DAY, INCLUDING RE-SEEDING AND MULCHING OR RE-SODDING IF NECESSARY. ALL INSPECTIONS SHALL BE DOCUMENTED WITH A WRITTEN REPORT WITHIN 24 HOURS, WHICH MUST DETAIL ANY REPAIRS DEEMED NECESSARY. SUCH REPAIRS SHALL BE INITIATED WITHIN 24 HOURS OF THE REPORT.
8. ALL SEDIMENT TRAPPING DEVICES SHALL BE INSTALLED AS SOON AS PRACTICAL AFTER THE AREA HAS BEEN DISTURBED. ALL SEDIMENT TRAPPING DEVICES SHALL BE CLEANED WHEN THE SEDIMENT LEVEL REACHES 25' CAPACITY. SEDIMENT SHALL BE DISPOSED OF BY SPREADING ON SITE OR HAULING AWAY IF NOT SUITABLE FOR FILL.
9. SEDIMENT FENCE, HAY BALE BARRIERS, OR OTHER SEDIMENT TRAPPING DEVICES SHALL CONTROL ALL STORM WATER LEAVING THE WORK AREA. ALL FILL OR CUT AREAS SHALL BE HYDRO-MULCHED OR SODDED AS PER THE ENGINEERS' PLANS UPON COMPLETION OR WITHIN 14 DAYS OF SOIL DISTURBING ACTIVITIES.
10. THE CONTRACTOR SHALL SEED ALL AREAS WHEN SOIL-DISTURBING ACTIVITIES CEASED FOR A PERIOD OF MORE THAN 14 DAYS.
11. SILTATION CONTROL (AS SHOWN ON THE DETAIL SHEETS) WILL BE PROVIDED AT ALL STORM DRAIN INLETS ONCE THEY ARE ABLE TO CONVEY WATER. THE SILTATION CONTROL WILL BE REMOVED ONCE TURF IS ESTABLISHED.
12. CONTRACTOR SHALL HYDROMULCH SEED ALL DISTURBED AREAS. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING SEEDING TILL 75% GERMINATION IS ESTABLISHED.
13. THE CONTRACTOR IS RESPONSIBLE FOR FILING A NOTICE OF INTENT A MINIMUM OF 48 HOURS PRIOR TO COMMENCING CONSTRUCTION.
14. THE CONTRACTOR IS RESPONSIBLE FOR FILING A NOTICE OF TERMINATION AT THE COMPLETION OF THE PROJECT.



STORM DRAIN SYSTEM SILTATION CONTROL DETAIL

(NTS)

SYMBOL

IPB

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TEMPORARY EROSION CONTROL PLAN AND DETAILS

DAVID MEMORIAL EXTENSION PHASE II

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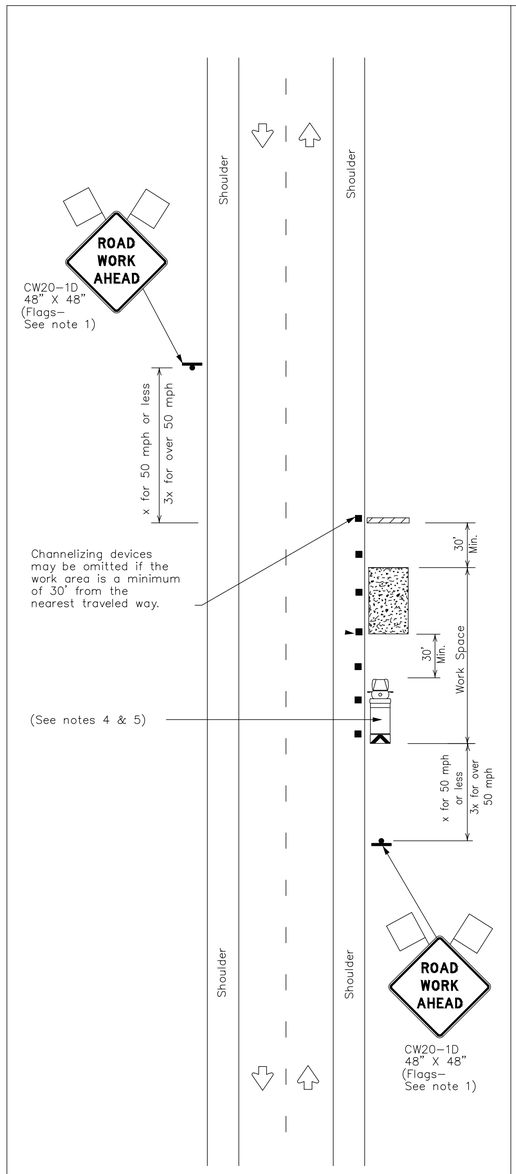
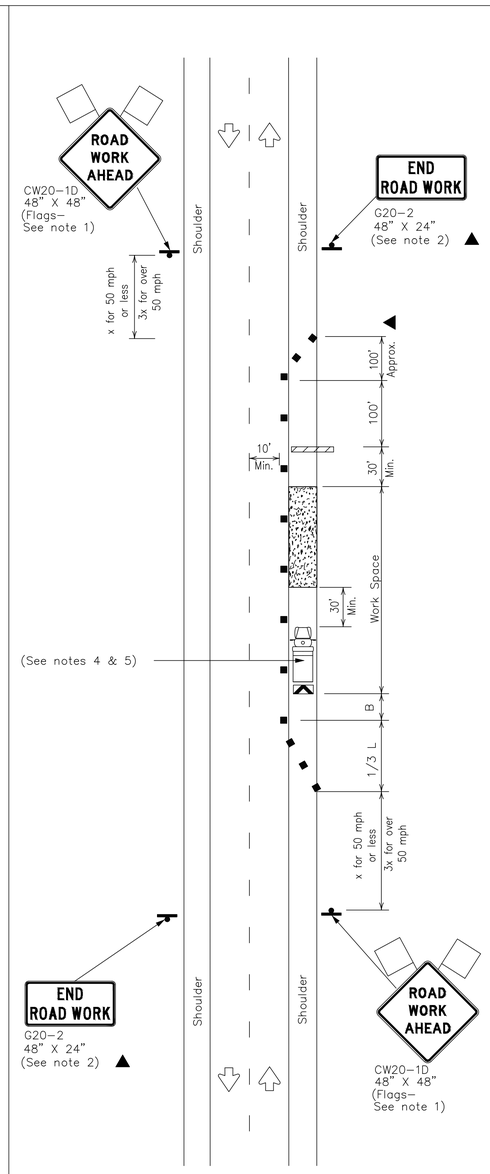


TCP (2-1a)

WORK SPACE NEAR SHOULDER

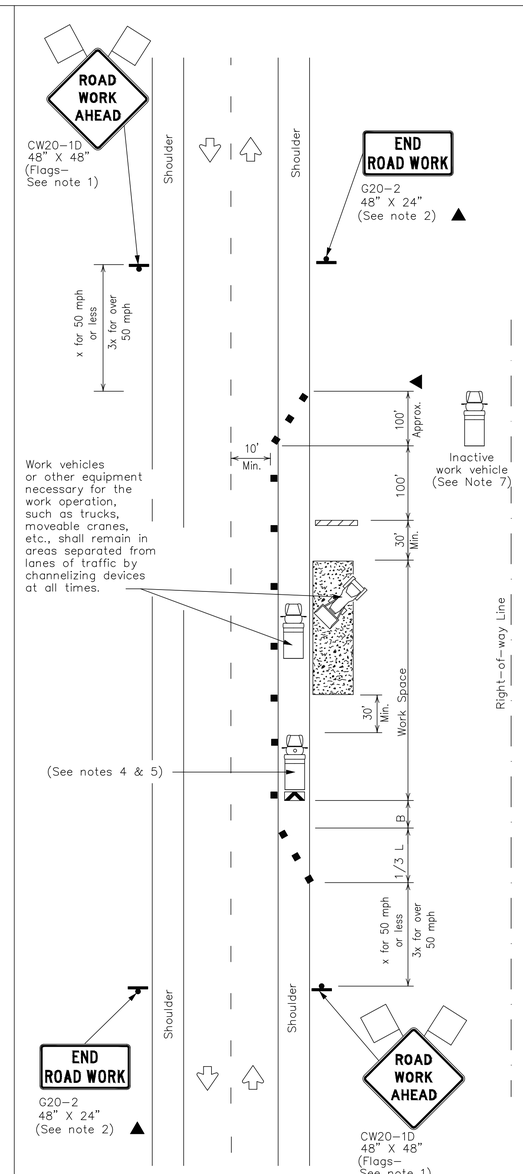
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER

Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER

Conventional Roads

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW21-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for Item 502, Barricades, Signs and Traffic Handling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-12

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
DIST		COUNTY	SHEET NO.
		MONTGOMERY	

REVISIONS
2-94 2-12
8-95
1-97
4-98

161

REV	DATE	BY	APP	COMMENT

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TEXAS FIRM REGISTRATION NO. 678
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AUSTIN BRYAN CONROE HOUSTON SAN ANGELO

TRAFFIC CONTROL PLAN

DAVID MEMORIAL EXTENSION
PHASE II

THIS SET OF PLANS WAS PREPARED UNDER THE DIRECTION OF JONNY GREEN, P.E., SEAL No.120300 ON JUNE 01, 2017. THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW ONLY AND NOT TO BE USED FOR CONSTRUCTION.

DESIGN: JONNY GREEN	
CAD: WSW	REV: JG
PROJECT NO: 11991	
SHEET: 14	OF:

DATE:
FILE:

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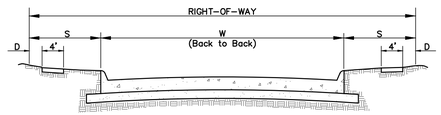


NOTE: THIS DESIGN SHOWS THE PRESENCE OF TYPICAL CURB AND DOES NOT IMPLY OR RECOMMEND DRAINAGE DESIGN.

UNDIVIDED ROADWAY DIMENSIONS (in feet)

ABUTTING LAND USE	SINGLE FAMILY			ALL OTHER	
	STANDARD LOT (1)		HIGH DENSITY LOT (2)	APT./ COMM. (3)	MAJOR * (4)
R.O.W.	50	60	60	70	80
W	29	29	39	49	49
S	10.5	15.5	10.5	10.5	15.5
D	2	2	2	2	2

(1) STANDARD LOT: Lot width 50 feet or greater along street Right-of-Way line.

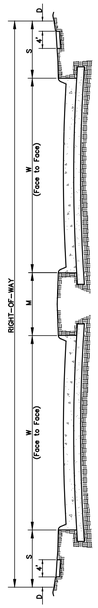
(2) HIGH DENSITY LOT: Lot widths less than 50 feet along street Right-of-Way line, except minor streets.

(3) APT./COMM.: Any property use other than single family shall fall under this designation.

(4) MAJOR: Any roadway within City of Shenandoah designated by the master plan.

* IF REQUESTED BY THE CITY ENGINEER A DIVIDED ROADWAY MAY BE REQUIRED; INSUCH CASES THE DIVIDED CROSS SECTION SHALL BE IN ACCORDANCE WITH PAVING DETAILS, DWG. NO. 2.

CITY OF SHENANDOAH TEXAS | UNDIVIDED ROADWAY CROSS SECTION | PAVING | DWG. NO. 1



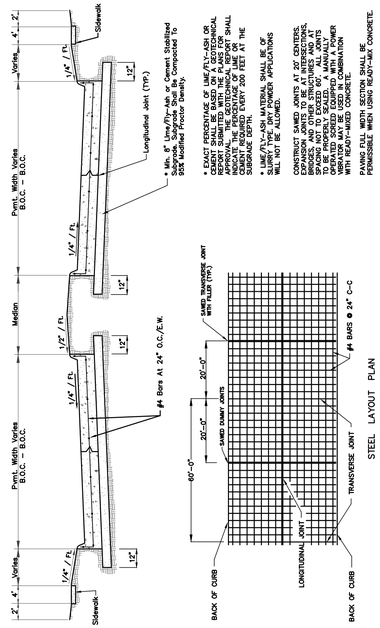
NOTE: THIS DESIGN SHOWS THE PRESENCE OF TYPICAL CURB AND DOES NOT IMPLY OR RECOMMEND DRAINAGE DESIGN.

DIVIDED ROADWAY DIMENSIONS (in feet)

R.O.W.	80	90	100
W	24	24	24
M	12	22	32
S	10	10	10
D	2	2	2

ANY RIGHT-OF-WAY DIMENSIONS DIFFERENT FROM THOSE SHOWN SHALL REQUIRE SPECIAL GEOMETRIC DESIGN.

CITY OF SHENANDOAH TEXAS | DIVIDED ROADWAY CROSS SECTION | PAVING | DWG. NO. 2



* EXACT PERCENTAGE OF LIME (TY.-ASH OR CEMENT SHALL BE BASED ON A GEOTECHNICAL REPORT SUBMITTED TO THE CITY FOR APPROVAL. THE GEOTECHNICAL REPORT SHALL INDICATE THE PERCENTAGE OF LIME OR CEMENT REQUIRED EVERY 200 FEET AT THE SUBGRADE DEPTH.

* LIME (TY.-ASH MATERIAL SHALL BE OF SLURRY TYPE. DRY POWDER APPLICATIONS WILL NOT BE ALLOWED.

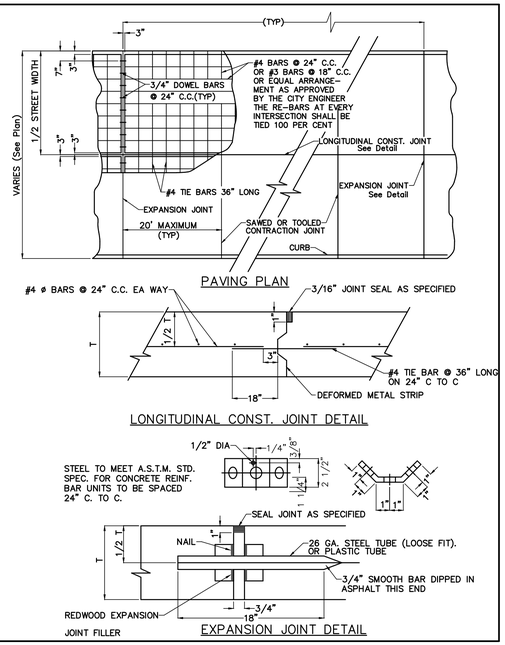
CONSTRUCT SAWED JOINTS AT 20' CENTERS. EXPANSION JOINTS AT 20' CENTERS ON BRIDGES AND OTHER STRUCTURES AND AT CONNECTIONS TO EXISTING PAVEMENT. JOINTS TO BE PROPERLY SEALED. A MANUALLY OPERATED, HIGH FREQUENCY, HIGH POWER VIBRATOR MAY BE USED IN COMBINATION WITH HAND FINISHING.

PAVING SLURRY MIXED CONCRETE SHALL BE PERMISSIBLE WHEN USING READY-MIX CONCRETE.

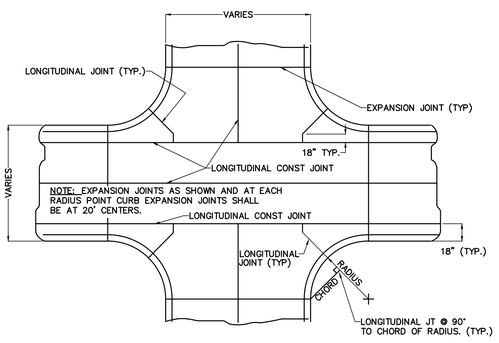
NOTES:

1. Pavement and Base Material thickness to be in accordance with the City of Shenandoah Subdivision Design Standards manual.
2. Street width shall conform to City of Shenandoah Subdivision Design Standards Manual.
3. Expansion joint to be at bridges, intersections, and other structures, and at spacing not to exceed 60 feet with sawed joints every 20 feet between expansion joints. All joints to be properly sealed.

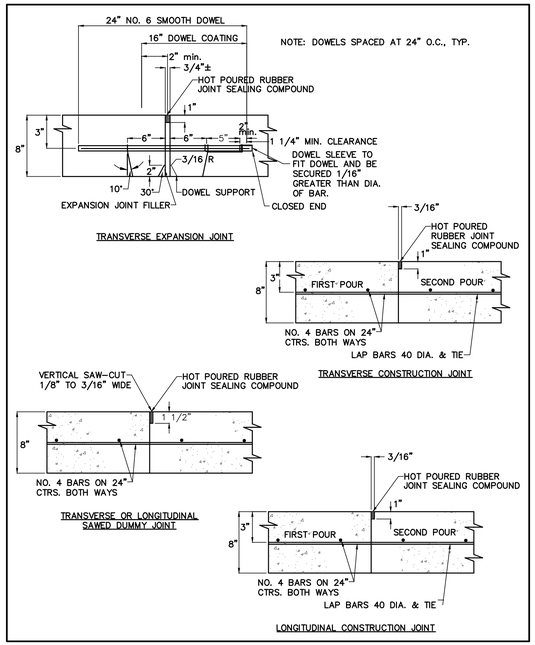
CITY OF SHENANDOAH TEXAS | DIVIDED ROADWAY TYPICAL SECTION | PAVING | DWG. NO. 3



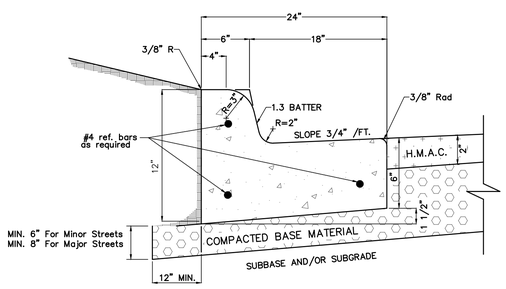
CITY OF SHENANDOAH TEXAS | CONCRETE PAVEMENT | PAVING | DWG. NO. 6



CITY OF SHENANDOAH TEXAS | CONCRETE INTERSECTION | PAVING | DWG. NO. 7



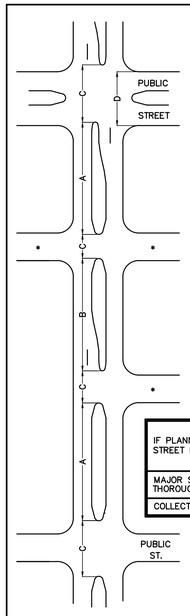
CITY OF SHENANDOAH TEXAS | TRANSVERSE & LONGITUDINAL CONSTRUCTION JOINTS | PAVING | DWG. NO. 8



NOTES:

1. All honeycombing shall be grouted to provide a uniform surface.
2. When honeycombing is excessive as determined by the Inspector, curb and gutter shall be replaced.
3. Backfill behind curbs shall be accomplished within 7 days.
4. Curb and gutter concrete shall be Class "A" (3000 psi).
5. Reinforcing steel as shown.
6. Expansion joints at a maximum length of 60 feet.
7. Sawed contraction joints every 20 feet between expansion joints.
8. All joints are to be properly sealed.

CITY OF SHENANDOAH TEXAS | STANDARD CURB AND GUTTER | PAVING | DWG. NO. 9



NOTES:
(1) Left turn Bay.
(2) Distance From Center Line Of Opening To Median Nose with Left Turn Lane Must Be 30'.
(3) See Roadway And Median Tapers.
(4) Opening May Be Allowed, Contact The City of Shenandoah, Enginnering Dept.

TYPICAL LENGTH OF MEDIAN OPENING "C"

MEDIAN INTERRUPTION	NO LTB (1)	1 LTB (1)	2 LTB (1)
PRIVATE DRIVE	45'	52.5 (2)	60'
UNDIVIDED STREET ≤40' 44'	45' 50'	52.5 (2) 55' (2)	60' 60'
DIVIDED STREET ALL	D + 10'	D + 10'	D + 10'

MINIMUM ACCEPTABLE MEDIAN LEGTH FOR TYPE OF STREET

IF PLANNED DIVIDED STREET IS:	PURPOSE OF MEDIAN INTERRUPTION			
	MAJOR STREET/ THOROUGHFARE (A)	COLLECTOR STREET (A)	LOCAL STREET (A)	PRIVATE STREET OR DRIVEWAY (B)
MAJOR STREET/ THOROUGHFARE	350'	300'	300' (4)	(4)
COLLECTOR STREET	300'	250'	250'	250'

CITY OF SHENANDOAH TEXAS | TYPICAL LENGTH OF MEDIAN AND MEDIAN OPENINGS | PAVING | DWG. NO. 12

REV	DATE	BY	APP	COMMENT

PREPARED FOR:
CITY OF SHENANDOAH
2906 I-45 NORTH
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PAVING DETAILS 1 OF 2

DAVID MEMORIAL EXTENSION PHASE II

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DESIGN: JONNY GREEN
CAD: WSW REV: JG
PROJECT NO: 11991
SHEET: 15 OF:

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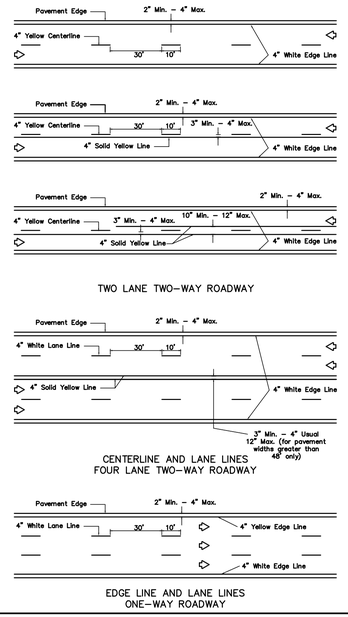
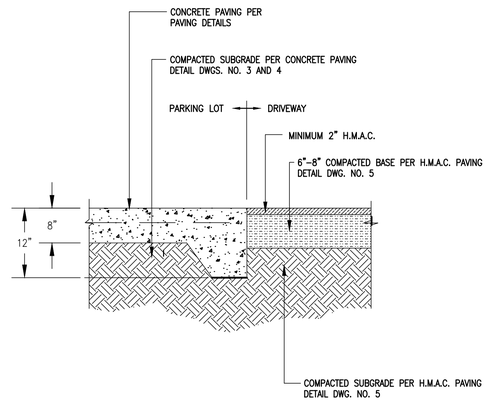
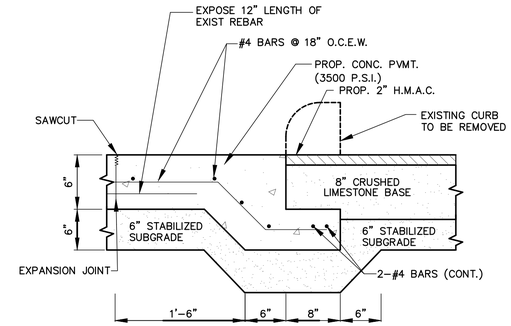


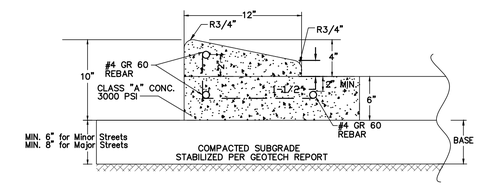
CITY OF SHENANDOAH TEXAS	TYPICAL STANDARD PAVEMENT MARKINGS	PAVING DWG. NO. 25



CITY OF SHENANDOAH TEXAS	TYPICAL CROSS SECTION ASPHALT TRANSITION DETAIL	PAVING DWG. NO. 27



CITY OF SHENANDOAH TEXAS	TYPICAL CROSS SECTION CONCRETE HEADER WITH UNDERCUT DETAIL	PAVING DWG. NO. 28

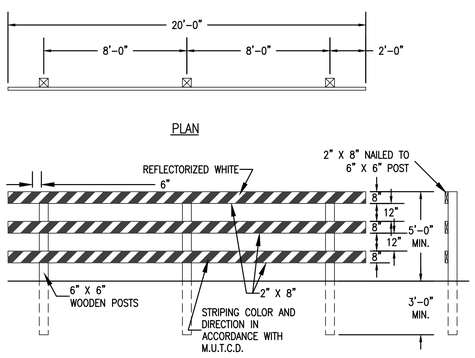


ROLL OVER CURB
SCALE : NONE

CURB NOTES:

1. ALL HONEYCOMBING SHALL BE GROUTED TO PROVIDE A UNIFORM SURFACE.
2. WHEN HONEYCOMBING IS EXCESSIVE AS DETERMINED BY THE INSPECTOR, CURB AND GUTTER SHALL BE REPLACED.
3. BACKFILL BEHIND CURBS SHALL BE ACCOMPLISHED WITHIN 7 DAYS.
4. CURB AND GUTTER CONCRETE SHALL BE CLASS "A" (3000 PSI)
5. REINFORCING STEEL AS SHOWN IN DETAIL.
6. EXPANSION JOINTS AT A MAXIMUM LENGTH OF 60 FEET.
7. SAWED CONTRACTION JOINTS EVERY 20 FEET BETWEEN EXPANSION JOINTS.
8. ALL JOINTS ARE TO BE PROPERLY SEALED.

CITY OF SHENANDOAH TEXAS	TYPICAL CROSS SECTION ROLL OVER CURB	PAVING DWG. NO. 29



BARRICADES & WARNING DEVICES, INCLUDING TYPE III BARRICADES

MATERIALS. ALL BARRICADES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF PART VI – TRAFFIC CONTROLS FOR STREET AND HIGHWAY CONSTRUCTION AND MAINTENANCE OPERATIONS OF THE LATEST MANUAL ON UNIFORM TRAFFIC CONTROL FOR STREETS AND HIGHWAYS: U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION. DETAILED DRAWINGS OF THE STANDARD SIGNS ILLUSTRATED IN THAT MANUAL ARE AVAILABLE FROM THE FEDERAL HIGHWAY ADMINISTRATION, WASHINGTON, D.C. 20591.

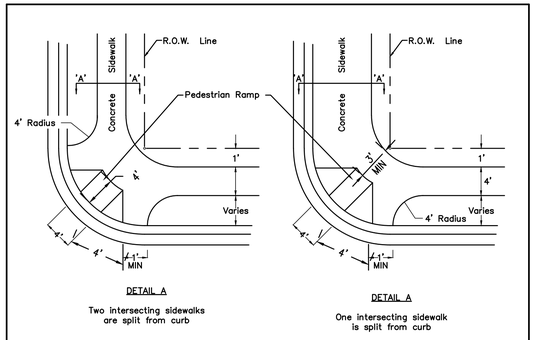
MARKINGS FOR TYPE III BARRICADE RAILS SHALL BE ALTERNATE RED AND WHITE (SLOPING DOWNWARD AT AN ANGLE OF 45 DEGREES IN THE DIRECTION TRAFFIC IS TO PASS). WHERE THE BARRICADE IS NOT COVERED WITH MARKINGS, IT SHALL BE PAINTED WHITE.

WHERE A TYPE III BARRICADE EXTENDS ENTIRELY ACROSS A ROADWAY, THE STRIPES SHALL SLOPE DOWNWARD IN THE DIRECTION TOWARD WHICH TRAFFIC MUST TURN IN DETOURING. WHERE BOTH RIGHT AND LEFT TURNS ARE PROVIDED FOR, THE CHEVRON STRIPING SHALL SLOPE DOWNWARD IN BOTH DIRECTIONS FROM THE CENTER OF THE BARRICADE.

THE ENTIRE AREA OF WHITE AND RED STRIPES SHALL BE REFLECTORIZED SO AS TO BE VISIBLE UNDER NORMAL ATMOSPHERIC CONDITIONS FROM A MINIMUM DISTANCE OF 1,000 FEET WHEN ILLUMINATED BY THE LOW BEAMS OF STANDARD AUTOMOBILE HEADLIGHTS. THE PREDOMINANT COLOR FOR OTHER BARRICADE COMPONENTS SHALL BE WHITE.

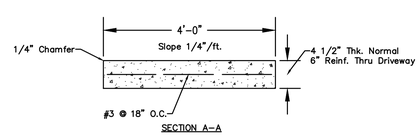
TYPE III BARRICADE (FIXED)

NTS

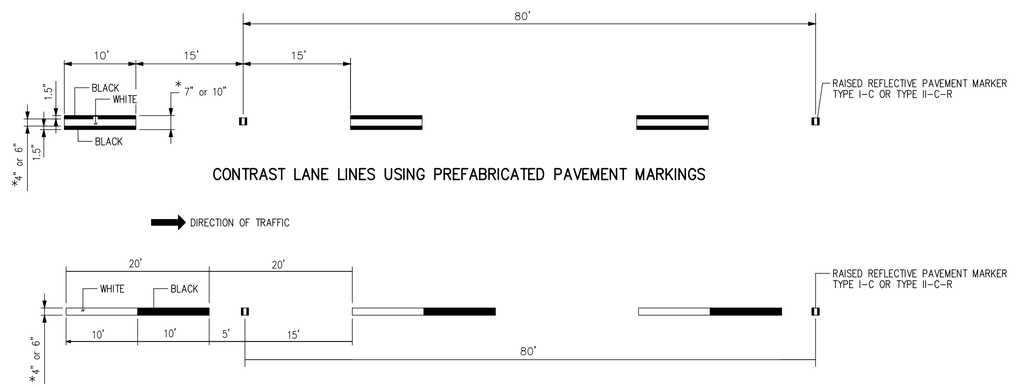


NOTES:

1. For sidewalk details see Standard Drawing.
2. Back of sidewalk radius to be reduced in order to avoid encroachment on private property in those instances where the property lines are extended.
3. Maximum slope of ramp shall be 12.5%
4. Ramps shall not conflict with curb inlets.
5. Ramps shall be rough broom finished transverse to slope.



CITY OF SHENANDOAH TEXAS	SIDEWALK AND PEDESTRIAN RAMP DETAILS	PAVING DWG. NO. P-21



* AS SHOWN ON THE PLANS.

Texas Department of Transportation
Houston District

PAVEMENT MARKINGS
(CONTRAST LANE LINES)

PM(CLL)–14

FILE	DN:	CK:	DW:	CK:
©TxDOT 2003	DIST	FED RES	PROJECT NO.	SHEET
	HOU	6		
	COUNTY		CONTROL	SECT	JOB	HIGHWAY

STD N-30

REV	DATE	BY	APP	COMMENT

PREPARED FOR:
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PAVING DETAILS 2 OF 2

DAVID MEMORIAL EXTENSION PHASE II

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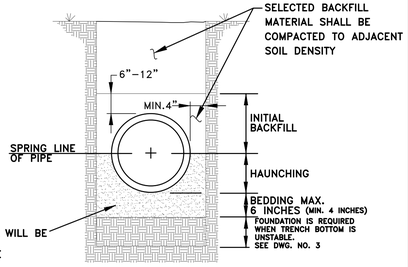


BEDDING DETAIL

NOTE: BACKFILL AND BEDDING MUST MEET ALL MINIMUM ASPECTS OF ASTM D–2321

Foundation
A foundation is required when the trench bottom is unstable. Any foundation that will support a rigid pipe without causing loss of grade or flexural breaking will be more than adequate for PVC pipes.

Bedding
The bedding directly underneath the pipe is required only to bring the trench bottom up to grade. It should not be so thick or soft that the pipe will settle and lose grade. The purpose of the bedding is to provide a firm, stable and uniform support of the pipe. A layer of material sufficient to establish line, grade, and support should be placed. Bell holes should be excavated to insure uniform bearing.

Haunching
The haunching area is the most important in terms of limiting the deflection of a flexible pipe. This is the area that should be compacted to the required or specified density.

ASTM D–2321
DESCRIPTION OF EMBEDMENT MATERIALS

Class I
Angular, 1/4" to 1–1/2" graded stone, including a number of fill materials that have regional significance, such as coral, slag, cinders, crushed stone and crushed shells.

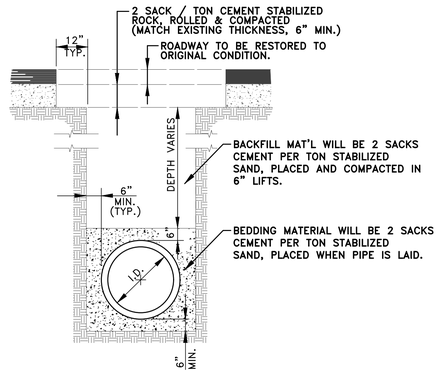
Class II
Coarse sands and gravels with maximum particle size of 1–1/2", including variously graded sands, and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil types GW, GP, SW, and SP are included in this class.

Class III
Fine sand and clayey gravels, including fine sands and sand–clay mixtures, and gravel clay mixtures. Soil types GM, GC, SM and SC are included in this class.

Class IV
Silt, silty clays, and clays, including inorganic clays and silts of medium to high plasticity and liquid limits. Soil types MH, ML, CH, and CL are included in this class.

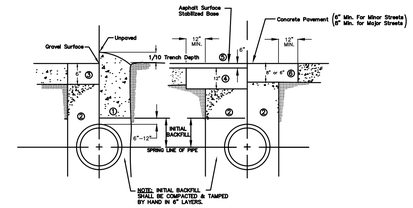
Class V
This class includes the organic soils OL, OH, and PT as well as soils containing frozen earth, debris, rocks larger than 1–1/2" in diameter, and other foreign materials. These materials are not recommended for bedding, haunching, or initial backfill.

CITY OF SHENANDOAH TEXAS	TYPICAL SANITARY SEWER BEDDING AND TRENCH DETAIL	SEWER DWG. NO. 1



NOTE: BACKFILL AND BEDDING MUST MEET ALL MINIMUM ASPECTS OF ASTM D–2321

CITY OF SHENANDOAH TEXAS	TYPICAL ROADWAY TRENCH BEDDING AND BACKFILL DETAIL	SEWER DWG. NO. 2



* ① Selected backfill material Class III compacted to density of adjacent soil.

* ② 2–Sack/Ton cement stabilized sand.

** ③ Crushed rock, ironore base material.

* Compaction by tamping or vibration as appropriate.

** Tamped pneumatically or mechanically to 95% modified proctor density.

** ④ 2–Sack cement stabilized rock subgrade.

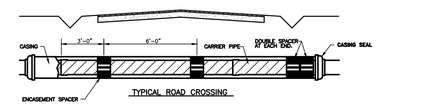
⑤ HMAC Pavement

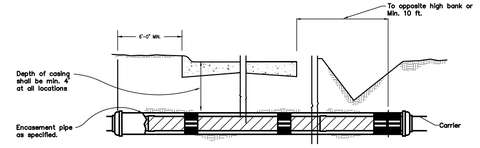
⑥ Class "A" concrete pavement, reinforced to match existing pavement.

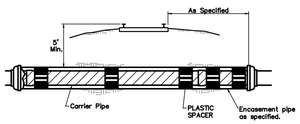
NOTES FOR UTILITY TRENCH REPAIR OF EXISTING ROADWAYS:

1. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO CITY STANDARD SPECIFICATIONS.
2. ALL TRENCHES UNDER CURB OR PAVING MUST BE BACKFILLED WITH 2 SACK PER TON OF CEMENT STABILIZED SAND.
3. ANY PAVEMENT DAMAGED DURING TRENCHING SHALL BE REMOVED AND REPLACED TO ORIGINAL CONDITION OR BETTER.
4. UTILITY CROSSINGS OF CITY STREETS MUST BE BORED, UNLESS PERMISSION FOR A STREET CUT HAS BEEN GIVEN IN WRITING BY THE CITY ENGINEER. STREET CUTS PARALLEL TO CENTERLINE MUST BE APPROVED BY THE CITY ENGINEER AND WILL REQUIRE RESURFACING BY A PAVING MACHINE.
5. STREET SURFACING SHALL BE TRIMMED TO A NEAT STRAIGHT LINE WITH THE EDGES FREE OF LOOSE MATERIAL.
6. ALL COLD JOINT SURFACES SHALL BE TACKED WITH EMULSION WHICH SHALL HAVE "BROKEN" PRIOR TO PATCHING.
7. COMPLETED PATCH SHALL NOT DEVIATE FROM EXISTING SURFACE MORE THAN 0.03 FT. / 10 FT. IN PROFILE OR 0.05 FT / 10 FT. IN CROSS–SECTION WHEN MEASURED WITH A 10 FT. STRAIGHT EDGE.
8. COMPLETE PATCH SHALL NOT POND WATER IN EXCESS OF 0.01 FOOT.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE OF THE REPAIRED AND PAVED

CITY OF SHENANDOAH TEXAS	TYPICAL SANITARY SEWER BACKFILL AND TRENCH REPAIR	SEWER DWG. NO. 5



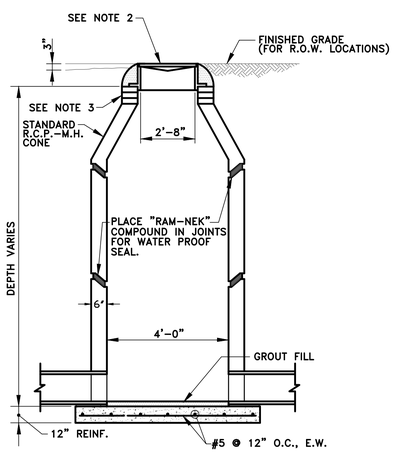




CARRIER SIZE	MINIMUM ENCASEMENT STEEL PIPE
4" C 900	10" – .25 WALL
6" C 900	12" – .25 WALL
8" C 900	16" – .25 WALL
10" C 900	18" – .25 WALL
12" C 900	20" – .25 WALL
14" C 905	24" – .25 WALL
16" C 905	26" – .25 WALL
18" C 905	30" – .25 WALL
20" C 905	36" – .375 WALL
24" C 905	42" – .375 WALL

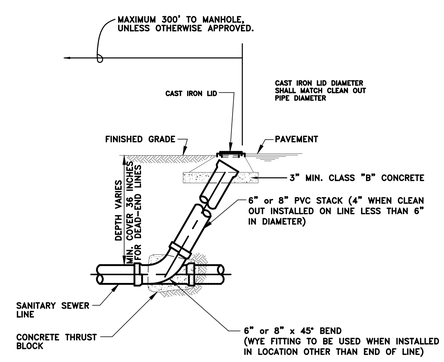
NOTES:
1. Steel casing shall have totally welded joints.
2. Steel casing shall be used in all bores.
3. Contractor to obtain permits prior to any construction at these crossings.

CITY OF SHENANDOAH TEXAS	TYPICAL SANITARY SEWER ENCASEMENT FOR BORED CROSSINGS	SEWER DWG. NO. 6

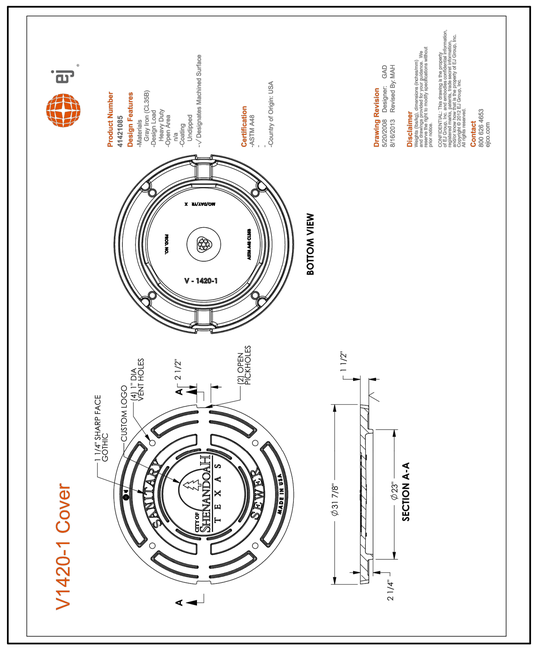


NOTE:
1.All R.C.P. Manholes shall be in accordance A.S.T.M. C–478.
2.Vulcan Foundry V–1418–2 Frame and Cover (or equal) with the City of Shenandoah logo embedded in lid.
3.For adjustment of Manhole Lid use standard concrete rings. No brick adjustment allowed.
4.Precast bottom section of manhole to be securely attached to reinforced concrete slab with waterproof sealer.

CITY OF SHENANDOAH TEXAS	STANDARD PRECAST MANHOLE	SEWER DWG. NO. 7



CITY OF SHENANDOAH TEXAS	CLEAN OUT DETAIL	SEWER DWG. NO. 14



CITY OF SHENANDOAH TEXAS	SANITARY SEWER MANHOLE COVER WITH SECTIONS	SEWER DWG. NO. 20

REV	DATE	BY	APP	COMMENT

PREPARED FOR:
CITY OF SHENANDOAH
2906 I–45 NORTH
SHENANDOAH, TX. 77381
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AUSTIN BRYAN CONROE HOUSTON SAN ANGELO

SANITARY SEWER DETAILS

DAVID MEMORIAL EXTENSION PHASE II

THIS SET OF PLANS WAS PREPARED UNDER THE DIRECTION OF JONNY GREEN, P.E., SEAL No.120300 ON JUNE 01, 2017. THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW ONLY AND NOT TO BE USED FOR CONSTRUCTION.

DESIGN: JONNY GREEN	
CAD: WSW	REV: JG
PROJECT NO: 11991	
SHEET: 17	OF:

SWIGGINS 6/1/2017 4:12:53 PM
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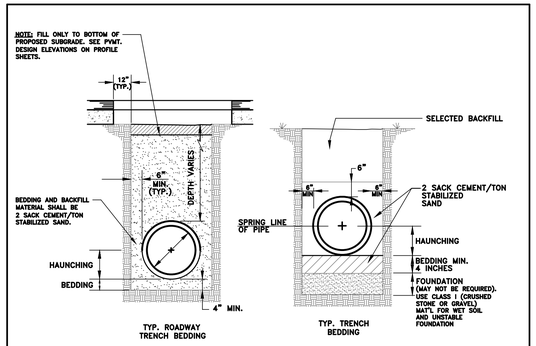


Foundation
A foundation is required when the trench bottom is unstable. An foundation that will support a rigid pipe without causing more than adequate for PVC pipes.

Bedding
The bedding directly underneath the pipe is required only to bring the trench bottom up to grade. It should not be so thick or soft that the pipe will settle and lose grade, and it should be sufficient to provide a firm, stable and uniform support of the pipe.
A layer of material sufficient to establish line, grade, and support should be placed. Bell holes should be excavated to insure uniform bearing.

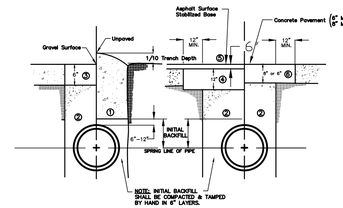
Haunching
The haunching area is the most important in terms of limiting the deflection of a flexible pipe. This is the area that should be compacted to the required or specified density.

* NOTE: WHEN USING HDPE PIPE, THE BACKFILL MATERIAL SHALL BE CEMENT STABILIZED SAND.
(1 SACK CEMENT/TON) OR OTHER APPROVED BACKFILL MATERIAL AS SPECIFIED BY THE ENGINEER, AND IN ACCORDANCE TO CITY OF SHENANDOAH HDPE SPECIFICATION. FURTHER, THE BACKFILL MATERIAL SHALL BE PLACED TO THE FULL DEPTH AND WIDTH OF ALL DITCHES, TRENCHES, ETC. UNDER ANY ROADWAY OR PAVED SURFACES. WHEN PIPES ARE NOT UNDER PAVED SURFACES, THE BACKFILL MATERIAL SHALL BE USED TO A MINIMUM OF 6" UNDER AND AROUND THE PIPE, BUT SHALL NOT BE THE FULL WIDTH OF THE TRENCH. THE UNDISTURBED WALLS TO HAVE THE MINIMUM DIMENSION OF THE TRENCH FOR THE HDPE PIPE SHALL BE AS SPECIFIED IN THE CITY OF SHENANDOAH HDPE SPECIFICATION.

ASTM D-2321
DESCRIPTION OF EMBEDMENT MATERIALS
Class I
Angular, 1/4" to 1-1/2" graded stone, including a number of fill materials that have regional significance, such as coral, slag, cinders, crushed stone and crushed shells.
Class II
Coarse sands and gravels with maximum particle size of 1-1/2", including variously graded sands, and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil types GW, GP, SW, and SP are included in this class.
Class III
Fine sand and clayey gravels, including fine sands and sand-clay mixtures, and gravel clay mixtures. Soil types GM, GC, SM and SC are included in this class.
Class IV
Silt, silty clays, and clays, including inorganic clays and silts of medium to high plasticity and liquid limits. Soil types ML, ML, CH, and CL are included in the class.
Class V
This class includes the organic soils OL, OH, and PT as well as soils containing frozen earth, debris, rocks larger than 1-1/2" in diameter, and other foreign materials. These materials are not recommended for bedding, haunching, or initial backfill.

NOTE: BACKFILL ABOVE THE BEDDING SHALL CONFORM TO "TYPICAL STORM SEWER BACKFILL AND TRENCH REPAIR" STANDARD DRAWING 1.

CITY OF SHENANDOAH TEXAS	TYPICAL STORM SEWER BEDDING AND TRENCH DETAIL	STORM DWG. NO. 1

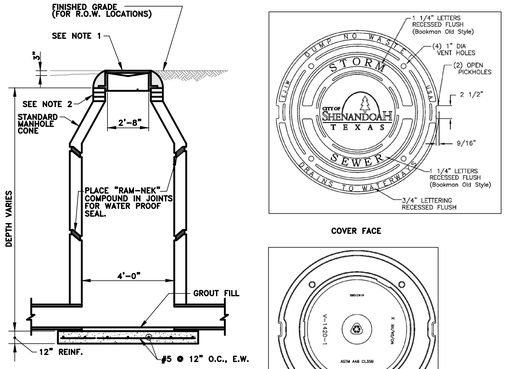


* ① Selected backfill material Class III compacted to density of adjacent soil.
* ② 2-Sack cement stabilized sand.
** ③ Crushed rock, iron ore base material.
* Compaction by tamping or vibration as appropriate.
** Tamped pneumatically or mechanically to 95% modified proctor density.
** ④ 2-Sack cement stabilized rock subgrade.
⑤ HMAC Pavement
⑥ Class "A" concrete pavement, reinforced to match existing pavement.

NOTES FOR UTILITY TRENCH REPAIR OF EXISTING ROADWAYS:

1. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO CITY STANDARD SPECIFICATIONS.
2. ALL TRENCHES UNDER CURB OR PAVING MUST BE BACKFILLED WITH 2 SACK PER CUBIC YARD CEMENT STABILIZED SAND.
3. ANY PAVEMENT DAMAGED DURING TRENCHING SHALL BE REMOVED AND REPLACED TO ORIGINAL CONDITION OR BETTER.
4. UTILITY CROSSINGS OF CITY STREETS MUST BE BORED, UNLESS PERMISSION FOR A STREET CUT HAS BEEN GIVEN IN WRITING BY THE CITY ENGINEER. STREET CUTS PARALLEL TO CENTERLINE MUST BE APPROVED BY THE CITY ENGINEER AND WILL REQUIRE RESURFACING BY A PAVING MACHINE.
5. STREET SURFACING SHALL BE TRIMMED TO A NEAT STRAIGHT LINE WITH THE EDGES FREE OF LOOSE MATERIAL.
6. ALL COLD JOINT SURFACES SHALL BE TACKED WITH EMULSION WHICH SHALL HAVE "BROKEN" PRIOR TO PATCHING.
7. COMPLETED PATCH SHALL NOT DEVIATE FROM EXISTING SURFACE MORE THAN 0.03 FT. / 10 FT. IN PROFILE OR 0.05 FT / 10 FT. IN CROSS-SECTION WHEN MEASURED WITH A 10 FT. STRAIGHT EDGE.
8. COMPLETE PATCH SHALL NOT POND WATER IN EXCESS OF 0.01 FOOT.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE OF THE REPAIRED AND PAVED SECTION FOR ONE YEAR AFTER COMPLETION.

CITY OF SHENANDOAH TEXAS	TYPICAL STORM SEWER BACKFILL AND TRENCH REPAIR	STORM DWG. NO. 2



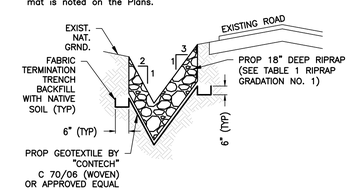
CITY OF SHENANDOAH TEXAS	STORM SEWER MANHOLE	STORM DWG. NO. 3

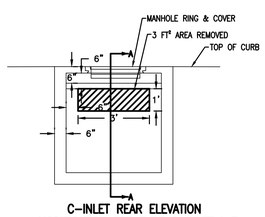
RIPRAP NOTES:
1. PROVIDE RIPRAP CONSISTING OF BROKEN CONCRETE OR STONE. PROVIDE RIPRAP THAT IS DENSE, DURABLE AND HARD MATERIAL FREE FROM CRACKS, SEAMS AND OTHER DEFECTS WHICH WOULD INCREASE DETERIORATION FROM HANDLING AND NATURAL CAUSES. PROVIDE A GEOTEXTILE MATTING BELOW RIPRAP IN ACCORDANCE WITH NOTE 14 BELOW.
2. CONTRACTOR TO PROVIDE ENGINEER 24 HOURS NOTICE TO INSPECT GEOTEXTILE FABRIC PRIOR TO FINAL INSTALLATION OF RIP RAP MATERIAL.
3. PROVIDE RIPRAP IN CUBIC FORM, RATHER THAN ELONGATED (FLAT) SHAPES.
4. PROVIDE RIPRAP WITH A MINIMUM THICKNESS OF 6 INCHES.
5. NO MORE THAN 25 PERCENT SHALL HAVE A LENGTH GREATER THAN 2-1/2 TIMES THE WIDTH OR THICKNESS. NO LENGTH SHALL EXCEED 3 TIMES THE WIDTH OR THICKNESS.
6. WHERE BROKEN CONCRETE IS USED, CUT EXPOSED METAL FLUSH WITH THE SURFACE PRIOR TO PLACING THE RIPRAP.
7. TRIM AND DRESS THE CHANNEL BOTTOM AND SIDE SLOPES TO PROPER LINES AND GRADE PRIOR TO PLACING RIPRAP.
8. PLACE THE RIPRAP TO THE SLOPES, LINES AND GRADES AS SHOWN ON THE PLANS.
9. TO ESTABLISH A WELL-GRADED MASS OF RIPRAP WITH MINIMAL VOIDS, FILL VOIDS BETWEEN LARGER RIPRAP BLOCKS WITH SPALLS AND SMALLER BLOCKS OF THE LARGEST FEASIBLE SIZE TO FORM A COMPACT MASS. DO NOT PLACE SPALLS AND SMALL BLOCKS IN PLACE OF LARGER SIZE RIPRAP.
10. INSTALL RIPRAP MAT TO THE THICKNESS AS SHOWN ON THE PLANS.
11. PLACE THE RIPRAP TO AVOID DISPLACEMENT OR DAMAGE TO THE PREPARED SURFACE OR GEOTEXTILE IN A MANNER TO AVOID SEGREGATION OF PARTICLE SIZES.
12. PROVIDE GEOTEXTILE FIBERS CONSISTING OF LONG CHAIN SYNTHETIC POLYMERS, COMPOSED OF AT LEAST 95 PERCENT BY WEIGHT POLYESTERS OR POLYOLEFINS. THESE FIBERS SHALL BE FORMED INTO A STABLE NETWORK SUCH THAT THE FILAMENTS OR YARNS RETAIN THEIR DIMENSIONAL STABILITY RELATIVE TO EACH OTHER, INCLUDING THE EDGES. MATERIAL SHALL BE RESISTANT TO DETERIORATION FROM ULTRAVIOLET RADIATION, HEAT EXPOSURE AND COMMONLY ENCOUNTERED SOIL CHEMICALS, MILDEW, ROT AND INSECTS.
13. MANUFACTURER RECOMMENDS TO MINIMIZE DAMAGE DUE TO ULTRAVIOLET RADIATION. DO NOT INSTALL A GEOTEXTILE IF IT HAS BEEN REMOVED FROM ITS PROTECTIVE COVERING LONGER THAN THE MANUFACTURER RECOMMENDS.
14. FOR PLACEMENT OF GEOTEXTILE, FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS AND AT A MINIMUM:
    a. PLACE THE GEOTEXTILE DIRECTLY ON THE PREPARED AREA. LAY THE GEOTEXTILE SMOOTHLY ON THE SUBGRADE TO MINIMIZE TENSION, STRESS, FOLDS AND WRINKLES.
    b. AFTER PLACEMENT, DO NOT UNNECESSARILY WALK ON OR DISTURB THE GEOTEXTILE UNLESS REQUIRED TO PRESERVE CONTACT WITH THE SUBGRADE. EQUIPMENT IS NOT ALLOWED ON THE UNPROTECTED GEOTEXTILE. PROTECT THE GEOTEXTILE FROM CLOGGING, PENETRATIONS, TEARS AND OTHER DAMAGE DURING INSTALLATION.
    c. PLACE THE GEOTEXTILE STRIPS FROM DOWNSTREAM TO UPSTREAM. OVERLAP ADJOINING GEOTEXTILE SHEETS SUCH THAT THE UPSTREAM SHEET IS PLACED OVER THE DOWNSTREAM SHEET AND/OR THE UPSLOPE OVER THE DOWNSLOPE.
    d. OVERLAP ADJOINING GEOTEXTILE SECTIONS A MINIMUM OF 2 FEET.
    e. REPLACE OR REPAIR ANY GEOTEXTILE DAMAGED DURING THE PLACEMENT OF RIPRAP OR OTHER MATERIALS AT NO ADDITIONAL COST TO THE DISTRICT. PLACE A GEOTEXTILE PATCH OF THE SAME MATERIAL OVER THE AREA AND EXTEND A MINIMUM OF 3 FEET BEYOND THE PERIMETER OF THE TEAR AND/OR DAMAGE. ORIENT THE PATCH MATERIAL SO THAT ITS FIBERS ARE ALIGNED WITH THE DAMAGED GEOTEXTILE FIBERS.
15. USE EVENLY GRADED, RIPRAP PER TABLE 1 BELOW.

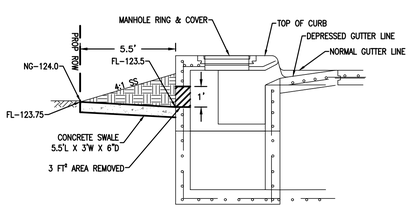
TABLE 1
RIPRAP GRADATION NO. 1

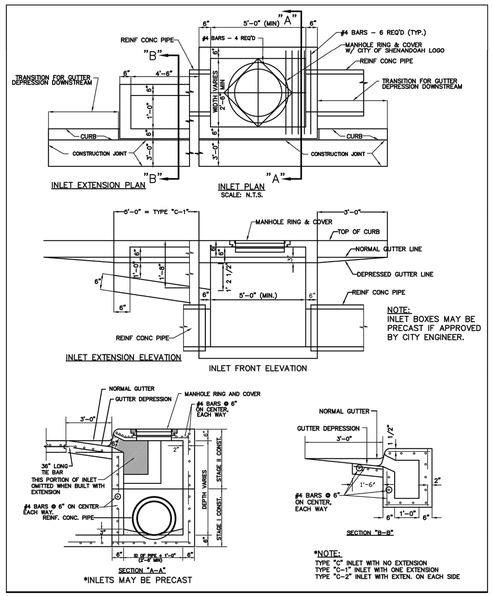
Percent Lighter by Weight	Stone Weight Lbs. Lower Limit	Stone Weight Lbs. Upper Limit	Volume Cubical Cubic Ft (2) Lower Limit	Volume Cubical Cubic Ft (2) Upper Limit	Shape Spherical Ft (Each Side) Lower Limit	Shape Spherical Ft (Each Side) Upper Limit	Shape Ft (Dia.) Lower Limit	Shape Ft (Dia.) Upper Limit
100	180	265	1.20	1.77	1.06	1.21	1.31	1.50
50	80	110	0.53	0.73	0.81	0.90	1.01	1.12
15	40	60	0.27	0.40	0.64	0.74	0.80	0.91

Notes:
1. The theoretical cube and sphere size is presented for guidance only.
2. Volume is based on 150 pcf, unit weight.
3. Riprap Gradation No. 1 is to be used where an 18 inch thick riprap mat is noted on the Plans.

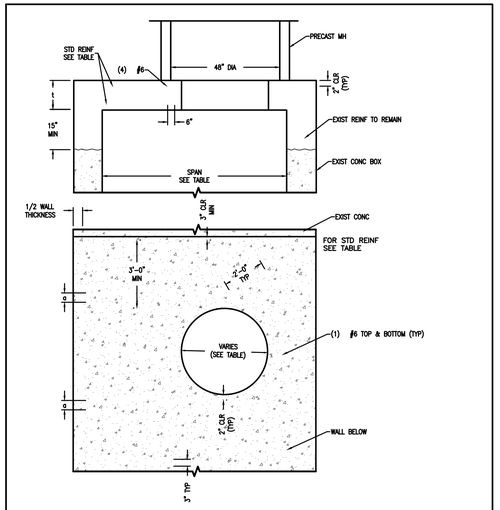








CITY OF SHENANDOAH TEXAS	TYPE "C", "C-1" & "C-2" INLETS	STORM DWG. NO. 13



SPAN (ft)	t (in)	STANDARD REINF	OPENING SIZE	a
3	14	#6 @ 11" O/C T & B	36" f	2#6 @ 5-59/64" O/C T & B
4	16	#6 @ 9" O/C T & B	36" f	2#6 @ 4-59/64" O/C T & B
5	18	#6 @ 8" O/C T & B	48" f	3#6 @ 4-59/64" O/C T & B
6	20	#6 @ 7" O/C T & B	48" f	4#6 @ 3-59/64" O/C T & B
7	20	#6 @ 7" O/C T & B	48" f	4#6 @ 3-59/64" O/C T & B
8	21	#6 @ 7" O/C T & B	48" f	4#6 @ 3-59/64" O/C T & B
9	21	#6 @ 7" O/C T & B	48" f	4#6 @ 3-59/64" O/C T & B
10	22	#6 @ 6" O/C T & B	48" f	4#6 @ 3-59/64" O/C T & B
11	23	#6 @ 6" O/C T & B	48" f	4#6 @ 3-59/64" O/C T & B
12	23	#6 @ 5" O/C T & B	48" f	5#6 @ 3" O/C T & B

DESIGNED FOR HS 20 W/ 2'-0" COVER TO 20'-0" COVER

PROPOSED MANHOLE ON REINFORCED CONCRETE BOX CULVERT

REV	DATE	BY	APP	COMMENT

PREPARED FOR:
CITY OF SHENANDOAH
2906 I-45 NORTH
SHENANDOAH, TX. 77381
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STORM SEWER DETAILS

DAVID MEMORIAL EXTENSION PHASE II

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DESIGN: JONNY GREEN
CAD: WSW REV: JG
PROJECT NO: 11991
SHEET: 18 OF:

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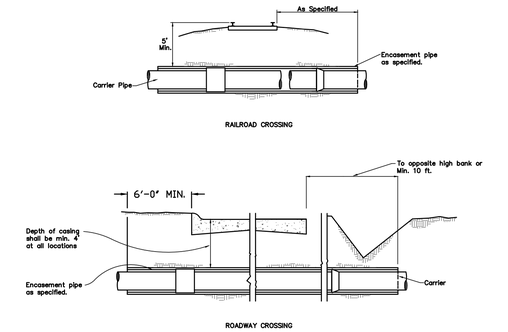
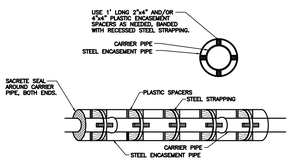


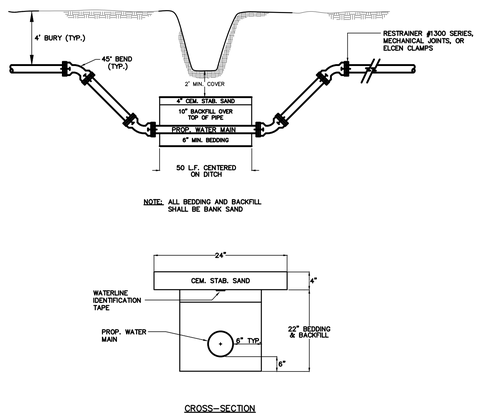


NOTE: LOCATE PLASTIC SPACERS ON EITHER SIDE OF CARRIER PIPE BELLS, THEN ONE SET CENTERED ON EACH JOINT.

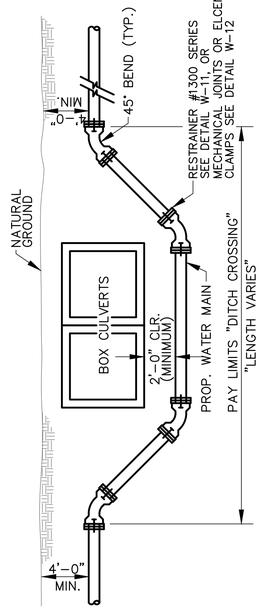
CARRIER SIZE	MINIMUM ENCASEMENT STEEL PIPE
4" C 900	10" - .25 WALL
6" C 900	12" - .25 WALL
8" C 900	16" - .25 WALL
10" C 900	18" - .25 WALL
12" C 900	20" - .25 WALL
14" C 905	24" - .25 WALL
16" C 905	26" - .25 WALL
18" C 905	30" - .25 WALL
20" C 905	36" - .375 WALL
24" C 905	42" - .375 WALL

NOTES:
1. Steel casing shall have totally welded joints.
2. Steel casing shall be used in all bores.
3. Contractor to obtain permits prior to any construction at these crossings.

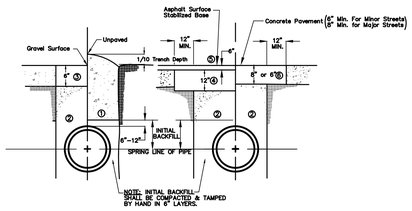
CITY OF SHENANDOAH TEXAS | STANDARD BORED CROSSING FOR WATERLINE | WATER | DWG. NO. 5



CITY OF SHENANDOAH TEXAS | DITCH CROSSING DETAILS FOR WATERLINE | WATER | DWG. NO. 6



CITY OF SHENANDOAH TEXAS | CULVERT CROSSING DETAILS FOR WATERLINE | WATER | DWG. NO. 7



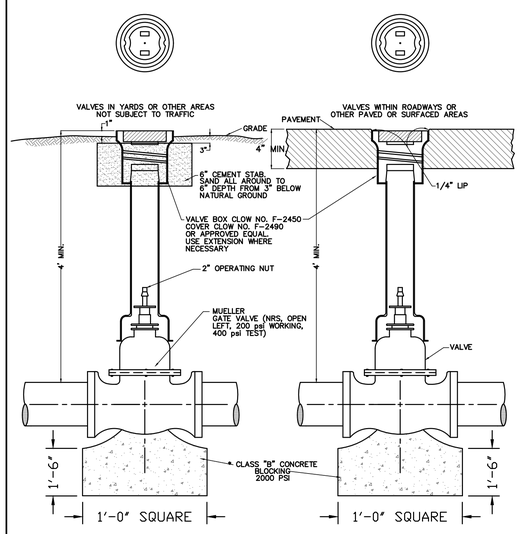
* ① Selected backfill material Class III compacted to density of adjacent soil.
* ② 2-Sack cement stabilized sand.
** ③ Crushed rock, ironore base material.
* Compaction by tamping or vibration as appropriate.
** Tamped pneumatically or mechanically to 95% modified proctor density.

** ④ 2-Sack cement stabilized rock subgrade.
⑤ HMAC Pavement
⑥ Class "A" concrete pavement, reinforced to match existing pavement.

NOTES FOR UTILITY TRENCH REPAIR OF EXISTING ROADWAYS:

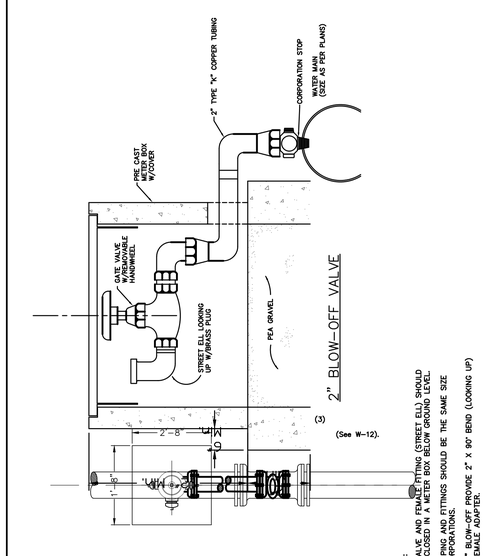
1. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO CITY STANDARD SPECIFICATIONS.
2. ALL TRENCHES UNDER CURB OR PAVING MUST BE BACKFILLED WITH 2 SACK PER CUBIC YARD CEMENT STABILIZED SAND.
3. ANY PAVEMENT DAMAGED DURING TRENCHING SHALL BE REMOVED AND REPLACED TO ORIGINAL CONDITION OR BETTER.
4. UTILITY CROSSINGS OF CITY STREETS MUST BE BORED, UNLESS PERMISSION FOR A STREET CUT HAS BEEN GIVEN IN WRITING BY THE CITY ENGINEER. STREET CUTS PARALLEL TO CENTERLINE MUST BE APPROVED BY THE CITY ENGINEER AND WILL REQUIRE RESURFACING BY A PAVING MACHINE.
5. STREET SURFACING SHALL BE TRIMMED TO A NEAT STRAIGHT LINE WITH THE EDGES FREE OF LOOSE MATERIAL.
6. ALL COLD JOINT SURFACES SHALL BE TACKED WITH EMULSION WHICH SHALL HAVE "BROKEN" PRIOR TO PATCHING.
7. COMPLETED PATCH SHALL NOT DEVIATE FROM EXISTING SURFACE MORE THAN 0.03 FT. / 10 FT. IN PROFILE OR 0.05 FT / 10 FT. IN CROSS-SECTION WHEN MEASURED WITH A 10 FT. STRAIGHT EDGE.
8. COMPLETE PATCH SHALL NOT POND WATER IN EXCESS OF 0.01 FOOT.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE OF THE REPAIRED PAVED SECTION FOR ONE YEAR AFTER COMPLETION.

CITY OF SHENANDOAH TEXAS | TYPICAL WATERLINE BACKFILL AND TRENCH REPAIR | WATER | DWG. NO. 8



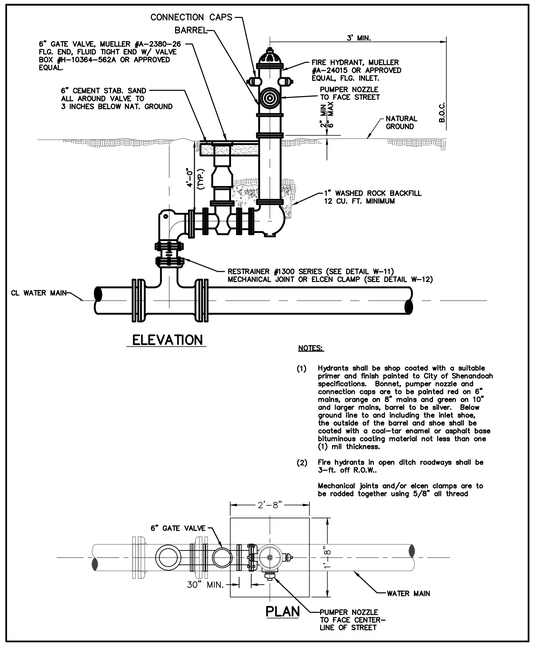
* BLOCK GATE VALVES WITH COMPRESSION JOINT FITTINGS ON 8" & LARGER LINES

CITY OF SHENANDOAH TEXAS | GATE VALVE & BOX INSTALLATION 14" & SMALLER WATERLINE | WATER | DWG. NO. 13



NOTES:
1. THE VALVE AND FEMALE FITTING (STREET ELL) SHOULD BE ENGINEERED IN A METER BOX BELOW GROUND LEVEL.
2. BRASS OR ALL COPPER FITTINGS SHOULD BE THE SAME SIZE AS CORPORATION.
3. FOR 2" BLOW-OFF PROVIDE 2" X 90° BEND (LOOKING UP) AND FEMALE ADAPTER.

CITY OF SHENANDOAH TEXAS | 2" BLOW-OFF VALVE & BOX FOR WATERLINE | WATER | DWG. NO. 15



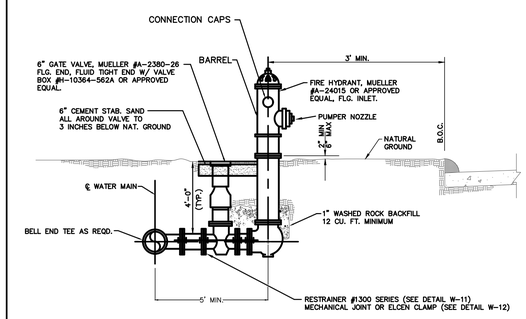
NOTES:

(1) Hydrants shall be shop coated with a suitable primer and finish painted to City of Shenandoah specifications. Bonnet, pumper nozzle and connection caps are to be painted red on 6" mains, orange on 8" mains and green on 10" and larger mains, barrel to be silver. Below ground line to and including the inlet shoe, the outside of the barrel and shoe shall be coated with a coal-tar enamel or asphalt base bituminous coating material not less than one (1) mil thickness.

(2) Fire hydrants in open ditch roadways shall be 3-ft. off R.O.W..

Mechanical joints and/or elcen clamps are to be rodded together using 5/8" all thread

CITY OF SHENANDOAH TEXAS | REVISED FIRE HYDRANT INSTALLATION | WATER | DWG. NO. 17-A



NOTES:

(1) Hydrants shall be shop coated with a suitable primer and finish painted to City of Shenandoah specifications. Bonnet, pumper nozzle and connection caps are to be painted red on 6" mains, orange on 8" mains and green on 10" and larger mains, barrel to be silver. Below ground line to and including the inlet shoe, the outside of the barrel and shoe shall be coated with a coal-tar enamel or asphalt base bituminous coating material not less than one (1) mil thickness.

(2) Fire hydrants in open ditch roadways shall be 3-ft. off R.O.W..

(3) Mechanical joints and/or elcen clamps are to be rodded together using 5/8" all thread (See W-12).

CITY OF SHENANDOAH TEXAS | STANDARD FIRE HYDRANT INSTALLATION | WATER | DWG. NO. 17

REV	DATE	BY	APP	COMMENT

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WATER DETAILS 1 OF 2

DAVID MEMORIAL EXTENSION PHASE II

THIS SET OF PLANS WAS PREPARED UNDER THE DIRECTION OF JONNY GREEN, P.E., SEAL No.120300 ON JUNE 01, 2017. THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW ONLY AND NOT TO BE USED FOR CONSTRUCTION.

DESIGN: JONNY GREEN
CAD: WSW REV: JG
PROJECT NO: 11991
SHEET: 19 OF:

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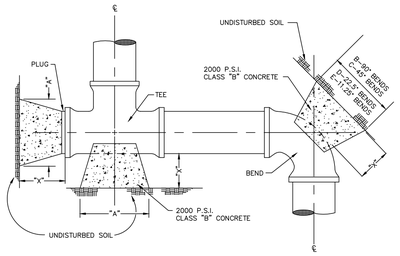
F:\11900S\11991 DAVID MEMORIAL EXENSION PHASE II\CAD\CD-11991\19 WATER DETAILS 1 OF 2.DWG



HORIZONTAL BLOCKING TABLE

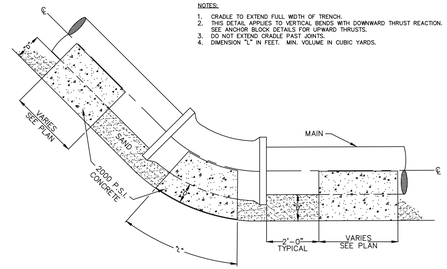
Dimension "X" to be a minimum of (1) foot, but is to be increased where necessary to provide bearing against undisturbed trench wall.

PIPE SIZE	"X" DIM.	PLUGS & TEES		90° BENDS				45° BENDS				22.50° BENDS				11.25° BENDS			
		"X"	MIN. AREA	MIN. VOL.	"Y"	MIN. AREA	MIN. VOL.	"Z"	MIN. AREA	MIN. VOL.	"Y"	MIN. AREA	MIN. VOL.	"Y"	MIN. AREA	MIN. VOL.
4"	1'-0"	1'-0"	0.88	0.05	1'-0"	0.83	0.05	1'-0"	0.83	0.05	1'-0"	0.83	0.05	1'-0"	0.83	0.05
6"	1'-6"	1'-0"	1.06	0.06	1'-2"	1.50	0.09	1'-0"	0.83	0.05	1'-0"	0.83	0.05	1'-0"	0.83	0.05
8"	1'-6"	1'-3"	1.89	0.11	1'-6"	2.66	0.15	1'-3"	1.44	0.08	1'-0"	0.83	0.05	1'-0"	0.83	0.05
10"	1'-6"	1'-3"	2.95	0.17	2'-0"	4.17	0.24	1'-6"	2.26	0.13	1'-3"	1.15	0.07	1'-0"	0.83	0.05
12"	1'-6"	2'-0"	4.25	0.24	2'-3"	6.00	0.34	1'-9"	3.25	0.18	1'-3"	1.65	0.10	1'-0"	0.83	0.05
16"	2'-0"	2'-7"	7.34	0.56	3'-0"	10.65	0.79	2'-3"	5.76	0.43	1'-8"	2.94	0.22	1'-2"	1.48	0.11
18"	2'-0"	2'-11"	7.70	0.57	3'-5"	10.89	0.82	2'-6"	5.89	0.44	1'-10"	3.01	0.22	1'-5"	1.51	0.11
20"	2'-0"	3'-3"	7.86	0.59	3'-9"	11.12	0.84	2'-9"	6.01	0.45	2'-0"	3.07	0.23	1'-7"	1.54	0.12
24"	2'-6"	3'-8"	11.33	0.84	4'-3"	16.00	1.20	3'-2"	8.65	0.65	2'-6"	4.42	0.33	1'-10"	2.22	0.17

NOTE: Calculations in Minimum Area column are in square feet.
Calculations in Minimum Volume column are in cubic yards.

CITY OF SHENANDOAH TEXAS	HORIZONTAL BLOCKING FOR WATERLINE	WATER DWG. NO. 24

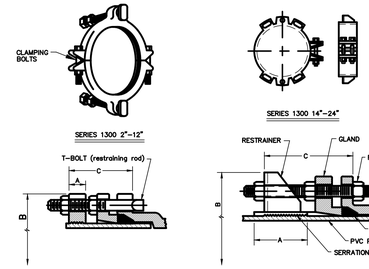
NOTES:
1. CRADLE TO EXTEND FULL WIDTH OF TRENCH.
2. THIS DETAIL APPLIES TO VERTICAL BENDS WITH DOWNWARD THRUST REACTION. SEE ANCHOR BLOCK DETAILS FOR UPWARD THRUSTS.
3. DO NOT EXTEND CRADLE PAST JOINTS.
4. DIMENSION "L" IN FEET. MIN. VOLUME IN CUBIC YARDS.



"D" = 6" MINIMUM OR TO UNDISTURBED SOIL

Pipe Class	Pipe Size	11° – 15°		22° – 30°		45°		90°	
		L	Min. Vol.	L	Min. Vol.	L	Min. Vol.	L	Min. Vol.
150	6"	0.42	0.02	0.45	0.02	0.50	0.02	1.00	0.04
150	8"	0.42	0.02	0.45	0.02	0.80	0.04	1.40	0.06
150	10"	0.42	0.03	0.58	0.03	1.15	0.06	2.03	0.11
150	12"	0.42	0.04	0.73	0.05	1.43	0.09	2.53	0.17
150	16"	0.42	0.08	0.74	0.14	1.48	0.27	2.61	0.48
150	18"	0.56	0.14	1.30	0.28	See Plan Sheets For Blocking		See Plan Sheets For Blocking	
150	20"	0.77	0.18	1.53	0.36				
200	18"	0.88	0.18	1.74	0.37				
200	20"	1.03	0.24	2.04	0.48				
250	18"	1.05	0.22	2.03	0.43				
250	20"	1.20	0.28	2.38	0.56				

CITY OF SHENANDOAH TEXAS	CONCRETE CRADLE AT VERTICAL BENDS	WATER DWG. NO. 25



RESTRAINER CHART

NOM. PIPE SIZE	PVC PIPE W/STEEL PIPE O.D. No.1300-S	PVC PIPE W/D.I. PIPE O.D. No.1300-C	A	B approx.	C max.	RESTRAINING RODS		CLAMPING BOLTS		APPROX. WGT. (lbs.)
						NO.	SIZE	NO.	SIZE	
2	2.375	N/A	1-1/8	6-1/4	4.0	2	5/8 x5	2	5/8 x4	4
3	3.500	N/A	1-1/8	7-11/16	4.0	2	5/8 x5	2	5/8 x4	5
4	4.500	4.80	1-1/8	9-1/8	6.0	2	3/4 x7	2	5/8 x4	6.5
6	6.625	6.90	1-1/8	11-1/8	6.0	2	3/4 x7	2	5/8 x4	8.5
8	8.625	8.05	1-1/4	13-7/8	6.0	2	3/4 x7	2	3/4 x5	13
10	10.750	11.10	1-3/8	16-5/8	6.0	4	3/4 x7	2	7/8 x6	23
12	12.750	13.20	1-3/8	19-1/4	6.0	4	3/4 x7	2	7/8 x6	25
14	N/A	15.30	4.0	22.0	15.0	6	3/4 x17	2	7/8 x7	50
16	N/A	17.40	4.0	24.2	15.0	6	3/4 x17	2	7/8 x7	65
18	N/A	19.50	5.0	26.5	15.0	8	3/4 x17	2	1 x 7	65
20	N/A	21.60	7.0	28.6	22.0	8	3/4 x24	3	1 1/8 x9	125
24	N/A	25.80	7.0	32.8	22.0	12	3/4 x24	3	1 1/8 x9	143

Weights include Restraining rods, clamping bolt and nuts and special "T" bolts and nuts.
N/A PIPE not manufactured in this size.
Dimensions in inches.

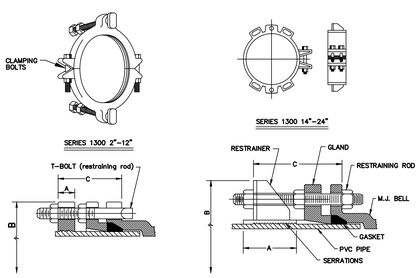
CITY OF SHENANDOAH TEXAS	WATERLINE RESTRAINER	WATER DWG. NO. 3

If a collection system pipe crosses a public water supply pipe, the following requirements apply:

(i) If a collection system is constructed of cast iron, ductile iron, or PVC with a minimum pressure rating of 150 psi, the following requirements apply:
- (I) A minimum separation distance is six inches between outside diameters of the pipes.
- (II) A collection system pipe must be below a public water supply pipe.
- (III) Collection system pipe joints must be located as far as possible from an intersection with a public water supply line.

(ii) If a collection system pipe crosses under a public water supply pipe and the collection system pipe is constructed of acrylonitrile butadiene styrene (ABS) truss pipe, similar semi-rigid plastic composite pipe, clay pipe, or concrete pipe with gasketed joints, the following requirements apply:
- (I) A minimum separation distance is two feet.
- (II) If a collection system pipe is within nine feet of a public water supply pipe, the initial backfill around the collection system pipe must be:
  - (-a-) sand stabilized with two or more 80 pound bags of cement per cubic yard of sand for any section of collection system pipe within nine feet of a public water supply pipe.
  - (-b-) installed from one quarter of the diameter of the collection system pipe below the centerline of the collection system pipe to one pipe diameter (but not less than 12 inches) above the top of the collection system pipe.

WHERE A NEW POTABLE WATERLINE CROSSES A NEW, NON-PRESSURE RATED WASTEWATER MAIN OR LATERAL AND THE STANDARD PIPE SEGMENT LENGTH OF THE WASTEWATER MAIN OR LATERAL IS AT LEAST 18 FEET, ONE SEGMENT OF THE WATERLINE PIPE SHALL BE CENTERED OVER THE WASTEWATER MAIN OR LATERAL SUCH THAT THE JOINTS OF THE WATERLINE PIPE ARE EQUIDISTANT AND AT LEAST NINE FEET HORIZONTALLY FROM THE CENTERLINE OF THE WASTEWATER MAIN OR LATERAL. THE POTABLE WATERLINE SHALL BE AT LEAST TWO FEET ABOVE THE WASTEWATER MAIN OR LATERAL. WHENEVER POSSIBLE, THE CROSSING SHALL BE CENTERED BETWEEN THE JOINTS OF THE WASTEWATER MAIN OR LATERAL. THE WASTEWATER PIPE SHALL HAVE A MINIMUM PIPE STIFFNESS OF 115 PSI AT 5.0% DEFLECTION. THE WASTEWATER MAIN OR LATERAL SHALL BE EMBEDDED IN CEMENT STABILIZED SAND FOR THE TOTAL LENGTH OF ONE PIPE SEGMENT PLUS 12 INCHES BEYOND THE JOINT ON EACH END.



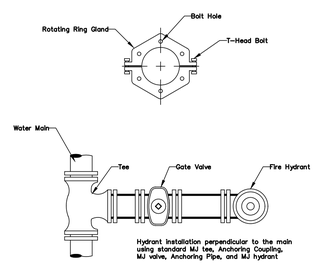
VERTICAL & HORIZONTAL RESTRAINER CHART

NOM. PIPE SIZE	PVC PIPE W/STEEL PIPE O.D. No.1300-S	PVC PIPE W/D.I. PIPE O.D. No.1300-C	A	B approx.	C max.	RESTRAINING RODS		CLAMPING BOLTS		APPROX. WGT. (lbs.)
						NO.	SIZE	NO.	SIZE	
2	2.375	N/A	1-1/8	6-1/4	4.0	2	5/8 x5	2	5/8 x4	4
3	3.500	N/A	1-1/8	7-11/16	4.0	2	5/8 x5	2	5/8 x4	5
4	4.500	4.80	1-1/8	9-1/8	6.0	2	3/4 x7	2	5/8 x4	6.5
6	6.625	6.90	1-1/8	11-1/8	6.0	2	3/4 x7	2	5/8 x4	8.5
8	8.625	8.05	1-1/4	13-7/8	6.0	2	3/4 x7	2	3/4 x5	13
10	10.750	11.10	1-3/8	16-5/8	6.0	4	3/4 x7	2	7/8 x6	23
12	12.750	13.20	1-3/8	19-1/4	6.0	4	3/4 x7	2	7/8 x6	25
14	N/A	15.30	4.0	22.0	15.0	6	3/4 x17	2	7/8 x7	50
16	N/A	17.40	4.0	24.2	15.0	6	3/4 x17	2	7/8 x7	65
18	N/A	19.50	5.0	26.5	15.0	8	3/4 x17	2	1 x 7	65
20	N/A	21.60	7.0	28.6	22.0	8	3/4 x24	3	1 1/8 x9	125
24	N/A	25.80	7.0	32.8	22.0	12	3/4 x24	3	1 1/8 x9	143

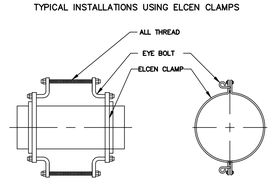
Weights include Restraining rods, clamping bolt and nuts and special "T" bolts and nuts.
N/A PIPE not manufactured in this size.
Dimensions in inches.

REVISIONS	CITY OF CONROE WATERLINE RESTRAINER	DWG. NO. 1200 W-11

TYPICAL INSTALLATIONS USING MJ ANCHORING FITTINGS



TYPICAL INSTALLATIONS USING ELCEN CLAMPS



CITY OF SHENANDOAH TEXAS	MECHANICAL JOINTS AND ELCEN CLAMPS FOR VERTICAL AND HORIZONTAL WATERLINES	WATER W-12

REV	DATE	BY	APP	COMMENT

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WATER DETAILS 2 OF 2

DAVID MEMORIAL EXTENSION
PHASE II

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DESIGN: JONNY GREEN
CAD: WSW REV: JG
PROJECT NO: 11991
SHEET: 20 OF:

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F:\11900S\11991 DAVID MEMORIAL EXENSION PHASE II\CAD\CD-11991\20 WATER DETAILS 2 OF 2.DWG