A PRE-CONSTRUCTION MEETING WITH THE CITY OF LEAGUE CITY ENGINEERING DEPARTMENT IS REQUIRED AT LEAST 10 WORKING DAYS PRIOR TO ON SITE CONSTRUCTION ACTIVITIES. CALL (281)-554-1451 FOR A MEETING DATE AND TIME. A PRE-CONSTRUCTION MEETING FOR THIS PROJECT MAY NOT BE SCHEDULED AND CONSTRUCTION OF THE PROJECT MAY NOT COMMENCE PRIOR TO APPROVAL OF THESE PLANS BY THE CITY ENGINEER AS EVIDENCED BY HIS SIGNATURE.

The City of League City

300 WEST WALKER, LEAGUE CITY, TEXAS 77573

NORTH KANSAS AVENUE RECONSTRUCTION

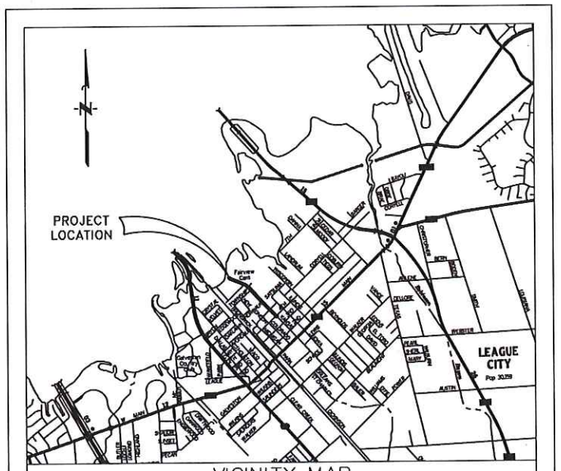
CIP # RE1702A

LENGTH OF ROADWAY = 2,433.24 LF (0.46 MI)

JULY 2017

League City TEXAS

PRIVATE UTILITY LINES SHOWN
AT LEAST 48 HOURS BEFORE EXCAVATING IN STREET R.O.W. OR EASEMENTS CALL THE LONE STAR NOTIFICATION 713-223-4567.
Date:
CenterPoint Energy/Electric Facilities Signature indicates underground electric lines are properly shown. No approval for construction is given.
Date:
CenterPoint Energy/Gas Facilities/ENTEX Incorporated (Gas service lines are not shown)
CABLE COMPANY



VICINITY MAP
Scale: NTS

GALVESTON COUNTY KEY MAP: 658 H, 659 E

MAYOR
PAT HALLISEY

COUNCIL MEMBERS

DON BECKER
POSITION 1

HANK DUGIE
POSITION 2

LARRY MILLICAN
POSITION 3

TODD KINSEY
POSITION 4

GREG GRIPON
POSITION 5

KEITH GROSS
POSITION 6

NICK LONG
POSITION 7

REVIEW SIGNATURES	DATE
ENGINEERING: CB	7/21/17
TRAFFIC: CB	7/21/17
FIRE MARSHAL:	
UTILITY LINE REPAIR:	
CONSTRUCTION MANAGEMENT:	

The review signatures above for this set of plans in no way implies approval or acceptance and is purely a reflection of the City's review process.

Christopher Sims 7/21/17
CHRISTOPHER SIMS, P.E. DATE
ASSISTANT CITY ENGINEER
CITY OF LEAGUE CITY

The signer of this set of plans has no objection to the design of these plans. Through the review process these plans have been found to be in general compliance with League City's "General Design and Construction Standards" manual and Construction Details. It should be noted that all calculations, measurements and overall line work within these plans should be checked and verified. This approval is good for 1 (one) year from the date of signing as shown. The plans submitted have been prepared, signed and sealed by a professional engineer licensed to practice engineering in the state of Texas, which conveys the engineer's responsibility and accountability. Design Engineer assumes all responsibility for any inconsistencies or imperfections in these plans.

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED (*) HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

STATE OF TEXAS
BELL ANDREA CHENG RAFT
86219
LICENSED PROFESSIONAL ENGINEER
7/21/17

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

NORTH KANSAS AVENUE RECONSTRUCTION – THE CITY OF LEAGUE CITY
JONES|CARTER BELLAIRE, TEXAS

GENERAL NOTES: 1-2015

1. DESIGN AND CONSTRUCTION SHALL CONFORM TO THE CITY OF LEAGUE CITY GENERAL DESIGN AND CONSTRUCTION STANDARDS AND THE CITY OF LEAGUE CITY STANDARD DETAILS AS CURRENTLY AMENDED. CONTRACTOR SHALL OBTAIN (AND USE) COPY FROM THE CITY OF LEAGUE CITY.
2. THERE WILL BE NO SEPARATE PAYMENT FOR WORK SHOWN ON THESE PLANS, UNLESS SPECIFICALLY ESTABLISHED IN THE BID PROPOSAL SECTION OF THE CONTRACT DOCUMENTS. INCLUDE COST OF THIS WORK IN THE CONTRACT UNIT PRICE FOR ITEMS OF WHICH THIS WORK IS A COMPONENT OR INCIDENTAL.
3. EXISTING UTILITY INFORMATION SHOWN IS NOT GUARANTEED TO BE ACCURATE AND ALL INCLUSIVE. ALL EXISTING UTILITY LOCATIONS ARE APPROXIMATE AND SHOULD BE VERIFIED BY THE CONTRACTOR IN ADVANCE OF HIS CONSTRUCTION. ANY CONFLICT OR DISCREPANCY DISCOVERED MUST IMMEDIATELY BE BROUGHT TO THE ENGINEER'S ATTENTION.
4. ANY DAMAGE TO EXISTING PUBLIC UTILITIES MUST BE REPAIRED IMMEDIATELY. THE CONTRACTOR MUST NOTIFY THE APPROPRIATE UTILITY OWNER, WHO WILL MAKE THE REPAIRS AT THE CONTRACTOR'S EXPENSE.
5. THE CONTRACTOR ON BEHALF OF THE OWNER, SHALL OBTAIN ALL CONSTRUCTION PERMITS PRIOR TO THE COMMENCEMENT OF WORK.
6. THE WORK AREA SHALL BE BARRICADED AND ILLUMINATED DURING DARKNESS AND PERIODS OF INACTIVITY, WHEN IN AN AREA OF DIRECT PUBLIC ACCESS.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STORAGE OF MATERIAL AND EQUIPMENT IN A SAFE AND WORKMAN LIKE MANNER TO PREVENT INJURIES, DURING AND AFTER WORKING HOURS UNTIL PROJECT COMPLETION. THERE SHALL BE NO PAYMENT MADE TO THE CONTRACTOR FOR STORED MATERIAL.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SHIPPING OF ALL MATERIALS. THE LOADING AND UNLOADING OF ALL PIPE, VALVES, HYDRANTS, MANHOLES AND OTHER ACCESSORIES 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. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO EXAMINE SUCH MATERIAL AT THE POINT OF DELIVERY AND TO REJECT ALL DEFECTIVE MATERIAL. THE DEFECTIVE MATERIAL MUST BE REPLACED WITH SOUND MATERIAL.
9. ALL PIPE AND REINFORCEMENT STEEL SHALL BE KEPT FREE OF DIRT AND OTHER DEBRIS. ANY DAMAGE TO THE COATING OF THE VARIOUS MATERIALS MUST BE REPAIRED.
10. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ADEQUATE AND POSITIVE DRAINAGE AT ALL TIMES DURING CONSTRUCTION OF PROPOSED FACILITIES. NATURAL GROUND ADJACENT TO UTILITY TRENCH EXCAVATION TO BE GRUBBED PRIOR TO PLACEMENT OF EXCESS TRENCH MATERIAL. (NO SEPARATE PAY).
11. ACCESS TO ALL EXISTING STREETS AND DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES.
12. THE CONTRACTOR IS REQUIRED TO FOLLOW ALL APPLICABLE OSHA RULES AND REGULATIONS. TRENCH SAFETY SHALL BE DONE IN ACCORDANCE WITH OSHA 29 CFR PART 1926, AS PUBLISHED IN THE FEDERAL REGISTER OCTOBER 31, 1989, AND EFFECTIVE JANUARY 2, 1990, AND AMENDMENTS THERETO.
13. NO CONNECTIONS SHALL BE MADE TO THE EXISTING WATER LINES OR SANITARY SEWERS UNTIL ALL PROPOSED LINES OR SEWERS HAVE BEEN THOROUGHLY CLEANED, TESTED, AND APPROVED BY THE ENGINEER.
14. ALL GEOTECHNICAL REPORTS (IF ANY) FOR THIS PROJECT ARE AVAILABLE AT THE OFFICE OF THE ENGINEER.
15. SURFACE RESTORATION: AT THE END OF ALL CONSTRUCTION PROJECTS, THE CONTRACTOR SHALL RESTORE THE EXISTING FACILITIES, I.E., THE PROPERTY, INCLUDING DITCH, EQUAL TO OR BETTER THAN EXISTING SITE CONDITIONS PRIOR TO CONSTRUCTION. ALL DISTURBED AREA SHALL BE SEEDED PROPERLY.
16. FINAL ACCEPTANCE OF THE UTILITIES WILL NOT BE GIVEN TO THE CONTRACTOR UNTIL THEY ARE INSPECTED AND APPROVED BY THE CITY OF LEAGUE CITY.
17. ALL MANHOLES ARE TO BE CONSTRUCTED TO ALLOW FOR A MINIMUM OF 1 FOOT OF VERTICAL ADJUSTMENT.
18. ALL TRENCH EXCAVATION, BEDDING AND BACKFILL SHALL BE IN CONFORMANCE WITH THE CITY OF LEAGUE CITY STANDARD DETAILS -- EXCAVATION AND BACKFILL FOR UTILITIES AND UTILITY BACKFILL MATERIAL SPECS.
19. ALL UTILITY TRENCHES UNDER OR WITHIN THREE FEET OF EXISTING, PROPOSED, AND/OR FUTURE PAVEMENT OR CURB SHALL BE BACKFILLED WITH NO LESS THAN 1-1/2 SACKS OF CEMENT PER TON OF CEMENT-STABILIZED SAND TO A POINT ONE FOOT BELOW PAVEMENT SUBGRADE. THE REMAINING BACKFILL SHALL BE MADE WITH COMPACTED SUITABLE MATERIAL.
20. THE USE OF WELL POINT SYSTEMS, WHEN REQUIRED BY TRENCH CONDITIONS, SHALL BE REQUESTED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.
21. CONTRACTOR SHALL PROTECT ALL TREES ADJACENT TO WORK AREA. NO TREES SHALL BE REMOVED WITHOUT PERMISSION OF OWNER.
22. CONTRACTOR SHALL PROVIDE MINIMUM CLEARANCES AT STORM SEWER, SANITARY SEWER AND WATER LINE CROSSINGS AS DESIGNED PER THE PLANS AND ACCORDING TO THE BEDDING AND BACKFILL DETAILS.
23. ALL AREAS DISTURBED ALONG SIDE AND BACK-OF-LOT EASEMENTS OR OTHER UNNECESSARY DISTURBANCES AS A RESULT OF CONSTRUCTION WORK SHALL BE SEEDED AND FERTILIZED IN ACCORDANCE WITH SEEDING SPECIFICATIONS (NO SEPARATE PAY).
24. EXCAVATE MUCK, ORGANIC MATERIAL AND UNSUITABLE SOIL PRIOR TO PLACING FILL. PLACE SUITABLE MATERIAL IN 8" MAXIMUM LOOSE LIFT AND COMPACT TO 95% STANDARD PROCTOR DENSITY.
25. ALL BACKFILL SHALL BE PLACED 8" LIFTS AND COMPACTED TO 95% STANDARD PROCTOR DENSITY AND BE TESTED BY AN APPROVED TESTING LAB.
26. ALL TRENCH BACKFILL SHALL HAVE AT LEAST ONE DENSITY TESTING ON EACH LIFT. ONLY STANDARD BACKFILL PROCEDURES ARE ALLOWED. ANY DEVIATION TO THIS STANDARD MUST BE APPROVED BY THE CITY OF LEAGUE CITY.
27. EXCEPT FOR WATER AND SANITARY SEWER FACILITIES, ALL PROPOSED FACILITIES MUST BE INSTALLED WITH A MINIMUM SEPARATION OF 4 FEET OUTSIDE TO OUTSIDE FROM ALL OTHER EXISTING OR PROPOSED FACILITIES.
28. ALL TESTING PROCEDURES USED ON THIS PROJECT SHALL CONFORM TO THE CITY OF LEAGUE CITY STANDARDS. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TESTS REQUIRED. IF ANY TEST RESULTS DO NOT MEET THE TESTING STANDARDS, SUCH MATERIAL SHALL BE REMOVED AND REPLACED SO THAT THE TESTING STANDARDS CAN BE MET. COST OF TEST AND LABORATORY SERVICES SHALL BE INCIDENTAL AND INCLUDED IN UNIT PRICE OF BID ITEM. A COPY OF THE TEST RESULTS SHALL BE SUBMITTED TO THE ENGINEER AND THE CITY OF LEAGUE CITY.
29. ALL UNSATISFACTORY AND OR WASTE MATERIALS INCLUDING VEGETATION, ROOTS, CONCRETE AND DEBRIS SHALL BE DISPOSED OF OFFSITE BY THE CONTRACTOR, NO DIRECT PAYMENT WILL BE MADE, BUT SHALL BE CONSIDERED AS INCIDENTAL TO THE VARIOUS BID PROPOSAL ITEMS.
30. UTILITY CONTRACTOR SHALL ADJUST RIM ELEVATIONS TO 0.3 FEET ABOVE THE FINISHED GRADE AT EACH MANHOLE LOCATION AFTER PAVEMENT CONTRACTOR HAS COMPLETED FINAL GRADING (NO SEPARATE PAY). SLOPED FILL SHALL BE ADDED FOR STORM WATER DRAINAGE AWAY FROM THE MANHOLE RIM.
31. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE FLAGMEN, SIGNING, STRIPING AND WARNING DEVICES, ETC., DURING CONSTRUCTION BOTH DAY AND NIGHT IN ACCORDANCE WITH THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES."

GENERAL NOTES CONTINUED:

31. UTILITY CONTRACTOR SHALL AT COMPLETION OF HIS WORK FILL AND GRADE ALL UTILITY EASEMENTS (WET AND DRY) FOR POSITIVE DRAINAGE, AS DIRECTED BY THE OWNER. (NOT SEPARATE PAY)
32. CITY OF LEAGUE CITY SIGNATURES ARE VALID FOR 1 (ONE) YEARS ONLY AFTER DATE & SIGNING OF PLANS.
33. UTILITY CONTRACTOR SHALL PROVIDE TEMPORARY SILT BARRIER FENCE ON ALL NON-CURB INLETS WHICH WILL REMAIN IN PLACE AFTER UNDERGROUND CONTRACT IS COMPLETE.
34. CONTRACTOR SHALL CONTACT THE FOLLOWING A MINIMUM OF 48 HOURS PRIOR TO BEGINNING CONSTRUCTION.

A) CITY OF LEAGUE CITY PROJECT MANAGEMENT (281)-554-1439
B) CITY OF LEAGUE CITY PUBLIC WORKS MANAGER, MR. JODY HOOKS (281)-554-1321
C) CITY OF LEAGUE CITY FIRE MARSHALL (281)-554-1290
D) TEXAS ONE CALL SYSTEM 1-800-245-4545
E) LONE STAR NOTIFICATION CENTER 1-800-669-8344
F) TEXAS EXCAVATION SAFETY SYSTEM INC. 1-800-344-8377

35. CONTRACTOR SHALL VERIFY LOCATIONS AND ELEVATIONS OF EXISTING UTILITIES AND PAVEMENT BEFORE CONSTRUCTION. ANY VERIFICATIONS THAT ARE INCONSISTENT WITH THE PLANS NEED TO BE REPORTED TO THE ENGINEER BEFORE CONSTRUCTION BEGINS.
36. WITH CITY ENGINEERS APPROVAL, W. S. & D. SPOIL MAY BE SPREAD EVENLY IN THE STREET RIGHT-OF-WAY AFTER UTILITIES ARE IN PLACE.
37. THERE WILL BE NO ADDITIONAL COST FOR INSTALLING WATER LINES AND SEWERS UNDER EXISTING UTILITIES AND PIPELINE. INCLUDE COST OF THIS WORK IN THE CONTRACT UNIT PRICE FOR ITEMS OF WHICH THIS WORK IS A COMPONENT OR INCIDENTAL.
38. LAWS TO BE OBSERVED, THE DEVELOPER/CONTRACTOR SHALL MAKE HIMSELF FAMILIAR WITH AND AT ALL TIMES SHALL OBSERVE AND COMPLY WITH ALL FEDERAL, STATE, AND LOCAL LAWS, ORDINANCES, AND REGULATIONS WHICH IN ANY MANNER AFFECT THE CONDUCT OF THE WORK AND SHALL INDEMNIFY AND SAVE HARMLESS THE CITY AND ITS REPRESENTATIVES AGAINST ANY CLAIM ARISING FROM THE VIOLATION OF ANY SUCH LAW, ORDINANCE, OR REGULATIONS, WHETHER BY HIMSELF OR BY HIS EMPLOYEES.
39. CONTRACTOR SHALL REMOVE ALL MUD, DIRT, AND DEBRIS DEPOSITED ON EXISTING PAVEMENT DUE TO HIS CONSTRUCTION ACTIVITY DAILY.
40. CONTRACTOR SHALL CONTACT THE WATER UTILITY DEPARTMENT AT 281-554-1390 TO COORDINATE VALVE OPERATIONS FOR PROPOSED TIE-INS.
41. DISPOSAL OF EXCESS EXCAVATION MATERIAL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. DISPOSAL OF EXCESS EXCAVATION MATERIAL WITHIN LEAGUE CITY SHALL COMPLY WITH ORDINANCE 2009-25 ARTICLE 2.

WATER CONSTRUCTION NOTES: 1-2015

1. WATER MAINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF LEAGUE CITY GENERAL DESIGN AND CONSTRUCTION STANDARDS AND THE CITY OF LEAGUE CITY STANDARD DETAILS AS CURRENTLY AMENDED.
2. ALL WATERLINES ARE TO BE HYDROSTATICALLY TESTED BY THE CONTRACTOR IN ACCORDANCE WITH CITY OF LEAGUE CITY CRITERIA.
3. PIPE MATERIAL SHALL BE PVC WATER PIPE AWWA C900 (DR 18) FOR SIZES 6" THROUGH 12" OR C905 (DR 18) FOR SIZES 14" THRU 24", DUCTILE IRON PIPE FOR SIZES 6" THROUGH 36", "STEEL CYLINDER CONCRETE PIPE (CLASS 150) FOR SIZES OVER 18" IN CONFORMANCE WITH MATERIAL SPECIFICATION OF THE CITY OF LEAGUE CITY. (ANY OTHER MATERIAL OR SIZES TO BE SUBMITTED FOR APPROVAL).
4. ALL WATER VALVES SHALL OPEN COUNTER CLOCKWISE. ALL WATER VALVES SHALL BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF AWWA C-500 AND SHALL BE OF THE RESILIENT SEAT TYPE.
5. ALL FLANGES BELOW GRADE SHALL BE INSULATED.
6. ALL WATERLINES SHALL BE ENCASED IN BANK SAND TO AT LEAST 12" ABOVE THE PIPE. COST OF BANK SAND TO BE INCLUDED IN UNIT PRICE OF WATERLINE.
7. WATERLINE TRENCHES UNDER PAVEMENT OR WITHIN THREE (3) FOOT OF PROPOSED CURBS SHALL BE BACKFILLED WITH CEMENT STABILIZED SAND (NO LESS THAN 1-1/2 SACK/PER TON) UP TO WITHIN ONE FOOT OF PAVEMENT. COST OF BACKFILL SHALL NOT BE PAID DIRECTLY BUT SHALL BE INCLUDED IN THE UNIT PRICE OF WATERLINE.
8. ALL FLUSHING VALVES SHALL BE LOCATED A MIN. OF 3' BACK OF CURB, ON CURB AND GUTTER STREETS. ON STREETS HAVING NO CURB, THE FLUSHING VALVE SHALL BE LOCATED INSIDE THE RIGHT-OF-WAY OR ADJACENT EASEMENT.
9. WATERLINE SHALL BE CONSTRUCTED SUCH THAT ALL CROSSES AND TEES WILL NOT BE LOCATED UNDER PROPOSED OR FUTURE PAVING.
10. UTILITY CONTRACTOR TO TURN FLUSHING VALVES AND ALL FINAL ADJUSTMENTS AFTER COMPLETION OF PAVING. NO SEPARATE PAY.
11. SANITARY PRECAUTIONS MUST BE TAKEN DURING WATERLINE CONSTRUCTION, AS CALLED FOR BY AWWA STANDARDS. PRECAUTIONS INCLUDE KEEPING PIPE CLEAN AND CAPPING OR OTHERWISE EFFECTIVELY COVERING OPEN PIPE ENDS TO EXCLUDE INSECTS, ANIMALS OR OTHER SOURCES OF CONTAMINATION FROM UNFINISHED PIPE LINES AT TIMES WHEN CONSTRUCTION IS NOT IN PROGRESS.
12. ALL NEWLY INSTALLED PIPES, COATINGS AND RELATED PRODUCTS MUST CONFORM TO AMERICAN NATIONAL STANDARDS INSTITUTE/NATIONAL SANITATION FOUNDATION (ANSI/NSF) STANDARDS AND MUST BE CERTIFIED BY AN ORGANIZATION ACCREDITED BY ANSI.
13. ALL DUCTILE IRON PIPE WATERLINE SHALL HAVE BEDDING AND BACKFILL EMBEDMENT IN ACCORDANCE WITH THE CITY OF LEAGUE CITY DETAILS AND DESIGN AND SPECIFICATIONS AS CURRENTLY AMENDED.
14. WATER MAINS SHALL HAVE MINIMUM OF 4' COVER FROM TOP OF CURB. EXCEPT 16" AND LARGER WATER LINES SHALL HAVE MINIMUM OF 5' COVER FROM TOP OF CURB.
15. FLUSHING VALVE UNIT CONSISTS OF: MAIN LINE SIZE X 6" TEE, 6" PVC PIPE LEAD, 6" GATE VALVE WITH BOX, AND ONE FLUSHING VALVE WITH 4' MIN. BURY. ANY OTHER PIPE MATERIAL SHALL BE IN ACCORDANCE WITH THE CITY'S DESIGN AND CONSTRUCTION STANDARDS MANUAL.
16. WATER & SANITARY SEWER THAT ARE PARALLEL MUST BE INSTALLED IN SEPARATE TRENCHES WITH NO LESS THAN 9' (NINE FEET) MIN. HORIZONTAL CLEARANCE. SEE LEAGUE CITY DETAIL SANITARY SEWER INSTALLATION CROSSING OR PARALLEL TO WATER LINE.
17. UNLESS MANHOLES CAN BE MADE WATERTIGHT AND TESTED FOR NO LEAKAGE THEY MUST BE INSTALLED SO AS TO PROVIDE A MINIMUM OF NINE FEET OF HORIZONTAL CLEARANCE FROM AN EXISTING OR PROPOSED WATER LINE. IF THE NINE FOOT SEPARATION DISTANCE CANNOT BE ACHIEVED, THE WATERLINE MUST BE ENCASED IN A JOINT OF 150 PSI PRESSURE CLASS PIPE AT LEAST 18 FEET LONG AND TWO NOMINAL SIZES LARGER THAN THE WATERLINE. THE SPACE AROUND THE CARRIER PIPE SHALL BE SUPPORTED AT 5 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 SEAL."
18. COMPLETED WATERLINES MUST BE DISINFECTED IN ACCORDANCE WITH AWWA STANDARD C651, "DISINFECTING WATER MAINS."
19. IF CLEARANCE IS BETWEEN SIX (6) INCHES TO TWO (2) FEET ONE 20 FOOT JOINT OF C-900 PVC, 150 PSI WATERLINE SHALL BE CENTERED AT SANITARY CROSSING.
20. ALL STUB OUTS AND THEIR FITTINGS FOR FUTURE WATER MAIN AND LATERAL EXTENSIONS SHALL BE MECHANICALLY RESTRAINED WITH MEGA-LUG, UNI-FLANGE OR APPROVED EQUAL RESTRAINT DEVICES.
21. ALL WATER LINES ON PRIVATE PROPERTY AND/OR UNDER PAVEMENT SHALL BE RESTRAINED.

PROTECTION REQUIREMENTS AT WATER LINE-SANITARY SEWER CROSSINGS:

PRIMARY CONDITION	PROPOSED WATER -- EXISTING SANITARY				OR PROPOSED WATER - PROPOSED SANITARY EXISTING WATER - PROPOSED SANITARY			
SECONDARY CONDITION	WATER OVER SANITARY		WATER UNDER SANITARY		WATER OVER SANITARY		WATER UNDER SANITARY	
IF THE CLEARANCE IS	LESS THAN 2 FEET	GREATER THAN OR EQUAL TO 2 FEET BUT LESS THAN 9 FT.	LESS THAN 2 FEET	GREATER THAN OR EQUAL TO 2 FEET BUT LESS THAN 9 FT.	LESS THAN 2 FEET	GREATER THAN OR EQUAL TO 2 FEET BUT LESS THAN 9 FT.	LESS THAN 2 FEET	GREATER THAN OR EQUAL TO 2 FEET BUT LESS THAN 9 FT.
PROTECTION REQUIREMENT	1,2,3	2	6	4	1,3,5	2	1,3,5	5

NOTE: PROTECTION REQUIREMENTS FOR SANITARY SEWER CROSSINGS (UNLESS VARIANCE IS GRANTED BY THE TCEQ) ARE (ALL CLEARANCES SHALL BE MEASURED FROM OUTSIDE WALL TO OUTSIDE WALL).

1. PLACE ONE FULL SECTION OF JOINT WATERLINE CENTERED AT SANITARY SEWER. NOT APPLICABLE FOR EXISTING WATER.
2. IF NO EVIDENCE OF SANITARY SEWER LEAKAGE PLACE ONE FULL SECTION OF WATERLINE CENTERED OVER SANITARY SEWER; IF THERE IS EVIDENCE OF LEAKAGE USE NOTE 4 BELOW.
3. ONE FOOT MINIMUM CLEARANCE.
4. AUGER 9 FEET MINIMUM EACH SIDE OF SANITARY SEWER. PLACE ONE FULL SECTION OF WATER LINE, CENTERED UNDER SANITARY SEWER. FILL AUGURED HOLE WITH BENTONITE/CLAY MIXTURE IF SEWER LINE IS LEAKING, SEWER LINE SHALL BE REPLACED WITH 150 PSI LINED DUCTILE IRON OR PVC PIPE WITH APPROPRIATE ADAPTERS ON ALL PORTIONS OF THE SANITARY SEWER WITHIN 9 FEET OF THE WATER LINE. PROVIDE RESTRAINED JOINTS FOR BOTH WATER AND SANITARY SEWER LINES AT EACH END OF PROPOSED PIPE SECTION. WATER LINE MUST PASS A PRESSURE AND LEAKAGE TEST AS SPECIFIED IN CITY'S STANDARD SPECIFICATIONS. SEWER LINE SHALL INFILTRATION, EX-FILTRATION LOW PRESSURE AIR TEST OR LEAKAGE TEST AS SPECIFIED IN TCEQ CHAPTER 317-2 DESIGN CRITERIA FOR SEWER SYSTEMS.
5. PLACE MINIMUM ONE FULL SECTION OF SANITARY SEWER, 150 PSI LINED DUCTILE IRON OR PVC PIPE CENTERED AT THE WATER LINE AND PROVIDE RESTRAINED JOINTS FOR BOTH WATER AND SANITARY SEWER LINES AT EACH END OF PROPOSED PIPE SECTION. USE CEMENT-STABILIZED SAND BACKFILL FOR ALL PORTIONS OF THE SANITARY SEWER WITHIN 9 FEET OF THE WATER LINE, AS MEASURED PERPENDICULARLY FROM ANY POINT ON THE WATER LINE TO THE SANITARY SEWER (MINIMUM 2.5 SACKS CEMENT PER CUBIC YARD OF SAND). THE CEMENT STABILIZED SAND BEDDING SHALL START AT A POINT 6 INCHES BELOW THE BOTTOM OF SANITARY SEWER TO 8 INCHES ABOVE THE TOP OF SANITARY SEWER AND ONE QUARTER OF THE PIPE DIAMETER OR 6 INCHES, WHICHEVER IS GREATER, ON THE SIDE OF THE SANITARY SEWER.
6. NOT ALLOWED.

STORM SEWER CONSTRUCTION NOTES: 1-2015

1. STORM SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF LEAGUE CITY GENERAL DESIGN AND CONSTRUCTION STANDARDS AND THE CITY OF LEAGUE CITY STANDARD DETAILS AS CURRENTLY AMENDED.
2. REINFORCED CONCRETE PIPE (C-76 CLASS III) STORM SEWERS SHALL BE INSTALLED, BEDDED AND BACKFILLED IN ACCORDANCE WITH CITY OF LEAGUE CITY DETAIL. WHEN FULLY ASPHALT COATED CORRUGATED GALVANIZED METAL PIPE (CGMP) IS SPECIFIED IN THE PLANS, THE BEDDING AND BACKFILL SHALL BE INSTALLED PER CITY OF LEAGUE CITY DETAIL. ALL CONCRETE BOX SEWERS SHALL HAVE BEDDING AND BACKFILL PER CITY OF LEAGUE CITY DETAILS.
3. ALL STORM SEWERS UNDER OR WITHIN THREE (3) FT. OF PROPOSED OR FUTURE PAVEMENTS SHALL BE BACKFILLED WITH NO LESS THAN 1-1/2 SACKS OF CEMENT PER TON OF CEMENT STABILIZED SAND TO WITHIN ONE (1) FT. OF SUBGRADE.
4. ALL STORM SEWERS CONSTRUCTED IN SIDE LOT EASEMENTS SHALL BE R.C.P. (C-76 CLASS III) UNLESS SPECIFIED OTHERWISE AND SHALL BE BEDDED IN ACCORDANCE WITH CITY OF LEAGUE CITY DETAIL.
5. ALL PROPOSED PIPE STUB-OUTS FROM MANHOLES OR INLETS ARE TO BE PLUGGED WITH 8" THICK BRICK WALLS UNLESS OTHERWISE NOTED.
6. ALL STORM SEWER MANHOLES SHALL BE CITY OF LEAGUE CITY TYPE "C" UNLESS OTHERWISE NOTED. RACK OVER MANHOLE TO MISS PROPOSED CURB IF CONFLICT EXISTS WITH PRE-CAST ECCENTRIC CONE SECTION.
7. ALL TYPE "E" INLETS SHALL HAVE 5/8 INCH IRON BARS ACROSS OPENINGS.
8. ALL STORM SEWER PIPES 18" AND LARGER TO BE REINFORCED CONCRETE PIPE ASTM C76 CLASS III INCLUDING INLET LEADS CROSSING UNDER EXISTING OR PROPOSED PAVEMENTS. ALL INLET LEADS SHALL BE 18" REINFORCED CONCRETE PIPE OR LARGER. ALL STORM SEWER PIPE SHALL BE RUBBER GASKETED.
9. CONTRACTOR SHALL PROVIDE 18" MINIMUM CLEARANCE AT STORM SEWER AND WATER LINE CROSSINGS.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING, MAINTAINING, AND RESTORING ANY BACKSLOPE DRAINAGE SYSTEMS DISTURBED AS A RESULT OF HIS WORK.
11. ALL DITCHES SHALL BE REGRADED TO PROPOSED ELEVATIONS TO INSURE PROPER DRAINAGE. ALL OUTFALLS SHALL BE PROPERLY BACKFILLED AND COMPACTED AND ALL DISTURBED AREAS SHALL BE REGRADED, SEEDED, AND FERTILIZED WITHIN 10 WORKING DAYS OF EACH OCCURRENCE. (NO SEPARATE PAYMENT).
12. THE CONTRACTOR SHALL RESEED ALL DRAINAGE EASEMENT AREAS DISTURBED AS A RESULT OF HIS WORK. (NO SEPARATE PAY)
13. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE OWNING AUTHORITY. ALL CONSTRUCTION STORM RUNOFF SHALL COMPLY WITH THE FINAL DRAFT OF STORMWATER MANAGEMENT HANDBOOK FOR CONSTRUCTION ACTIVITIES AS PREPARED BY HARRIS COUNTY/HCFCD, ALL IN COMPLIANCE WITH THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) REQUIREMENTS.
14. ALL INLETS TO BE TYPE "H-2" PRECAST OR APPROVED EQUAL, UNLESS OTHERWISE INDICATED ON THESE PLANS. INLETS INCLUDE ALL DEPTHS AND SHALL BE CONSTRUCTED IN TWO (2) PHASES.
15. CORRUGATED STEEL PIPE FOR STORM SEWER OUTFALLS SHALL BE IN ACCORDANCE WITH THE FOLLOWING:

    MATERIAL: THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF ASTM A742.

    PIPE: THE CORRUGATED STEEL PIPE SHALL BE MANUFACTURED IN ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF ASTM A762. THE PIPE SIZES, GAUGES AND CORRUGATIONS SHALL BE AS SHOWN ON THE PLANS.

    INSTALLATION: SHALL BE IN ACCORDANCE WITH ASTM A798 AND IN CONFORMANCE WITH THE PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS, THE CONTRACTOR MUST BRING THEM TO THE ATTENTION OF THE PROJECT ENGINEER.

16. ALL DRAINAGE FACILITIES SHALL BE INSPECTED VISUALLY TO VERIFY ACCURACY OF ALIGNMENT AND FREEDOM FROM DEBRIS AND OBSTRUCTION PER CITY OF LEAGUE CITY GENERAL DESIGN & CONSTRUCTION STANDARD ITEM 708.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

GENERAL NOTES

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
BELL ANDREA CHENG RANFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\ROADWAY\GENERAL NOTES.dgn 7/20/2017 10:00:13 PM CCL

PAVING CONSTRUCTION NOTES: 1-2015

1. GUIDELINES SET FORTH IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" SHALL BE OBSERVED.
2. ALL RETURNS HAVE 25' RADIUS AT BACK OF CURB UNLESS OTHERWISE NOTED.
3. WHEN THE TOP OF CURB ELEVATION OR BOTTOM OF PAVEMENT SLAB IS ABOVE NATURAL GROUND, THE PAVING CONTRACTOR SHALL BACKFILL FROM THE NATURAL GROUND TO TOP OF CURB IN LAYERS NOT EXCEEDING 8 INCHES IN DEPTH AND EACH LAYER COMPACTED TO NOT LESS THAN 95% STANDARD PROCTOR DENSITY AND SHALL FILL FROM CURB TO EDGE OF TREELINE. (NO SEPARATE PAY)
4. PAVING CONTRACTOR SHALL PROTECT WATER, SEWER, AND DRAINAGE FACILITIES; AND WILL REPLACE AT HIS EXPENSE ANY FACILITIES DAMAGED DURING PAVING OPERATIONS. ALL MANHOLES AND VALVES FALLING WITHIN PAVEMENT AREA SHALL BE ADJUSTED TO FINISHED GRADE BY PAVING CONTRACTOR WITHOUT THE USE OF BLOCKOUTS WHEN DIRECTED BY OWNER (WITH NO SEPARATE PAY).
5. PAVING SHALL BE IN ACCORDANCE WITH THE CITY OF LEAGUE CITY GENERAL DESIGN AND CONSTRUCTION STANDARDS AND THE CITY OF LEAGUE CITY STANDARD DETAILS AS CURRENTLY AMENDED.
6. EXISTING PAVEMENTS, CURBS, SIDEWALKS, AND DRIVEWAYS DAMAGED OR REMOVED DURING CONSTRUCTION SHALL BE REPLACED TO CITY OF LEAGUE CITY STANDARDS.
7. CONDITION OF THE ROAD AND / OR RIGHT-OF-WAY, UPON COMPLETION OF JOB, SHALL BE AS GOOD AS OR BETTER THAN THE CONDITION PRIOR TO STARTING WORK.
8. ALL ROAD WIDTHS, CURB RADII, AND CURB ALIGNMENT SHOWN INDICATE BACK OF CURB. T.C. INDICATES TOP OF CURB. T.P. INDICATES TOP OF PAVEMENT ELEVATIONS.
9. DOUBLE REFLECTORIZED BLUE TRAFFIC MARKERS SHALL BE PLACED 1 FOOT OFFSET OF THE CENTERLINE AT ALL FIRE HYDRANT LOCATIONS BY THE PAVING CONTRACTOR. HYDRANTS LOCATED AT INTERSECTIONS SHALL HAVE A BUTTON PLACED ON EACH STREET. NO EXTRA PAY.
10. AREAS TO RECEIVE FILL SHALL BE STRIPPED 4 INCHES AND SCARIFIED PRIOR TO FILL PLACEMENT. PAVEMENT FILL SHALL BE COMPACTED TO A MINIMUM 95% MAXIMUM DENSITY PER ASTM D698 IN MAXIMUM 8" LOOSE LIFTS
11. TRANSVERSE EXPANSION JOINTS SHALL BE INSTALLED AT EACH CURB RETURN AND AT A MAXIMUM SPACING OF 80 FEET.
12. THE SUBGRADE IS TO BE SCARIFIED TO A DEPTH DETERMINED BY TEST LAB, WITH LIME OR CEMENT STABILIZE AS DETERMINED BY LAB RESULTS AND COMPACTED TO 95% STANDARD PROCTOR DENSITY PER ASTM D698 OR ASTM D1557.
13. WHEN A 6 INCH THICK CONCRETE ROADWAY INTERSECTS WITH A 7 INCH THICK CONCRETE ROADWAY, 7 INCH THICK CONCRETE SHALL BE CONSTRUCTED FOR THE ENTIRE INTERSECTION TO THE ENDS OF ALL CURB RETURNS.
14. AREAS TO BE FILLED SHALL BE SCARIFIED AND COMPACTED TO AT LEAST 95% OF MAXIMUM DENSITY PER ASTM D-698, TO A DEPTH OF 8 INCHES PRIOR TO FILL PLACEMENT. FILL MATERIAL SHALL BE PLACED IN MAXIMUM 8 INCH THICK LOOSE LIFTS AND COMPACTED TO AT LEAST 95% OF MAXIMUM DENSITY AS PER ASTM D-698. MOISTURE CONTENT SHALL BE WITHIN 2% OF OPTIMUM UNLESS OTHERWISE DIRECTED BY OWNER'S TESTING LAB OR THE ENGINEER. FILL SHALL BE CLEAN EARTH, SAND, OR A COMBINATION, AND BE FREE FROM TRASH, VEGETATION AND LARGE STONES.
15. A CONTINUOUS LONGITUDINAL REINFORCING BAR SHALL BE USED IN THE CURBS.
16. STREET NAME SIGNS TO BE STANDARD CITY OF LEAGUE CITY SIGNS AND INSTALLED BY CONTRACTOR. CONTACT CITY OF LEAGUE CITY STREET DEPARTMENT FOR EXAMPLE. CONTRACTOR TO VERIFY STREET NAME WITH APPROVED PLAT.
17. ALL EXCESS SUITABLE SOILS FROM WS&D AND PAVING CONSTRUCTION SHALL BE EVENLY APPLIED TO LOT AREAS IN ACCORDANCE WITH ITEM 15 OF THIS PAVING CONSTRUCTION NOTES, AND BE INCIDENTAL TO THE LOT GRADING ITEM OF THIS CONTRACT.
18. CONTRACTOR SHALL GET A COPY OF THE APPROVED PLAT TO DETERMINE THE CORRECT NAMES OF THE STREETS BEFORE ORDERING AND PLACING STREET SIGN NAMES.
19. SIDEWALKS FALLING WITHIN OR ADJACENT TO RESERVES PARALLEL WITH ROAD RITH-OF-WAYS AND ALL CROSS WALK RAMPS SHALL BE PLACED BY THE OWNERS CONTRACTOR.

STORM WATER POLLUTION PREVENTION: 5-2016

1. IF THE SWPPP IS CHANGED AFTER THE CITY HAS APPROVED THE PLAN SET, THE CONTRACTOR MUST RESUBMIT CHANGES TO THE STORM WATER INSPECTOR FOR APPROVAL BEFORE CHANGES ARE MADE ON-SITE.
2. THE CONTRACTOR SHALL MAINTAIN SILT FENCING AND SEDIMENT DEVICES AT ALL TIMES AND DO AN INSPECTION EVERY 7 DAYS AND/OR WITHIN 24 HOURS OF THE END OF A RAINFALL EVENT. ALL EROSION CONTROL DEVICES SHOULD BE CLEANED AND REPAIRED IN ACCORDANCE WITH THE FOLLOWING:

A. SILT FENCING &SEDIMENT DEVICES SHALL BE REPAIRED OR REPLACED IF THEY SHOW SIGNS OF UNDERMINING, OR SHALL BE REPLACED IF THE SHOW SIGNS OF DETERIORATION.

B. ALL SEEDED AREAS SHALL BE CHECKED REGULARLY TO SEE THAT A GOOD STAND IS MAINTAINED. AREAS SHOULD BE FERTILIZED AND RESEEDED AS NEEDED.

C. SILT FENCING SHALL BE REPAIRED TO THEIR ORIGINAL CONDITIONS IF DAMAGED. SEDIMENT SHALL BE REMOVED FROM THE SILT FENCING WHEN IT REACHES ONE-THIRD TO ONE-HALF THE HEIGHT OF THE SILT FENCE.

D. THE CONSTRUCTION ENTRANCES SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD ONTO A RIGHT-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING OF THE CONSTRUCTION ENTRANCES AS CONDITIONS DEMAND.

E. THE TEMPORARY PARKING AND STORAGE AREA SHALL BE KEPT IN GOOD CONDITION (SUITABLE FOR PARKING AND STORAGE). THIS MAY REQUIRE PERIODIC TOP DRESSING OF TEMPORARY PARKING AS CONDITIONS DEMAND.

3. A FINAL CO SHALL NOT BE ISSUED UNTIL ALL EROSION AND SEDIMENT CONTROL DEVICES ARE REMOVED.
4. CONTRACTOR WILL SWEEP STREETS AND CURB LINES ONCE A DAY UNTIL ALL CONCRETE/PAVING IS IN PLACE. ALL MATERIAL SPILLED, DROPPED, WASHED OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.
5. ALL CONTRACTORS AND SUBCONTRACTORS INVOLVED WITH STORM WATER POLLUTION PREVENTION SHALL OBTAIN A COPY OF THE STORM WATER POLLUTION PREVENTION PLAN AND THE STATE OF TEXAS NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEMS GENERAL PERMIT (NPDES PERMIT) AND BECOME FAMILIAR WITH THEIR CONTENTS.
6. MUST KEEP DUMPSTERS CLEAN AND ALL TRASH PICKED UP ON PROJECT SITE AT ALL TIMES.
7. ALL WASH WATER (CONCRETE TRUCKS, VEHICLE CLEANING, EQUIPMENT CLEANING, ETC.) SHALL BE DISPOSED OF IN A MATTER THAT PREVENTS CONTACT BETWEEN THESE MATERIALS AND STORM WATER THAT IS DISCHARGED FROM THE SITE.
8. MAINTAIN OR HAVE READILY AVAILABLE SUFFICIENT OIL AND GREASE ABSORBING MATERIALS AND FLOTATION BOOMS TO CONTAIN AND CLEAN UP FUEL OR CHEMICAL SPILLS AND LEAKS.
9. DUST SHALL BE CONTROLLED BY SPRAYING WATER ON DRY AREAS OF THE SITE. THE USE OF MOTOR OILS AND OTHER PETROLEUM BASED OR TOXIC LIQUIDS FOR DUST SUPPRESSION OPERATIONS IS PROHIBITED.
10. NO RUBBISH, TRASH, GARBAGE OR OTHER SUCH MATERIALS SHALL BE DISCHARGED INTO DRAINAGE DITCHES OR WATERS OF THE STATE.
11. ALL STORM WATER POLLUTION PREVENTION MEASURES PRESENTED ON THIS PLAN, AND IN THE STORM WATER POLLUTION PREVENTION PLAN, SHALL BE INITIATED AS SOON AS PRACTICABLE.
12. DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITY WILL STOP FOR AT LEAST 21 DAYS SHALL BE TEMPORARILY SEEDED WITHIN 14 DAYS.
13. DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITY HAS PERMANENTLY STOPPED SHALL BE PERMANENTLY SEEDED. THESE AREAS SHALL BE SEEDED NO LATER THAN 14 DAYS AFTER THE LAST CONSTRUCTION ACTIVITY OCCURRING IN THESE AREAS. REFER TO THE LANDSCAPING PLAN.
14. CONTRACTORS OR SUBCONTRACTORS WILL BE RESPONSIBLE FOR REMOVING SEDIMENT IN THE DETENTION POND AFTER THE STABILIZATION OF THE SITE AND ANY SEDIMENT THAT MAY HAVE COLLECTED IN THE STORM SEWER DRAINAGE SYSTEMS.
15. IF SOIL STOCKPILING IS EMPLOYED ON THIS SITE, SILT FENCES SHALL BE USED TO HELP CONTAIN THE SEDIMENT.
16. SEDIMENT BASINS ARE ATTRACTIVE TO CHILDREN AND CAN BE VERY DANGEROUS. IN ALL CASES, LOCAL ORDINANCES AND REGULATIONS REGARDING HEALTH AND SAFETY MUST BE ADHERED TO.
17. DURING THE DEVELOPMENT OF THE PROJECT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING THE EROSION CONTROL MEASURES (SILT FENCES, STRAW BALES, ETC.) TO HELP PREVENT EROSION AND STORM WATER POLLUTION. THE LEAGUE CITY STORM WATER INSPECTOR SHALL HAVE FINAL APPROVAL OF ANY CHANGES MADE TO THE EROSION CONTROL MEASURES.
18. ALL OFF-SITE CONSTRUCTION SHALL BE STABILIZED AT THE END OF EACH WORKING DAY; THIS INCLUDES BACKFILLING OF TRENCHES FOR STORM DRAINS & UTILITY CONSTRUCTION AND PLACEMENT OF GRAVEL OR BITUMINOUS PAVING FOR ROAD CONSTRUCTION.

CENTERPOINT ENERGY GAS FACILITIES:

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 LOCATIONS. 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) 945-8037 (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.

ACTIVITIES ON OR ACROSS CENTERPOINT ENERGY FEE OR EASMENT PROPERTY:
NO APPROVAL TO USE, CROSS, OR OCCUPY CENTERPOINT FEE OR EASEMENT PROPERTY IS GIVEN. IF YOU NEED TO USE CENTERPOINT PROPERTY, PLEASE CONTACT OUR SURVEYING & RIGHT OF WAY DIVISION AT (713) 207-6248 OR (713) 207-5269.

TEXAS NEW MEXICO POWER:

WARNING:
OVERHEAD LINES MAY EXIST ON THE PROPERTY. WE HAVE NOT ATTEMPTED TO MARK THOSE LINES SINCE THEY ARE CLEARLY VISIBLE, BUT CONTRACTOR SHALL LOCATE THEM PRIOR TO BEGINNING ANY CONSTRUCTION. TEXAS LAW, SECTION 752, HEALTH & SAFETY CODE, FORBIDS ALL ACTIVITIES IN WHICH PERSONS OR THINGS MAY COME WITHIN SIX (6) FEET OF LIFE OVERHEAD HIGH VOLTAGE LINES. CONTRACTORS AND OWNERS ARE LEGALLY RESPONSIBLE FOR SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW. THIS LAW CARRIES BOTH CRIMINAL AND CIVIL LIABILITY. TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL TEXAS NEW MEXICO POWER AT (409)-945-2386.

FRONTIER COMMUNICATIONS NOTES:

1. THE LOCATIONS OF FRONTIER COMMUNICATIONS FACILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. SERVICE LINES ARE NOT SHOWN. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. CONTRACTOR AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES, WHICH MIGHT BE OCCASIONED BY THIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.
2. THE CONTRACTOR SHALL CALL TEXAS ONE-CALL AT 1-800-245-4545 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD LOCATED.
3. WHEN EXCAVATING WITHIN EIGHTEEN INCHES (18") OF THE INDICATED LOCATION OF FRONTIER COMMUNICATIONS FACILITIES, ALL EXCAVATIONS MUST BE ACCOMPANIED USING NON-MECHANIZED EXCAVATION PROCEDURES.
4. WHENEVER FRONTIER COMMUNICATIONS FACILITIES ARE EXPOSED, SUFFICIENT SUPPORT SHOULD BE PROVIDED TO THE FACILITIES TO PREVENT EXCESSIVE STRESS ON CABLE AND/OR CONDUIT DUCTS.
5. CONTACT DARRIN ALBRECHT, SUPERVISOR-NETWORK ENGINEERING AT (281) 338-2221 FOR QUESTIONS REGARDING FRONTIER COMMUNICATIONS FACILITIES.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

GENERAL NOTES

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
BELL ANDREA CHENG RAFT
86219
LICENSED
PROFESSIONAL ENGINEER
7/20/17

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\ROADWAY\GENERAL NOTES.dgn 7/20/2017 10:00:14 PM CCL

ROADWAY

ROADWAY PLAN SHEET	LOCATION	0110 6001	0132 6006	0162 6002	0162 6003	0164 6066	0166 6001	0168 6001	0247 6312	0260 6009	0260 6012	0310 6001	0341 6043	0360 6028	0479 6004	0514 6001	0529 6002	0530 6004	0530 6005	0531 6003	0531 6004	0531 6007	0550 6001	0550 6015	0552 6001	0560 6015
		EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY C)	BLOCK SODDING	STRAW OR HAY MULCH	DRILL SEEDING (PERM) (WARM OR COOL)	FERTILIZER	VEGETATIVE WATERING	FL BS (CMP IN PLC) (TY D GR 1 - 2) (8")	LIME TRT (EXST MATL) (6")	LIME (HYD, COM OR CK) (SLRY) OR CK (DRY)	PRIME COAT (MULTI OPTION)	D - GR HMA TY - D PG70 - 22	CONC PAV (JOINT REINF) (6")	ADJUSTING MANHOLES (SANITARY)	PERM CTB (SGL SLOPE) (TY 1) (42)	CONC CURB (TY B)	DRIVEWAYS (CONC)	DRIVEWAYS (ACP)	CONC SIDEWALKS (6")	CURB RAMPS (TY 1)	CURB RAMPS (TY 4)	CHAIN LINK FENCE (INSTALL) (6')	REMOVE AND INSTALL EXISTING GATE	WIRE FENCE (TY A)	MAILBOX INSTALL - S (TIM - POST) TY S
		CY	CY	SY	SY	SY	AC	MG	SY	SY	TON	GAL	TON	SY	EA	LF	LF	SY	SY	SY	EA	EA	LF	EA	LF	EA
N. KANSAS SHEET 1 OF 6	BEGIN TO STA 105+00	360	50	308	583	583	0.18	22.1	1,214	1,214	21	266	117			50		0	28	234				1	288	
N. KANSAS SHEET 2 OF 6	STA 105+00 TO STA 110+00	1,460	715	424	1,331	1,331	0.35	43.5	1,544	1,544	27	334	147				60	101	35	319					233	
N. KANSAS SHEET 3 OF 6	STA 110+00 TO STA 114+50	1,360	775	416	1,936	1,936	0.50	59.8	1,376	1,448	25	281	124	164			126	198		277	2		14			
N. KANSAS SHEET 4 OF 6	STA 114+50 TO STA 119+00	1,240	620	400	1,320	1,320	0.35	42.6	1,300	1,300	23	281	124		1			302		289			14			1
N. KANSAS SHEET 5 OF 6	STA 119+00 TO STA 123+50	690	870	406	1,410	1,410	0.38	45.0	1,481	1,481	26	326	143					145		279		2				1
N. KANSAS SHEET 6 OF 6	STA 123+50 TO END	330	120	147	334	334	0.10	11.9	541	541	9	161	71					12		64		1				1
SATSUMA SHEET 1 OF 1		100	150	175			0.04	4.3	1,739	1,159	20	237	104									2				
PROJECT TOTALS		6,480	3,300	2,276	6,974	6,974	2	228	9,194	8,686	152	1,886	830	164	1	50	186	759	63	1,462	2	5	28	1	521	3

REMOVAL

ROADWAY PLAN SHEET	LOCATION	0100 6002	COLC 1535	COLC 2915	0104 6001	0104 6009	0104 6017	0104 6021	0105 6020	0105 6021	0305 6002	0496 6004	0496 6006	0496 6007	0542 6001	0542 6002
		PREPARING ROW	TREE AND PLANT PROTECTION FENCING	TREE PLANTING	REMOVING CONC (PAV)	REMOVING CONC (RIPRAP)	REMOVING CONC (DRIVEWAYS)	REMOVING CONC (CURB)	REMOVING STAB BASE & ASPH PAV (12")	REMOVING STAB BASE AND ASPH PAV (0-4")	SALV, HAUL & STKPL RCL APH PV (0 TO 2")	REMOV STR (SET)	REMOV STR (HEADWALL)	REMOV STR (PIPE)	REMOVE METAL BEAM GUARD FENCE	REMOVE TERMINAL ANCHOR SECTION
		STA	LF	EA	SY	SY	SY	LF	SY	SY	SY	EA	EA	LF	LF	EA
N. KANSAS SHEET 1 OF 6	BEGIN TO STA 105+00	4	720						719	32				21		
N. KANSAS SHEET 2 OF 6	STA 105+00 TO STA 110+00	5	580			75	197	60	1,132	33			3	107		
N. KANSAS SHEET 3 OF 6	STA 110+00 TO STA 114+50	5	100	1	192		158	126	1,042			10	2	228	57	
N. KANSAS SHEET 4 OF 6	STA 114+50 TO STA 119+00	5	280	1			197		1,063	56		16		250	47	1
N. KANSAS SHEET 5 OF 6	STA 119+00 TO STA 123+50	5	340	2			114		1,148	62				241		
N. KANSAS SHEET 6 OF 6	STA 123+50 TO END	2	150	4					414	20	167		1	199	134	4
PROJECT TOTALS		25	2,170	8	192	75	576	186	5,518	203	167	26	6	1,046	238	5

WATER LINE

ROADWAY PLAN SHEET	LOCATION	COLC 401	COLC 401	COLC 401	COLC 401	COLC 401	COLC 401	COLC 401	COLC 401	COLC 401	COLC 401	COLC 401	COLC 401	COLC 401	COLC 401
		WATER MAIN (PVC) (SCHD 40) (2")	WATER MAIN (PVC) (C - 900) (6")	WATER MAIN (PVC) (C - 900) (8")	ABAND / FILL EXST WATER PIPE (2")	REMOVE EXST WATER PIPE (2")	REMOVE EXST WATER PIPE (6")	REMOVE EXST WATER PIPE (8")	ADJUST EXISTING VALVE BOX	WTR (GATE VALVE & BOX) COMPL (2")	REMOVING WATER VALVE AND BOX	CUT AND PLUG WATER MAIN (2IN)	CUT AND PLUG WATER MAIN (8IN)	WET CONNECTION (2IN)	ADJUST FIRE HYDRANT
		LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA
N. KANSAS SHEET 1 OF 6	BEGIN TO STA 105+00														
N. KANSAS SHEET 2 OF 6	STA 105+00 TO STA 110+00														
N. KANSAS SHEET 3 OF 6	STA 110+00 TO STA 114+50														
N. KANSAS SHEET 4 OF 6	STA 114+50 TO STA 119+00		30				30								1
N. KANSAS SHEET 5 OF 6	STA 119+00 TO STA 123+50			30				63					2		
N. KANSAS SHEET6 OF 6	STA 123+50 TO END	86		30	27	40		30	2	2	1	1		1	1
PROJECT TOTALS		86	30	60	27	40	30	93	2	2	1	1	2	1	2

DRAINAGE

ROADWAY PLAN SHEET	LOCATION	0402 6001	0462 6030	0462 6084	0464 6002	0464 6003	0464 6005	0464 6008	0464 6032	0465 6002	0465 6154	0465 6238	0467 6363	0467 6391	0467 6395	0467 6545
		TRENCH EXCAVATION PROTECTION	CONC BOX CULV (10 FT X 6 FT)	CONC BOX CULV (12 FT X 4 FT) (EXTEND)	RC PIPE (CL III) (15 IN)	RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	RC PIPE (CL III) (36 IN)	RC PIPE (ARCH) (CL III) (DES 3)	MANH (COMPL) (PRM) (48IN)	INLET (COMPL) (PAZD) (RC) (5FTX5FT)	MANH (COMPL) (JUNCT BOX) (SPL W / RISER)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	SET (TY II) (24 IN) (RCP) (4: 1) (P)	SET (TY II) (24 IN) (RCP) (6: 1) (P)	SET (TY II) (DES 3) (RCP) (6: 1) (P)
		LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA
N. KANSAS SHEET 1 OF 6	BEGIN TO STA 105+00															
N. KANSAS SHEET 2 OF 6	STA 105+00 TO STA 110+00	110	110					36	92	1	1					4
N. KANSAS SHEET 3 OF 6	STA 110+00 TO STA 114+50	450	450					68	410		4					18
N. KANSAS SHEET 4 OF 6	STA 114+50 TO STA 119+00	450	450		13		232	68	210		4				16	14
N. KANSAS SHEET 5 OF 6	STA 119+00 TO STA 123+50	450	450				64	89	216	2	7				4	12
N. KANSAS SHEET6 OF 6	STA 123+50 TO END	150	150	18		10	68	34			2	2	1	2	1	
SATSUMA SHEET 1 OF 1						33							2			
PROJECT TOTALS		1,610	1,610	18	13	43	364	294	928	3	18	2	3	2	21	48

TRAFFIC CONTROL

TRAFFIC CONTROL PLAN SHEET	LOCATION	0105 6041	0292 6002	0341 6043	0400 6008	0460 6002	0460 6003	0460 6007	0496 6007	0502 6001	0510 6001	0512 6009	0512 6010	0512 6033	0512 6034	0512 6057	0512 6058	0550 6003	0662 6063
		REMOVING STAB BASE AND ASPH PAV(8")	ASPHALT STAB BASE (GR 2) (PG 64)	D - GR HMA TY - D PG70 - 22	CUT & RESTORE ASPH PAVING	CMP (GAL STL 18 IN)	CMP (GAL STL 24 IN)	CMP (GAL STL 48 IN)	REMOV STR (PIPE)	BARRICADES, SIGNS AND TRAFFIC HANDLING	ONE - WAY TRAF CONT (FLAGGER CONT)	PORT CTB (FUR & INST) (LOW PROF) (TY 1)	PORT CTB (FUR & INST) (LOW PROF) (TY 2)	PORT CTB (MOVE) (LOW PROF) (TY 1)	PORT CTB (MOVE) (LOW PROF) (TY 2)	PORT CTB (REMOVE) (LOW PROF) (TY 1)	PORT CTB (REMOVE) (LOW PROF) (TY 2)	CHAIN LINK FENCE (REMOVE)	WK ZN PAV MRK REMOV (W) 4" (SLD)
		SY	TON	TON	SY	LF	LF	LF	LF	MO	HR	LF	LF	LF	LF	LF	LF	LF	LF
ADVANCE WARNING SIGN										6									
TCP PHASE 2 STEP 1	STA 110+50 TO STA 120+00		93	31		16		56										28	436
TCP PHASE 2 STEP 1 ACCESS ROAD							36		36										
TCP PHASE 2 STEP 2	BEGIN TO STA 114+50				45														
TCP PHASE 2 STEP 2	STA 114+50 TO STA 123+50				61														
TCP PHASE 2 STEP 2	STA 123+50 TO END				15														
TCP PHASE 3 DETOUR PLAN DAYTIME																			
TCP PHASE 3 DETOUR PLAN NIGHTTIME																			
TCP PHASE 3	BEGIN TO STA 114+50	389	128	43								228	40	112	40	228	40		
TCP PHASE 3	STA 114+50 TO STA 123+50	582	191	64					58			620	120			620	120		
TCP PHASE 3	STA 123+50 TO END	103	34	11								220	40			220	40		
TCP PHASE 4 DETOUR PLAN DAYTIME																			
TCP PHASE 4 DETOUR PLAN NIGHTTIME																			
TCP PHASE 4	BEGIN TO STA 114+50																		
TCP PHASE 4	STA 114+50 TO STA 123+50																		
TCP PHASE 4	STA 123+50 TO END																		
PROJECT TOTALS		1,074	447	149	121	16	36	56	92	6	3,044	1,068	200	112	40	1,068	200	28	436

SIGNING & PAVEMENT MARKING

ROADWAY PLAN SHEET	LOCATION	0644 6001	0644 6058	0658 6059	0666 6042	0666 6048	0672 6009	0688 6126	0678 6001	0678 6006	0678 6008
		IN SM RD SN SUP & AM TY10BWG (1) SA (P)	RELOCATE SM RD SN SUP & AM TY 10BWG	INSTL OM ASSM (OM - 4) (FLG GND	REFL PAV MRK TY I (W) 12" (SLD) (100MIL)	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	REFL PAV MRKR TY II - A - A	REFL PAV MRK TY I (Y) 4" (SLD) (100MIL)	PAV SURF PREP FOR MRK (4")	PAV SURF PREP FOR MRK (12")	PAV SURF PREP FOR MRK (24")
		EA	EA	EA	LF	LF	EA	LF	LF	LF	LF
N. KANSAS SHEET 1 OF 6	BEGIN TO STA 105+50			4							
N. KANSAS SHEET 2 OF 6	STA 105+50 TO STA 110+00		1			15					15
N. KANSAS SHEET 3 OF 6	STA 110+00 TO STA 114+50		1			42	1				42
N. KANSAS SHEET 4 OF 6	STA 114+50 TO STA 119+00						1				
N. KANSAS SHEET 5 OF 6	STA 119+00 TO STA 123+50		2		46	31				46	31
N. KANSAS SHEET6 OF 6	STA 123+50 TO END		2			57	1				57
SATSUMA SHEET 1 OF 1		1			44	11				44	11
PROJECT TOTALS		1	6	4	90	156	3	440	440	90	156

SWPPP

STORM WATER POLLUTION PREVENTION PLAN SHEET	LOCATION	0506 6002	0506 6011	0506 6020	0506 6024	0506 6038	0506 6039	0506 6041	0506 6043
		ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTIO N EXITS (INSTALL) (TY 1)	CONSTRUCTIO N EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
		LF	LF	SY	SY	LF	LF	LF	LF
N. KANSAS SHEET 1 OF 3	BEGIN TO STA 110+00	20	20	112	112	196	196	78	78
N. KANSAS SHEET 2 OF 3	STA 110+00 TO STA 119+00	0	0	0	0	452	452	208	208
N. KANSAS SHEET 3 OF 3	STA 119+00 TO END	20	20	112	112	242	242	182	182
PROJECT TOTALS		40	40	224	224	890	890	468	468

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

SUMMARY OF QUANTITIES

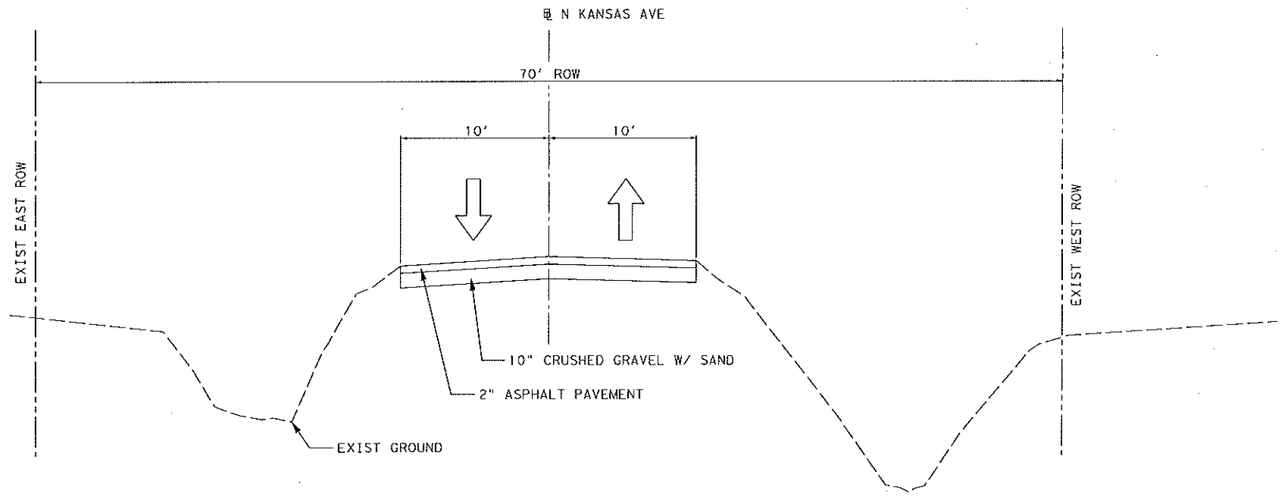
JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
BELL, ANDREA CHENG RAFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

SHEET NO. 4 OF 118

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\ROADWAY\QUANTITIES_01.dgn 7/20/2017 9:21:06 PM CCL



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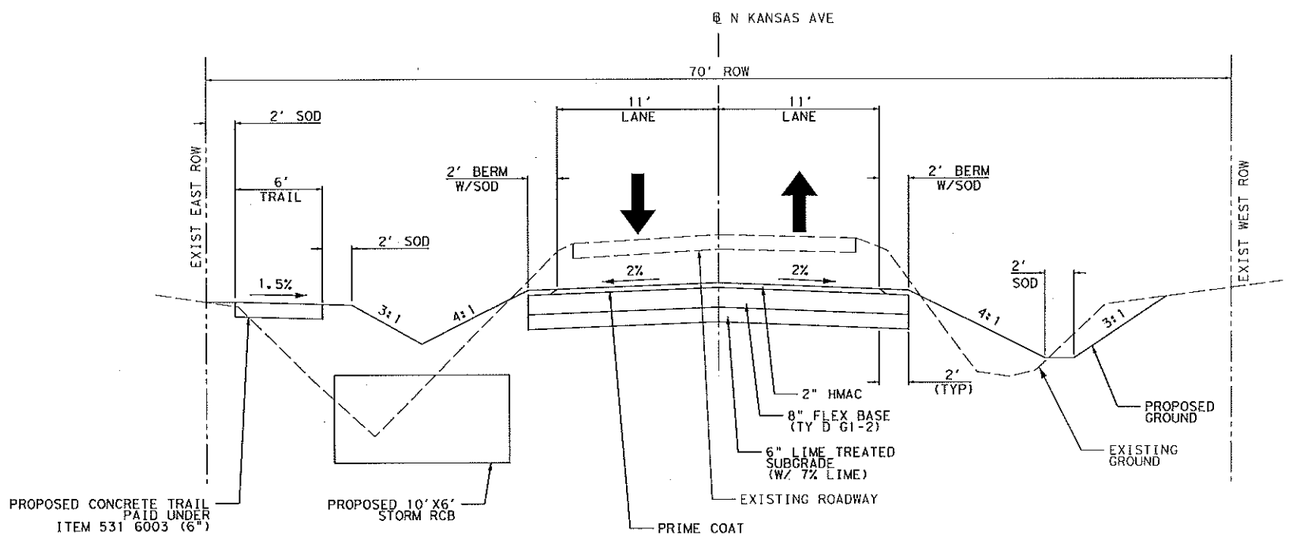

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

TYPICAL SECTIONS

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/21/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
BELL ANDREA CHENG RANFT
86219
LICENSED PROFESSIONAL ENGINEER
7.21.17

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NORTH KANSAS AVENUE

Beginning chain P_N_KANSAS description

Point 105 N 13,758,585.8917 E 3,209,891.3675 Sta 100+00.00

Course from 105 to PC P_N_KANSAS1 S 66° 28' 22.82" E Dist 822.8285

		Curve Data				
Curve P_N_KANSAS1						
P.I. Station		108+72.09	N	13,758,237.7715	E	3,210,690.9588
Delta	=	22° 17' 32.81"	(RT)			
Degree	=	22° 55' 05.92"				
Tangent	=	49.2575				
Length	=	97.2691				
Radius	=	250.0000				
External	=	4.8064				
Long Chord	=	96.6568				
Mid. Ord.	=	4.7157				
P.C. Station		108+22.83	N	13,758,257.4342	E	3,210,645.7960
P.T. Station		109+20.10	N	13,758,202.4466	E	3,210,725.2875
C.C.			N	13,758,028.2161	E	3,210,546.0007
Back	= S 66° 28' 22.82" E					
Ahead	= S 44° 10' 50.01" E					
Chord Bear	= S 55° 19' 36.41" E					

Course from PT P_N_KANSAS1 to 106 S 44° 10' 50.01" E Dist 1,802.6858

Point 106 N 13,756,909.6556 E 3,211,981.6185 Sta 127+22.78

Ending chain P_N_KANSAS description

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

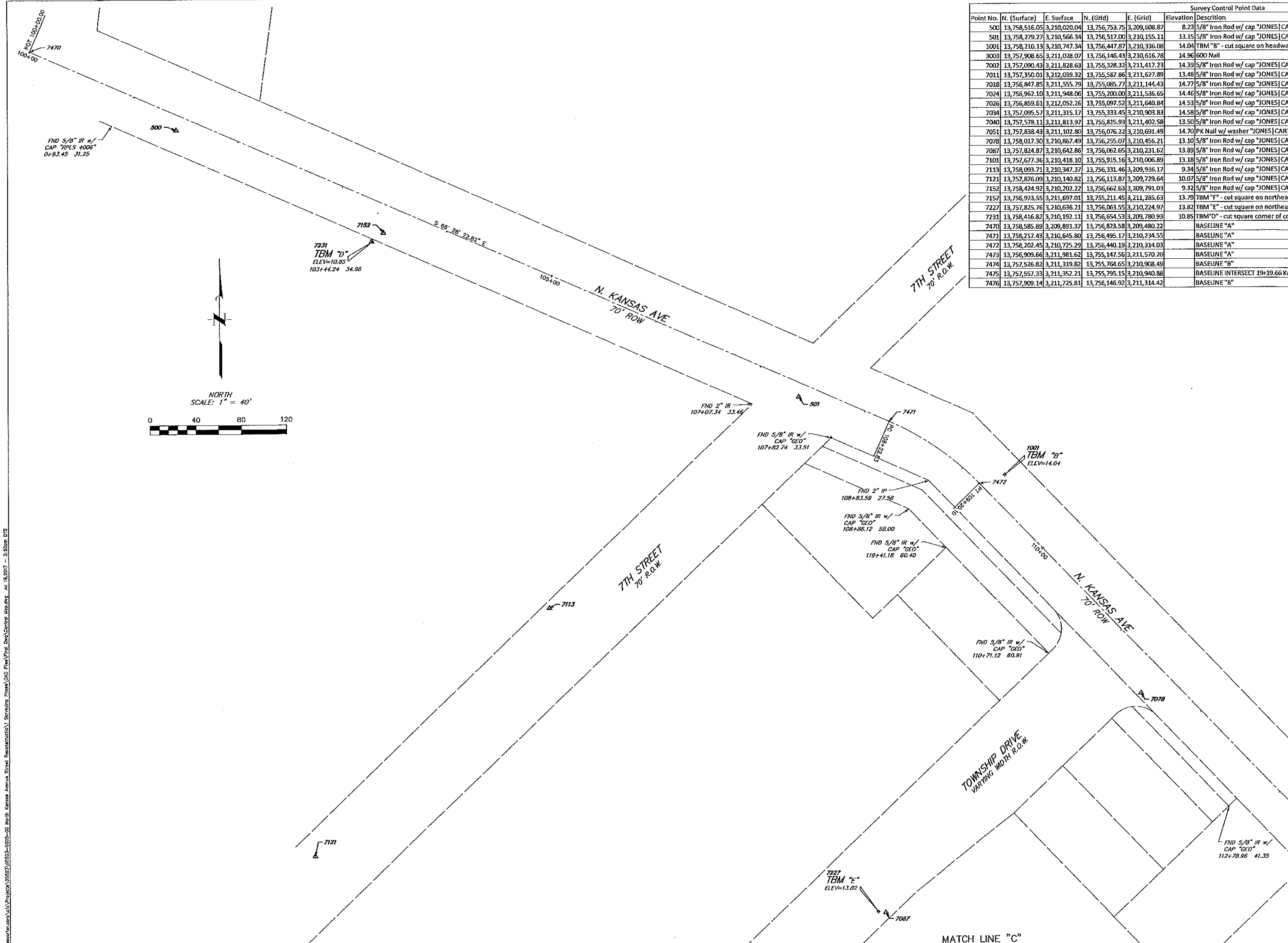
HORIZONTAL ALIGNMENT DATA

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
BELL ANDREA CHENG RANFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\ROADWAY\HAD.dgn 7/20/2017 8:16:36 PM CCL



Survey Control Point Data								
Point No.	N. (Surface)	E. Surface	N. (Grid)	E. (Grid)	Elevation	Descrition	Station	Offset
500	13,758,516.05	3,210,020.04	13,756,753.75	3,209,608.87	8.23	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	2+45.85	R12.67
501	13,758,279.27	3,210,566.34	13,756,517.00	3,210,155.11	13.15	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	8+41.26	R11.70
1001	13,758,210.13	3,210,747.34	13,756,447.87	3,210,336.08	14.04	TBM "B" - cut square on headwall north side of north entrance Training Facility	10+30.07	L21.30
3003	13,757,908.65	3,211,028.07	13,756,146.43	3,210,616.78	14.96	60D Nail	14+41.81	L12.39
7002	13,757,090.43	3,211,828.63	13,755,328.32	3,211,417.23	14.39	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	25+86.52	L16.27
7011	13,757,350.01	3,212,039.32	13,755,587.86	3,211,627.89	13.48	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	25+47.20	L348.27
7018	13,756,847.85	3,211,555.79	13,755,085.77	3,211,144.43	14.77	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	25+70.34	R348.45
7024	13,756,962.10	3,211,948.06	13,755,200.00	3,211,536.65	14.46	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	27+61.78	L12.49
7026	13,756,859.61	3,212,052.26	13,755,097.52	3,211,640.84	14.53	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	29+07.91	L15.79
7034	13,757,095.57	3,211,315.17	13,755,333.45	3,210,903.83	14.58	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	22+24.99	R348.38
7040	13,757,578.11	3,211,813.97	13,755,815.93	3,211,402.58	13.50	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	22+26.57	L345.63
7051	13,757,838.43	3,211,102.80	13,756,076.22	3,210,691.49	14.70	PK Nail w/ washer "JONES|CARTER"	15+44.24	L17.04
7078	13,758,017.30	3,210,867.49	13,756,255.07	3,210,456.21	13.10	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	12+51.98	R27.05
7087	13,757,824.87	3,210,642.86	13,756,062.65	3,210,231.62	13.89	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	12+33.44	R322.26
7101	13,757,677.36	3,210,418.10	13,755,915.16	3,210,006.89	13.18	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	11+82.58	R586.24
7113	13,758,093.71	3,210,347.37	13,756,331.46	3,209,936.17	9.34	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	7+14.57	R269.24
7121	13,757,876.09	3,210,140.82	13,756,113.87	3,209,729.64	10.07	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	6+12.06	R551.22
7152	13,758,424.92	3,210,202.22	13,756,662.63	3,209,791.03	9.32	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	4+49.34	R23.26
7157	13,756,973.55	3,211,697.01	13,755,211.45	3,211,285.63	13.79	TBM "F" - cut square on northeast end of culvert at paved driveway-717 4th St.	25+78.61	R159.58
7227	13,757,825.76	3,210,636.21	13,756,063.55	3,210,224.97	13.82	TBM "E" - cut square on northeast corner of community mailbox	12+28.15	R326.40
7231	13,758,416.82	3,210,192.11	13,756,654.53	3,209,780.93	10.85	TBM"D" - cut square corner of concrete base for sign	4+43.24	R34.96
7470	13,758,585.89	3,209,891.37	13,756,823.58	3,209,480.22		BASELINE "A"	100+00.00	
7471	13,758,257.43	3,210,645.80	13,756,495.17	3,210,234.55		BASELINE "A"	108+22.83	
7472	13,758,202.45	3,210,725.29	13,756,440.19	3,210,314.03		BASELINE "A"	109+20.10	
7473	13,756,909.66	3,211,981.62	13,755,147.56	3,211,570.20		BASELINE "A"	127+22.78	
7474	13,757,526.82	3,211,319.82	13,755,764.65	3,210,908.49		BASELINE "B"	100+00.00	
7475	13,757,557.33	3,211,352.21	13,755,795.15	3,210,940.88		BASELINE INTERSECT 19+19.66 Kansas 1+44.49 Satsuma		
7476	13,757,909.14	3,211,725.81	13,756,146.92	3,211,314.42		BASELINE "B"	105+57.67	

1. Elevations shown hereon are based on National Geodetic Survey Monument Designation E 1245, PID No. AW1080 having published information as follows:

Latitude 29°30'39.8" North
Longitude 095°05'53.4" West
NAD 83
Elevation 16.54 feet, NAVD 88

2. Temporary Benchmark B being a cut square located on the west end of a concrete headwall on the north side of the north entrance of the League City Fire Training Facility.
Elevation = 14.04 feet, NAVD 88.

3. Temporary Benchmark D being a cut square on corner of concrete base for the entry sign located at the entrance and for Fairview Cemetery on the leg closest to Kansas Ave.
Elevation = 10.85 feet, NAVD 88.

4. Temporary Benchmark E being a cut square located on the northeast corner of the community mailbox pad on the south side of Township Drive.
Elevation = 13.82 feet, NAVD 88.

5. Temporary Benchmark F being a cut square on the northeast end of a culvert located at a paved driveway at 717 4th St.
Elevation = 13.79 feet, NAVD 88.

6. Grid Coordinates shown hereon are Texas Coordinate System, South Central Zone NAD 83 and can be brought to surface by applying a Combined Scale Factor of 0.999871912.

STATE OF TEXAS
REGISTERED
STEVEN JARES
5317
PROFESSIONAL
LAND SURVEYOR

NO.	DATE	REVISIONS	APP.

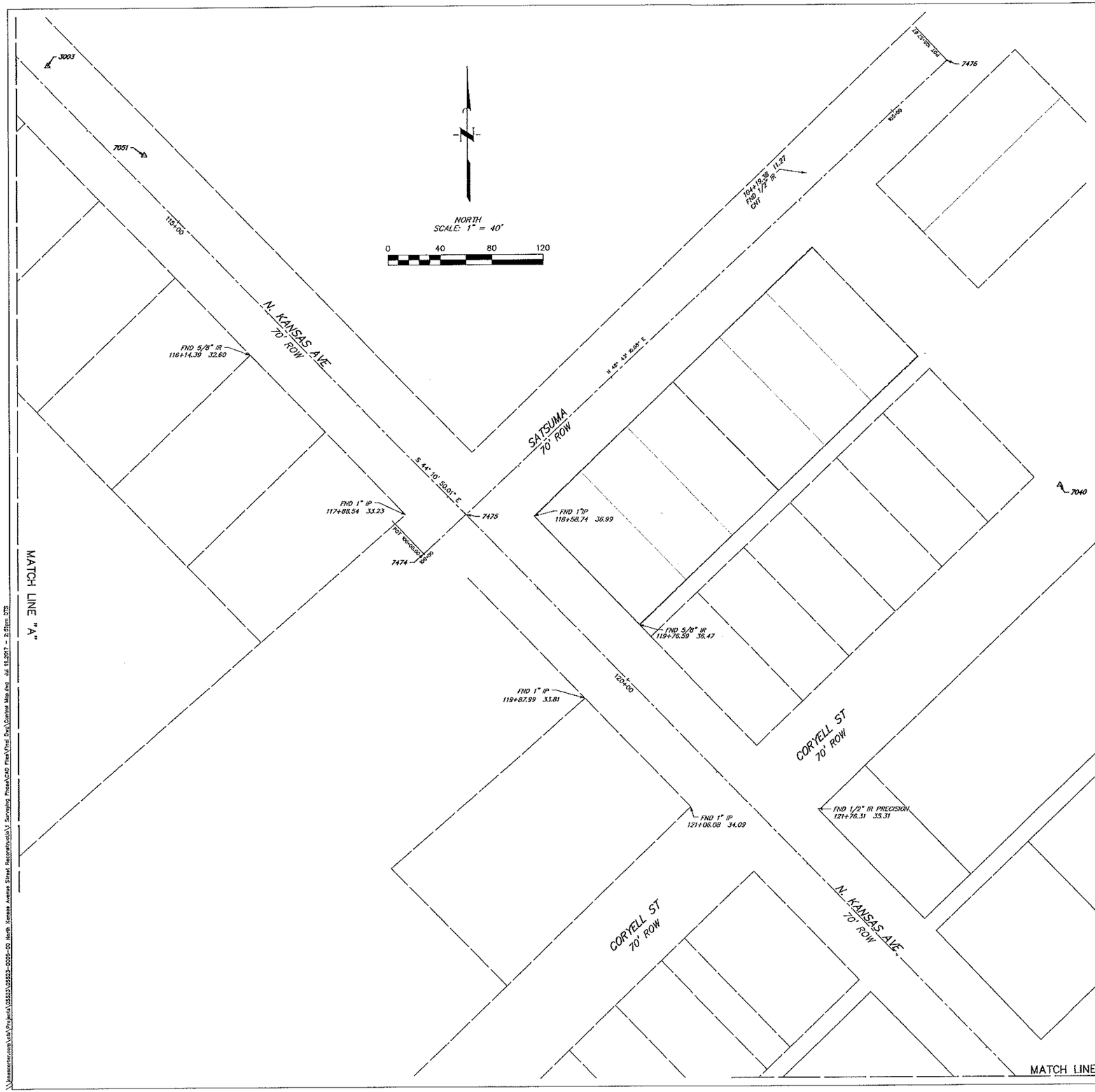
CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE
RECONSTRUCTION

SURVEY CONTROL MAP
SHEET 1 OF 3

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: 1" = 40'   DGN. BY: DCG/DTS
DATE: 07/19/2017   DWN. BY: DCG/DTS
JOB NO. 05523-0005-00   DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO. 2780 & 2787



Survey Control Point Data								
Point No.	N. (Surface)	E. Surface	N. (Grid)	E. (Grid)	Elevation	Descrition	Station	Offset
500	13,758,516.05	3,210,920.04	13,756,753.75	3,209,608.87	8.23	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	2+45.85	R12.67
501	13,758,279.27	3,210,566.34	13,756,517.00	3,210,155.11	13.15	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	8+41.26	R11.70
1001	13,758,210.13	3,210,747.34	13,756,447.87	3,210,336.08	14.04	TBM "B" - cut square on headwall north side of north entrance Training Facility	10+30.07	L21.30
3003	13,757,908.65	3,211,028.07	13,756,146.43	3,210,616.78	14.96	60D Nail	14+41.81	L12.39
7002	13,757,090.43	3,211,828.63	13,755,328.32	3,211,417.23	14.39	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	25+86.52	L16.27
7011	13,757,350.01	3,212,039.32	13,755,587.86	3,211,627.89	13.48	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	25+47.20	L348.27
7018	13,756,847.85	3,211,555.79	13,755,085.77	3,211,144.43	14.77	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	25+70.34	R348.45
7024	13,756,962.10	3,211,948.06	13,755,200.00	3,211,536.65	14.46	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	27+61.78	L12.49
7026	13,756,859.61	3,212,052.26	13,755,097.52	3,211,640.84	14.53	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	29+07.91	L15.79
7034	13,757,095.57	3,211,315.17	13,755,333.45	3,210,903.83	14.58	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	22+24.99	R348.38
7040	13,757,578.11	3,211,813.97	13,755,815.93	3,211,402.58	13.50	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	22+26.57	L345.63
7051	13,757,838.43	3,211,102.80	13,756,076.22	3,210,691.49	14.70	PK Nail w/ washer "JONES|CARTER"	15+44.24	L17.04
7078	13,758,017.30	3,210,867.49	13,756,255.07	3,210,456.21	13.10	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	12+51.98	R27.05
7087	13,757,824.87	3,210,642.86	13,756,062.65	3,210,231.62	13.89	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	12+33.44	R322.26
7101	13,757,677.36	3,210,418.10	13,755,915.16	3,210,006.89	13.18	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	11+82.58	R586.24
7113	13,758,093.71	3,210,347.37	13,756,331.46	3,209,936.17	9.34	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	7+14.57	R269.24
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7152	13,758,424.92	3,210,202.22	13,756,662.63	3,209,791.03	9.32	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	4+49.34	R23.26
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7227	13,757,825.76	3,210,636.21	13,756,063.55	3,210,224.97	13.82	TBM "E" - cut square on northeast corner of community mailbox	32+28.15	R326.40
7231	13,758,416.82	3,210,192.11	13,756,654.53	3,209,780.93	10.85	TBM"D" - cut square corner of concrete base for sign	4+43.24	R34.96
7470	13,758,585.89	3,209,891.37	13,756,823.58	3,209,480.22		BASELINE "A"	100+00.00	
7471	13,758,257.43	3,210,645.80	13,756,495.17	3,210,234.55		BASELINE "A"	108+22.83	
7472	13,758,202.45	3,210,725.29	13,756,440.19	3,210,314.03		BASELINE "A"	109+20.10	
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7474	13,757,526.82	3,211,319.82	13,755,764.65	3,210,908.49		BASELINE "B"	100+00.00	
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7476	13,757,909.14	3,211,725.81	13,756,146.92	3,211,314.42		BASELINE "B"	105+57.67	

1. Elevations shown hereon are based on National Geodetic Survey Monument Designation E 1245, PID No. AW1080 having published information as follows:

Latitude 29°30'39.8" North
Longitude 095°05'53.4" West
NAD 83
Elevation 16.54 feet, NAVD 88

2. Temporary Benchmark B being a cut square located on the west end of a concrete headwall on the north side of the north entrance of the League City Fire Training Facility.
Elevation = 14.04 feet, NAVD 88.

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4. Temporary Benchmark E being a cut square located on the northeast corner of the community mailbox pad on the south side of Township Drive.
Elevation = 13.82 feet, NAVD 88.

5. Temporary Benchmark F being a cut square on the northeast end of a culvert located at a paved driveway at 717 4th St.
Elevation = 13.79 feet, NAVD 88.

6. Grid Coordinates shown hereon are Texas Coordinate System, South Central Zone NAD 83 and can be brought to surface by applying a Combined Scale Factor of 0.999871912.

STATE OF TEXAS
REGISTERED
STEVEN JARES
5317
PROFESSIONAL
LAND SURVEYOR

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE
RECONSTRUCTION

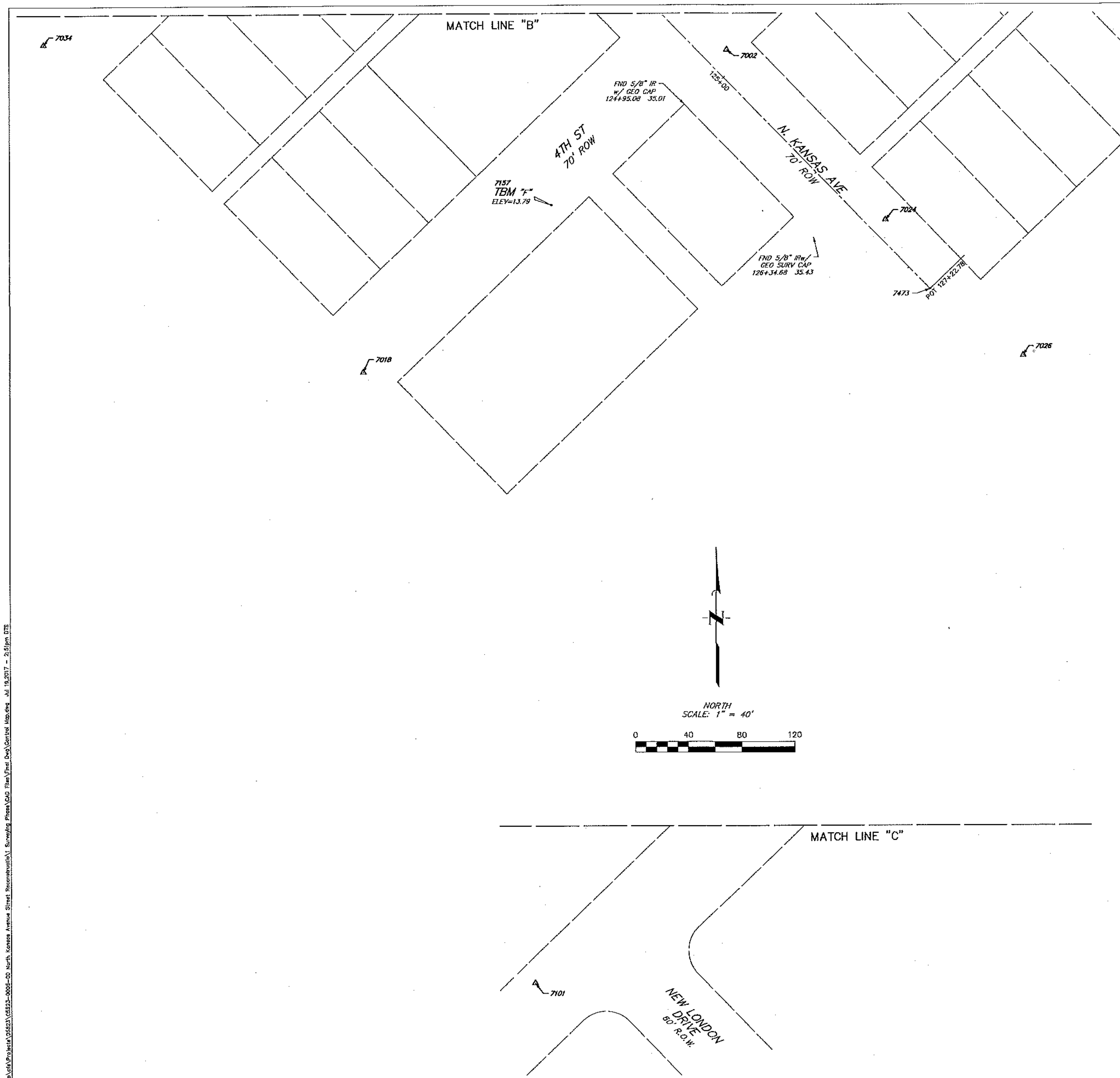
SURVEY CONTROL MAP
SHEET 2 OF 3

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: 1" = 40' DGN. BY: DCG/DTS
DATE: 07/19/2017 DWN. BY: DCG/DTS
JOB NO. 05523-0005-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO. 2780 & 2787

SHEET NO. 8 OF118

\\Jonescarter.com\ch\Projects\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\1 Surveying Phase\CAD Files\Final Dwg\Control Map.dwg Jul 19,2017 - 2:51pm DTS



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3003	13,757,908.65	3,211,028.07	13,756,146.43	3,210,616.78	14.96	60D Nail	14+41.81	L12.39
7002	13,757,090.43	3,211,828.63	13,755,328.32	3,211,417.23	14.39	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	25+86.52	L16.27
7011	13,757,350.01	3,212,039.32	13,755,587.86	3,211,627.89	13.48	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	25+47.20	L348.27
7018	13,756,847.85	3,211,555.79	13,755,085.77	3,211,144.43	14.77	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	25+70.34	R348.45
7024	13,756,962.10	3,211,948.06	13,755,200.00	3,211,536.65	14.46	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	27+61.78	L12.49
7026	13,756,859.61	3,212,052.26	13,755,097.52	3,211,640.84	14.53	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	29+07.91	L15.79
7034	13,757,095.57	3,211,315.17	13,755,333.45	3,210,903.83	14.58	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	22+24.99	R348.38
7040	13,757,578.11	3,211,813.97	13,755,815.93	3,211,402.58	13.50	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	22+26.57	L345.63
7051	13,757,838.43	3,211,102.80	13,756,076.22	3,210,691.49	14.70	PK Nail w/ washer "JONES| CARTER"	15+44.24	L17.04
7078	13,758,017.30	3,210,867.49	13,756,255.07	3,210,456.21	13.10	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	12+51.98	R27.05
7087	13,757,824.87	3,210,642.86	13,756,062.65	3,210,231.62	13.89	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	12+33.44	R322.26
7101	13,757,677.36	3,210,418.10	13,755,915.16	3,210,006.89	13.18	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	11+82.58	R586.24
7113	13,758,093.71	3,210,347.37	13,756,331.46	3,209,936.17	9.34	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	7+14.57	R269.24
7121	13,757,876.09	3,210,140.82	13,756,113.87	3,209,729.64	10.07	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	6+12.06	R551.22
7152	13,758,424.92	3,210,202.22	13,756,662.63	3,209,791.03	9.32	5/8" Iron Rod w/ cap "JONES|CARTER TRAVERSE POINT"	4+49.34	R23.26
7157	13,756,973.55	3,211,697.01	13,755,211.45	3,211,285.63	13.79	TBM "F" - cut square on northeast end of culvert at paved driveway-717 4th St.	25+78.61	R159.58
7227	13,757,825.76	3,210,636.21	13,756,063.55	3,210,224.97	13.82	TBM "E" - cut square on northeast corner of community mailbox	12+28.15	R326.40
7231	13,758,416.82	3,210,192.11	13,756,654.53	3,209,780.93	10.85	TBM"D" - cut square corner of concrete base for sign	4+43.24	R34.96
7470	13,758,585.89	3,209,891.37	13,756,823.58	3,209,480.22		BASELINE "A"	100+00.00	
7471	13,758,257.43	3,210,645.80	13,756,495.17	3,210,234.55		BASELINE "A"	108+22.83	
7472	13,758,202.45	3,210,725.29	13,756,440.19	3,210,314.03		BASELINE "A"	109+20.10	
7473	13,756,909.66	3,211,981.62	13,755,147.56	3,211,570.20		BASELINE "A"	127+22.78	
7474	13,757,526.82	3,211,319.82	13,755,764.65	3,210,908.49		BASELINE "B"	100+00.00	
7475	13,757,557.33	3,211,352.21	13,755,795.15	3,210,940.88		BASELINE INTERSECT 19+19.66 Kansas 1+44.49 Satsuma		
7476	13,757,909.14	3,211,725.81	13,756,146.92	3,211,314.42		BASELINE "B"	105+57.67	

1. Elevations shown hereon are based on National Geodetic Survey Monument Designation E 1245, PID No. AW1080 having published information as follows:

Latitude 29°30'39.8" North
Longitude 095°05'53.4" West
NAD 83
Elevation 16.54 feet, NAVD 88

2. Temporary Benchmark B being a cut square located on the west end of a concrete headwall on the north side of the north entrance of the League City Fire Training Facility.
Elevation = 14.04 feet, NAVD 88.

3. Temporary Benchmark D being a cut square on corner of concrete base for the entry sign located at the entrance and for Fairview Cemetery on the leg closest to Kansas Ave.
Elevation = 10.85 feet, NAVD 88.

4. Temporary Benchmark E being a cut square located on the northeast corner of the community mailbox pad on the south side of Township Drive.
Elevation = 13.82 feet, NAVD 88.

5. Temporary Benchmark F being a cut square on the northeast end of a culvert located at a paved driveway at 717 4th St.
Elevation = 13.79 feet, NAVD 88.

6. Grid Coordinates shown hereon are Texas Coordinate System, South Central Zone NAD 83 and can be brought to surface by applying a Combined Scale Factor of 0.999871912.

STATE OF TEXAS
REGISTERED
STEVEN JARES
5317
PROFESSIONAL LAND SURVEYOR

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE
RECONSTRUCTION

SURVEY CONTROL MAP
SHEET 3 OF 3

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: 1" = 40' DGN. BY: DCG/DTS
DATE: 07/19/2017 DWN. BY: DCG/DTS
JOB NO. 05523-0005-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO. 2780 & 2787

PHASE 1 STEP 1

1. INSTALL TRAFFIC CONTROL DEVICES AS SHOWN ON ADVANCE WARNING SIGN SHEETS.
2. INSTALL TRAFFIC CONTROL DEVICES AS SHOWN ON TCP LAYOUT SHEETS. CONSTRUCT TEMPORARY ASPHALT. REGRADE DITCH TO DRAIN FROM STA 107+64.47 TO TEMPORARY 36" CMP CULVERT AT STA 110+30.09.
3. CONSTRUCT 9'x6' EFFLUENT LINE FROM WASTEWATER TREATMENT PLANT TO OUTFALL. CONSTRUCT 10'x8' STORM RCB AND N. KANSAS AVE PAVEMENT SECTION TO STA 107+31.67.
4. TIE PROP 48" RCP INTO EXIST 48" STORM WITH A MANHOLE. CONSTRUCT PROP 48" RCP TO PROP INLET TY E (STAGE 1). CONNECT TEMPORARY 18" PVC FROM DRIVEWAY CULVERT AT STA 107+60.25 TO INLET TY E (STAGE 1). JACK & BORE PROP 48" RCP UNDER 7TH STREET TO PROP INLET TY E. CONSTRUCT PROP 60" RCP TO INLET TY E TO 10'x8' STORM RCB.

PHASE 1 STEP 2A

1. INSTALL TRAFFIC CONTROL DEVICES AS SHOWN ON LAYOUT SHEET.
2. CONSTRUCT APPROXIMATELY 170' OF 10'x6' STORM RCB TO STA 108+91.81.

PHASE 1 STEP 2B

1. INSTALL TRAFFIC CONTROL DEVICES AS SHOWN ON LAYOUT SHEET.
2. CONSTRUCT N. KANSAS AVE PAVEMENT TO STA 108+86.81. CONSTRUCT WEST HALF OF 7TH STREET INTERSECTION AT N. KANSAS AVE.

PHASE 1 STEP 2C

1. INSTALL TRAFFIC CONTROL DEVICES AS SHOWN ON LAYOUT SHEET.
2. CONSTRUCT EAST HALF OF 7TH STREET INTERSECTION AT N. KANSAS AVE.
3. REMOVE TEMPORARY 18" PVC. CONSTRUCT INLET TY E (STAGE 2). REMOVE TEMPORARY 36" CMP CULVERT AT STA 110+30.09. REGRADE WEST DITCH TO PROP CONDITIONS.

PHASE 2 STEP 1

1. INSTALL TRAFFIC CONTROL DEVICES AS SHOWN ON LAYOUT SHEET.
2. CONSTRUCT TEMPORARY ASPHALT PAVEMENT. CONSTRUCT 10'x6' RCB FROM STA 117+94.90 TO STA 118+44.90 PRIOR TO CONNECTING TEMPORARY ACCESS ROAD WITH N KANSAS AVE.

PHASE 2 STEP 2

1. INSTALL TRAFFIC CONTROL DEVICES AS SHOWN ON LAYOUT SHEETS.
2. CONSTRUCT 10'x6' STORM RCB ALONG N. KANSAS AVE TO STA 124+87.50 AND TIE INTO EXIST 42" STORM. CUT & RESTORE EXIST N. KANSAS AVE TO CONSTRUCT LATERALS.

PHASE 3

1. INSTALL TRAFFIC CONTROL DEVICES AS SHOWN ON LAYOUT SHEETS.
2. USE DAYTIME DETOUR PLAN DURING DAYLIGHT HOURS.
3. PRIOR TO LEAVING THE WORK AREA, PLACE NIGHTTIME DETOUR FOR TRAFFIC.
4. CONSTRUCT EAST HALF OF N. KANSAS AVE WITH DRIVEWAYS, CULVERTS, AND TEMPORARY ASPHALT PAVEMENT.

PHASE 4

1. INSTALL TRAFFIC CONTROL DEVICES AS SHOWN ON LAYOUT SHEETS.
2. USE DAYTIME DETOUR PLAN DURING DAYLIGHT HOURS.
3. PRIOR TO LEAVING THE WORK AREA, PLACE NIGHTIME DETOUR FOR TRAFFIC.
4. CONSTRUCT WEST HALF OF N. KANSAS AVE WITH DRIVEWAYS, CULVERTS AND RCB EXTENSION.
5. CONSTRUCT SATSUMA STREET FINAL PAVEMENT SURFACE.
6. REMOVE AND DISPOSE OF TEMPORARY ASPHALT PAVEMENT. REMOVE TEMPORARY ACCESS ROAD. REESTABLISH EXISTING GRADES.
7. REMOVE REMAINING TRAFFIC CONTROL DEVICES.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

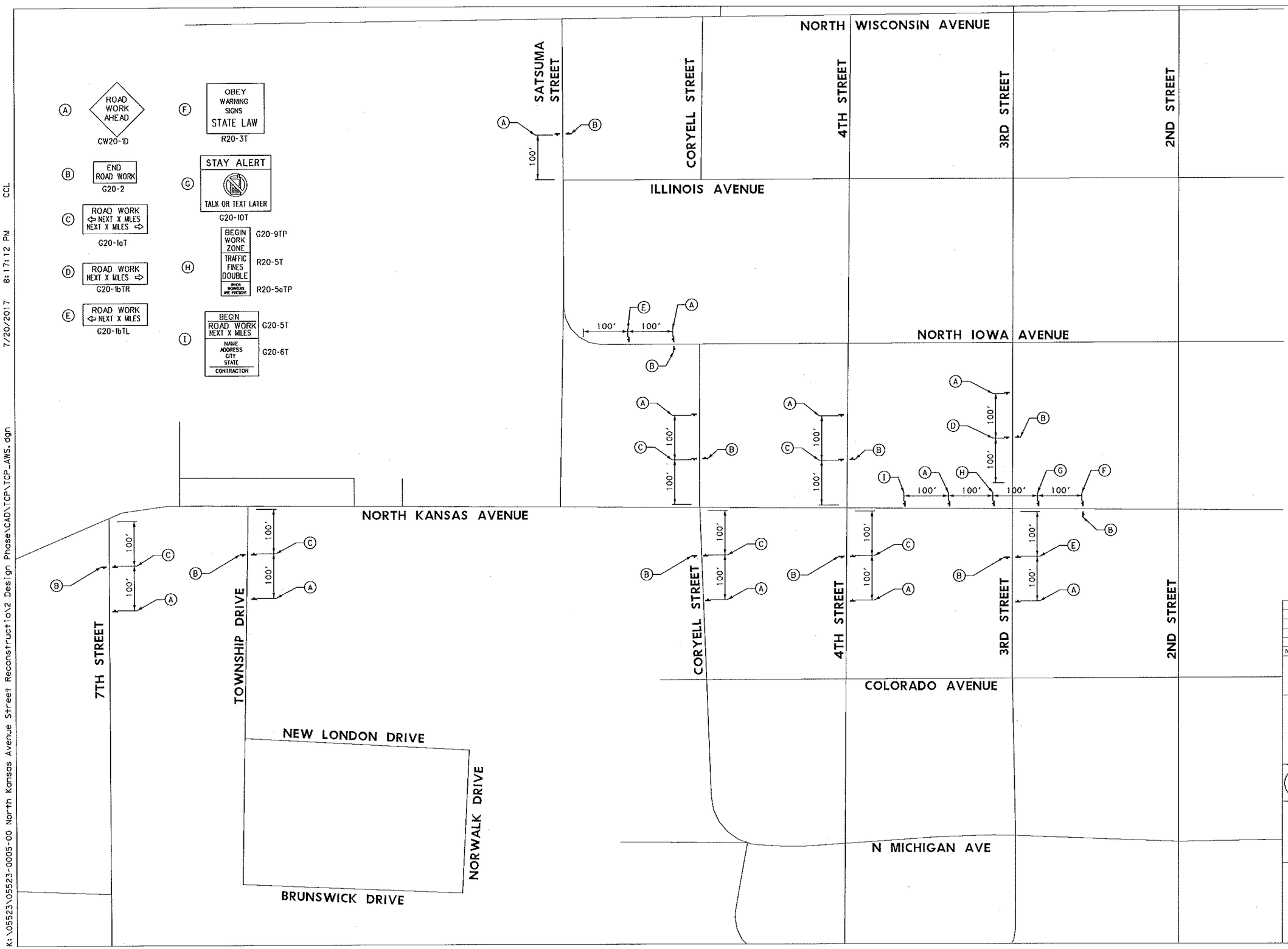
NORTH KANSAS AVENUE RECONSTRUCTION

TRAFFIC CONTROL PLAN NARRATIVE

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: ______ DGN. BY: ______
DATE: 7/21/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. ______
SUBMITTED: SURV. BY: ______
F.B. NO. ______

STATE OF TEXAS
BELL ANDREA CHENG RANFT
86219
LICENSED PROFESSIONAL ENGINEER
, PE 7/20/17



SCALE: N.T.S.

ROADWAY	SPEED LIMIT
N KANSAS AVE	= 25 MPH
7TH ST	= 25 MPH
TOWNSHIP DR	= 25 MPH
NORWALK DR	= 25 MPH
SATSUMA ST	= 25 MPH
CORYELL ST	= 25 MPH
4TH ST	= 25 MPH
3RD ST	= 25 MPH
2ND ST	= 25 MPH
BRUNSWICK DR	= 25 MPH
N MICHIGAN AVE	= 25 MPH
NEW LONDON DR	= 25 MPH
COLORADO AVE	= 25 MPH
N IOWA AVE	= 25 MPH
ILLINOIS AVE	= 25 MPH
N WISCONSIN AVE	= 25 MPH

SPACING

Posted Speed	Sign Spacing "X"
MPH	Feet (Apprx.)
25	100
30	120
35	160
40	240

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

ADVANCE WARNING SIGNS

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: DGN. BY:
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

STATE OF TEXAS
BELL ANDREA CHENG RANFT
86219
LICENSED
PROFESSIONAL ENGINEER

SHEET NO. 11 OF 118

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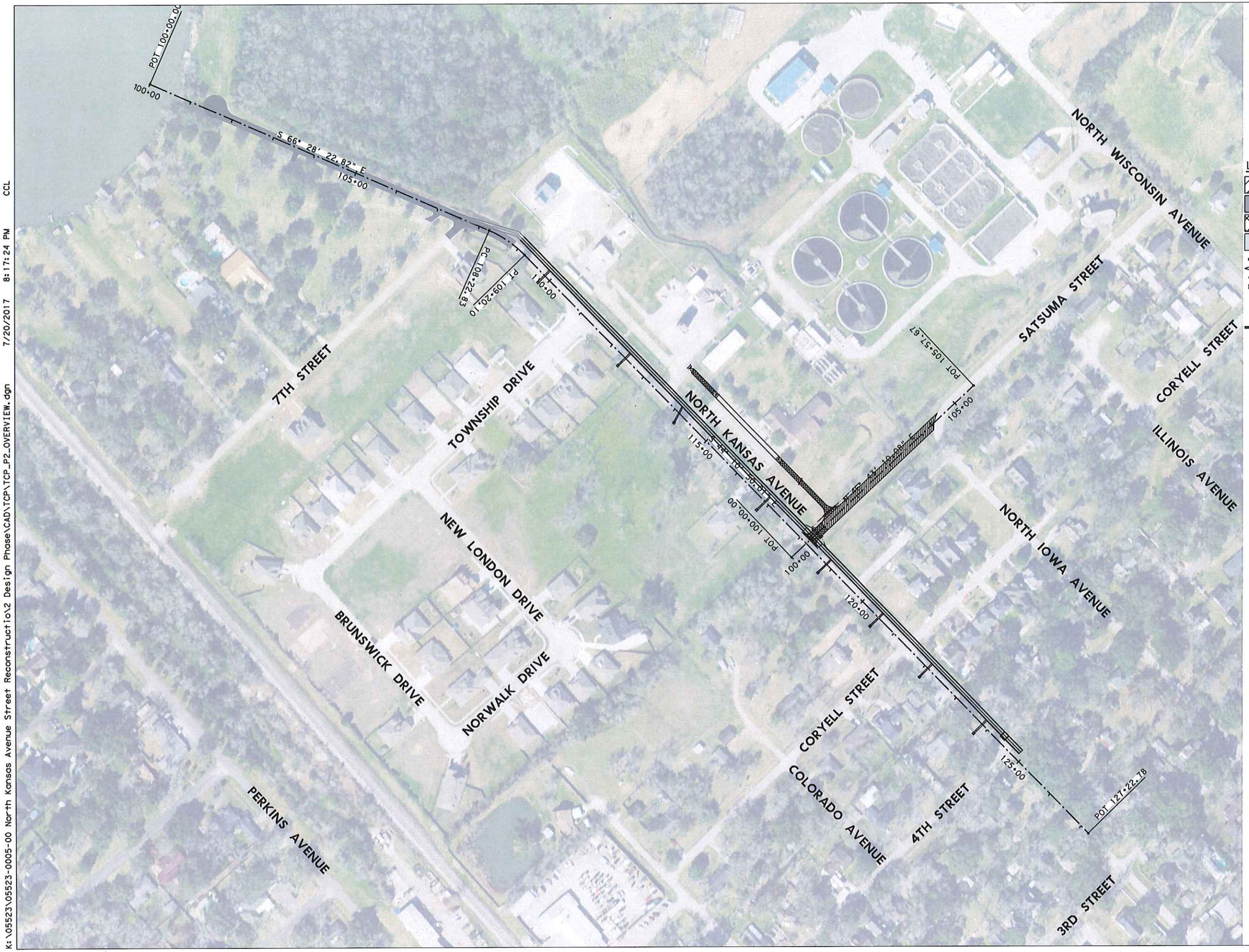

0 200 400 600

SCALE: 1" = 200'

LEGEND

- PROPOSED CONSTRUCTION (THIS PHASE)
- COMPLETED CONSTRUCTION
- TEMP PAVEMENT WIDENING (THIS PHASE)
- EXIST TEMP PAVEMENT (PREVIOUS PHASE)
- EXIST TRAFFIC FLOW
- ONE LANE TWO-WAY TRAFFIC FLOW
- PROP TRAFFIC FLOW
- TYPE III BARRICADE
- SIGN
- CHANNELIZING DEVICE
- LPCB

NOTES:
1. CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY EXISTING DRIVEWAYS DAMAGED DURING CONSTRUCTION WITHOUT EXTRA PAY.
2. CONTRACTOR SHALL PROVIDE ACCESS TO DRIVEWAYS THROUGHOUT CONSTRUCTION.
3. RESIDENTS TO BE NOTIFIED IN WRITING ONE-WEEK PRIOR TO ANY TEMPORARY ROAD CLOSURES OR TRAFFIC SWITCHES ALONG N. KANSAS AVE.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE
RECONSTRUCTION
TRAFFIC CONTROL PLAN PHASE 2 OVERVIEW

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
BELL ANDREA CHENG RAFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

SHEET NO. 12 OF 118

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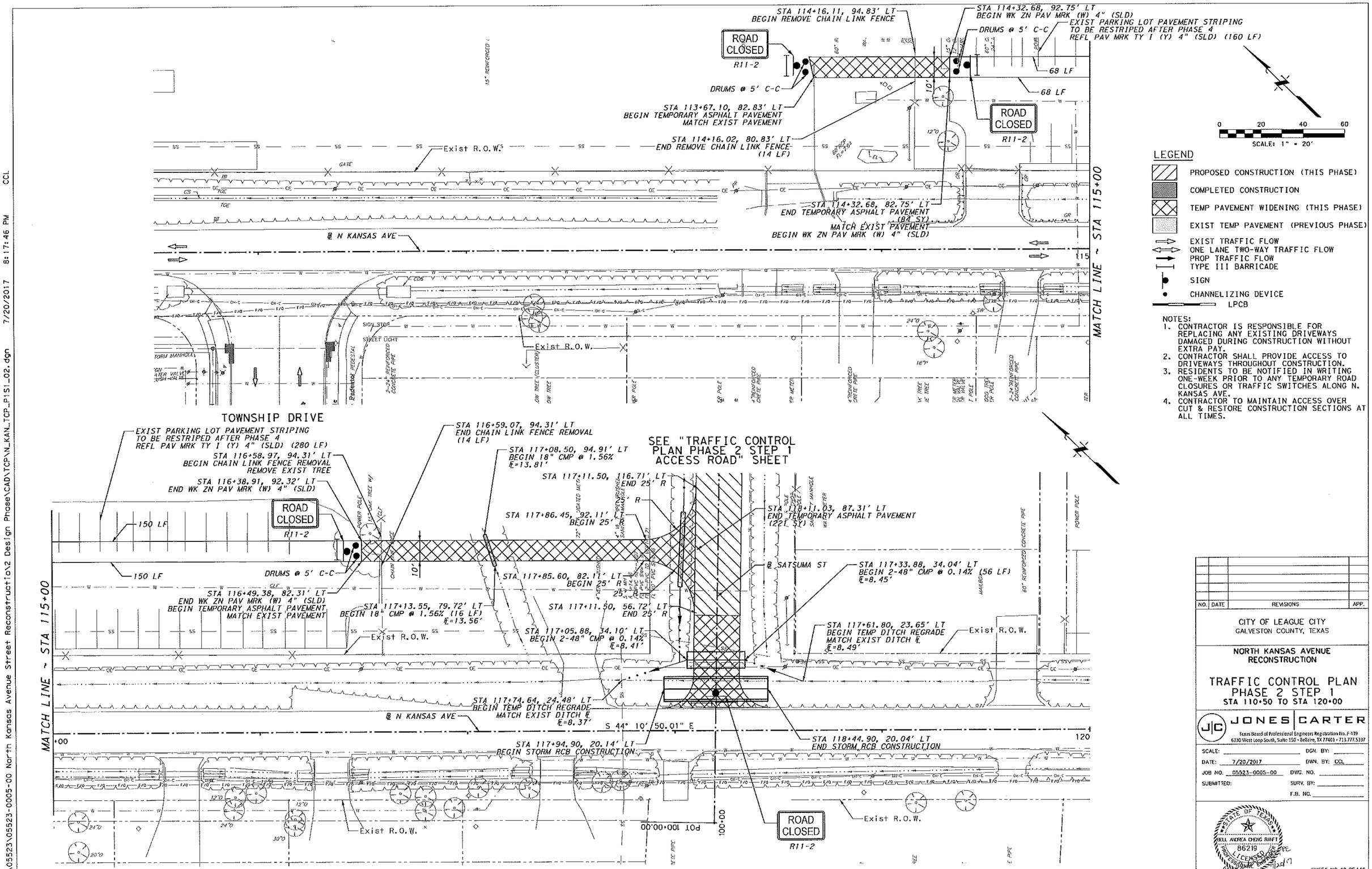

NOTES:
1. CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY EXISTING DRIVEWAYS DAMAGED DURING CONSTRUCTION WITHOUT EXTRA PAY.
2. CONTRACTOR SHALL PROVIDE ACCESS TO DRIVEWAYS THROUGHOUT CONSTRUCTION.
3. RESIDENTS TO BE NOTIFIED IN WRITING ONE-WEEK PRIOR TO ANY TEMPORARY ROAD CLOSURES OR TRAFFIC SWITCHES ALONG N. KANSAS AVE.
4. CONTRACTOR TO MAINTAIN ACCESS OVER CUT & RESTORE CONSTRUCTION SECTIONS AT ALL TIMES.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

TRAFFIC CONTROL PLAN PHASE 2 STEP 1
STA 110+50 TO STA 120+00

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
BELL ANDREA CHENG RAFFI
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

SHEET NO. 13 OF 118

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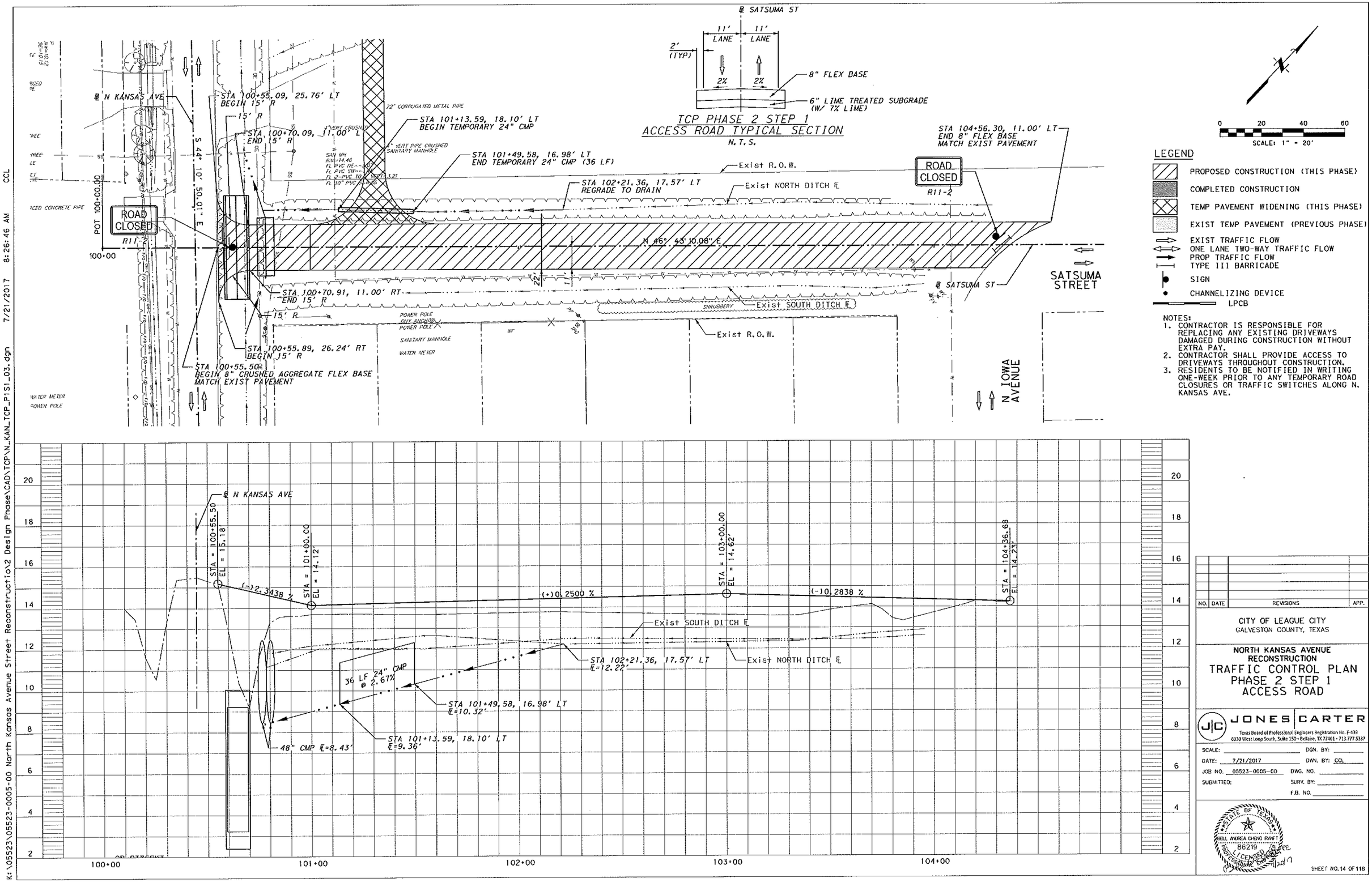

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NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

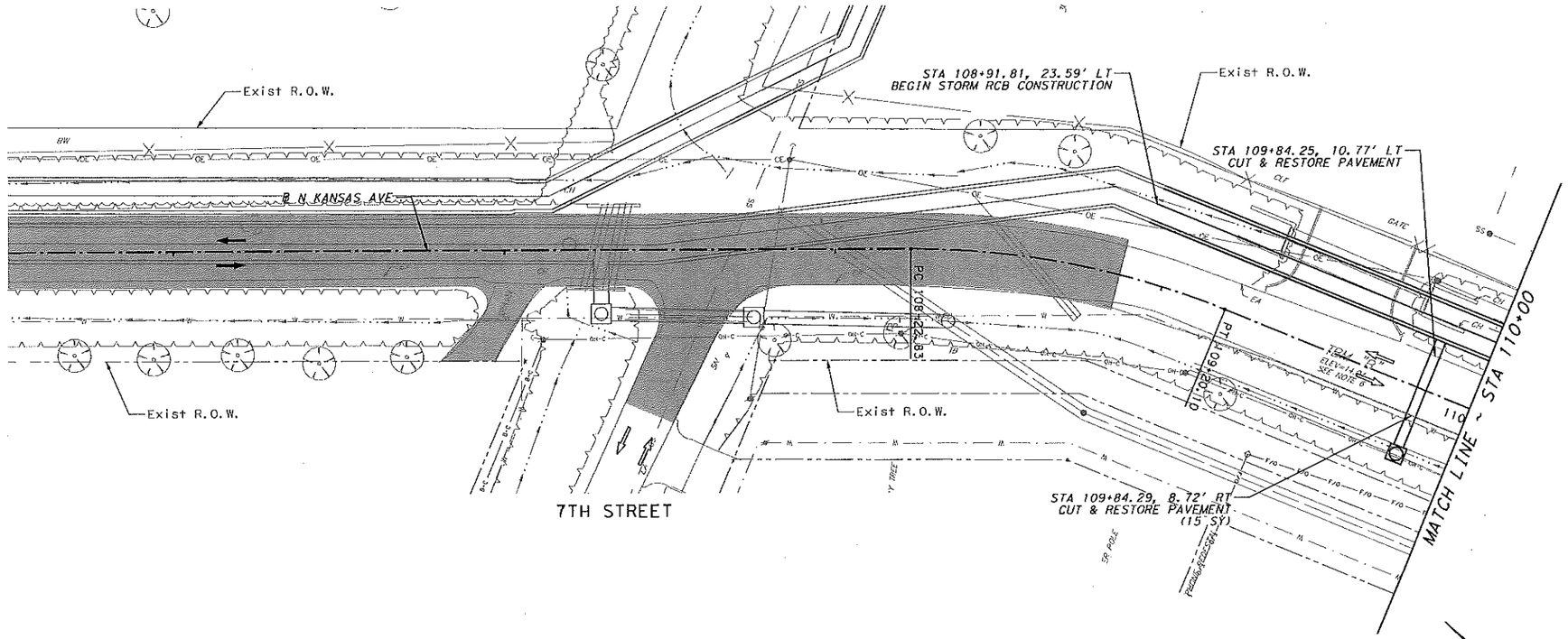
NORTH KANSAS AVENUE RECONSTRUCTION
TRAFFIC CONTROL PLAN
PHASE 2 STEP 1
ACCESS ROAD

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/21/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
KELL ANDREA CHENG RAMEY
86219
LICENSED PROFESSIONAL ENGINEER
7/21/17

SHEET NO.14 OF 118



0 20 40 60

SCALE: 1" = 20'

LEGEND

- PROPOSED CONSTRUCTION (THIS PHASE)
- COMPLETED CONSTRUCTION
- TEMP PAVEMENT WIDENING (THIS PHASE)
- EXIST TEMP PAVEMENT (PREVIOUS PHASE)
- EXIST TRAFFIC FLOW
- ONE LANE TWO-WAY TRAFFIC FLOW
- PROP TRAFFIC FLOW
- TYPE III BARRICADE
- SIGN
- CHANNELIZING DEVICE
- LPCB

NOTES:
1. CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY EXISTING DRIVEWAYS DAMAGED DURING CONSTRUCTION WITHOUT EXTRA PAY.
2. CONTRACTOR SHALL PROVIDE ACCESS TO DRIVEWAYS THROUGHOUT CONSTRUCTION.
3. RESIDENTS TO BE NOTIFIED IN WRITING ONE-WEEK PRIOR TO ANY TEMPORARY ROAD CLOSURES OR TRAFFIC SWITCHES ALONG N. KANSAS AVE.
4. CONTRACTOR TO MAINTAIN ACCESS OVER CUT & RESTORE CONSTRUCTION SECTIONS AT ALL TIMES.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE
RECONSTRUCTION

TRAFFIC CONTROL PLAN
PHASE 2 STEP 2
BEGIN TO STA 114+50

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
ELL ANDREA CHENG RAFFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

SHEET NO. 15 OF 118

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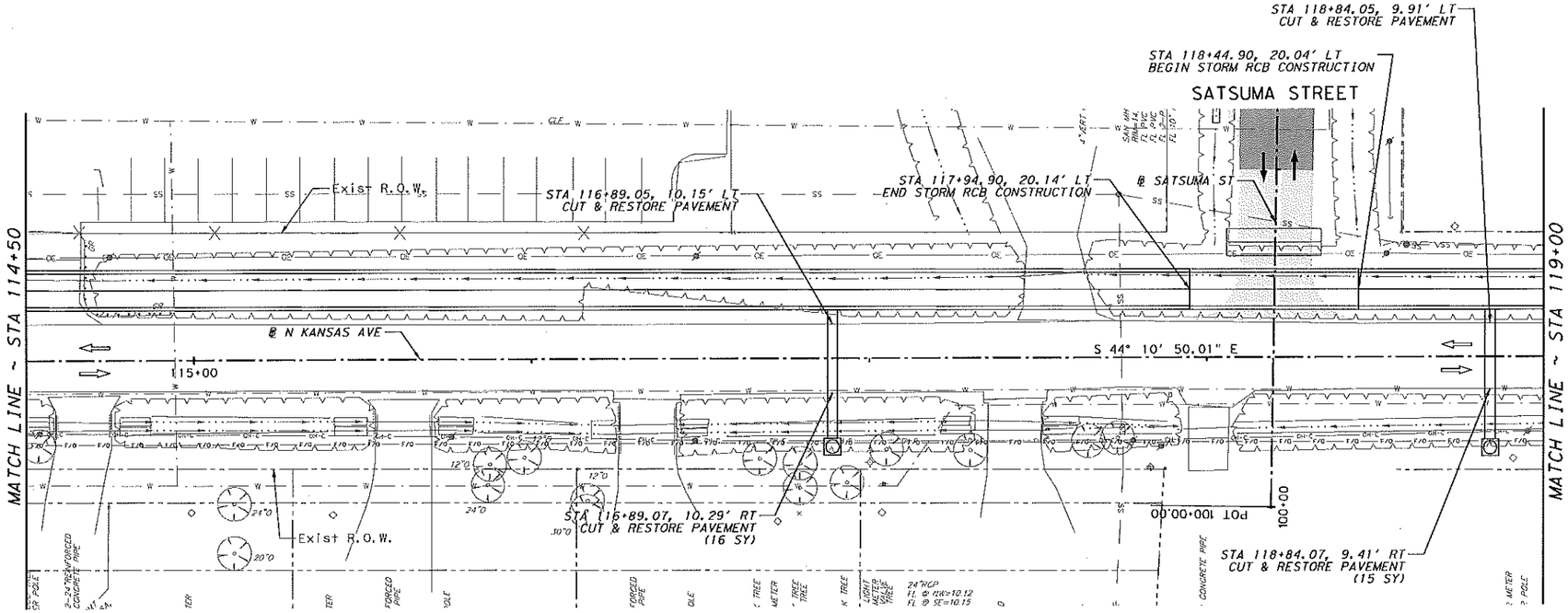

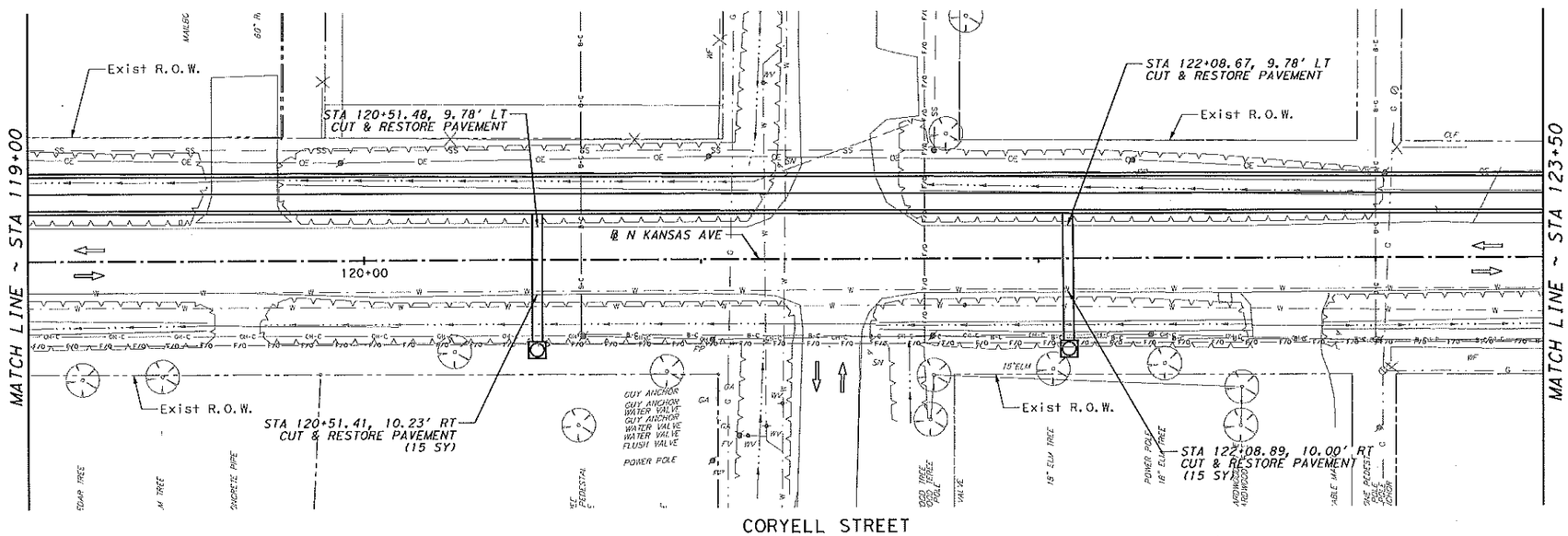

0 20 40 60
SCALE: 1" = 20'

LEGEND

- PROPOSED CONSTRUCTION (THIS PHASE)
- COMPLETED CONSTRUCTION
- TEMP PAVEMENT WIDENING (THIS PHASE)
- EXIST TEMP PAVEMENT (PREVIOUS PHASE)
- EXIST TRAFFIC FLOW
- ONE LANE TWO-WAY TRAFFIC FLOW
- PROP TRAFFIC FLOW
- TYPE III BARRICADE
- SIGN
- CHANNELIZING DEVICE
- LPCB

NOTES:
1. CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY EXISTING DRIVEWAYS DAMAGED DURING CONSTRUCTION WITHOUT EXTRA PAY.
2. CONTRACTOR SHALL PROVIDE ACCESS TO DRIVEWAYS THROUGHOUT CONSTRUCTION.
3. RESIDENTS TO BE NOTIFIED IN WRITING ONE-WEEK PRIOR TO ANY TEMPORARY ROAD CLOSURES OR TRAFFIC SWITCHES ALONG N. KANSAS AVE.
4. CONTRACTOR TO MAINTAIN ACCESS OVER CUT & RESTORE CONSTRUCTION SECTIONS AT ALL TIMES.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE
RECONSTRUCTION

TRAFFIC CONTROL PLAN
PHASE 2 STEP 2
STA 114+50 TO STA 123+50

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
KELL ANDREA CHENG RANEY
86219
LICENSED
PROFESSIONAL ENGINEER
7/20/17

SHEET NO. 16 OF 118

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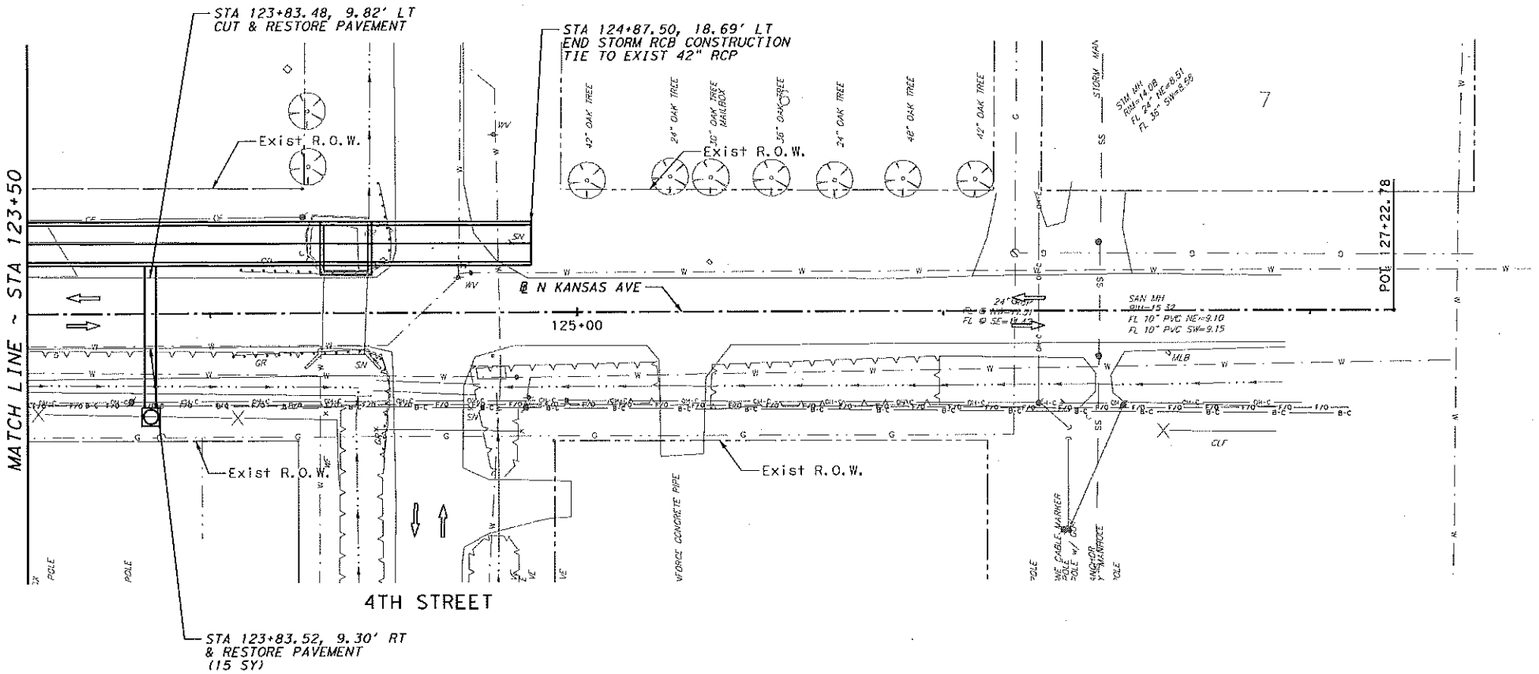

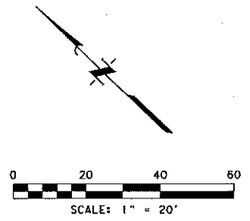

LEGEND

- PROPOSED CONSTRUCTION (THIS PHASE)
- COMPLETED CONSTRUCTION
- TEMP PAVEMENT WIDENING (THIS PHASE)
- EXIST TEMP PAVEMENT (PREVIOUS PHASE)
- EXIST TRAFFIC FLOW
- ONE LANE TWO-WAY TRAFFIC FLOW
- PROP TRAFFIC FLOW
- TYPE III BARRICADE
- SIGN
- CHANNELIZING DEVICE
- LPCB

NOTES:
1. CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY EXISTING DRIVEWAYS DAMAGED DURING CONSTRUCTION WITHOUT EXTRA PAY.
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4. CONTRACTOR TO MAINTAIN ACCESS OVER CUT & RESTORE CONSTRUCTION SECTIONS AT ALL TIMES.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE
RECONSTRUCTION

TRAFFIC CONTROL PLAN
PHASE 2 STEP 2
STA 123+50 TO END

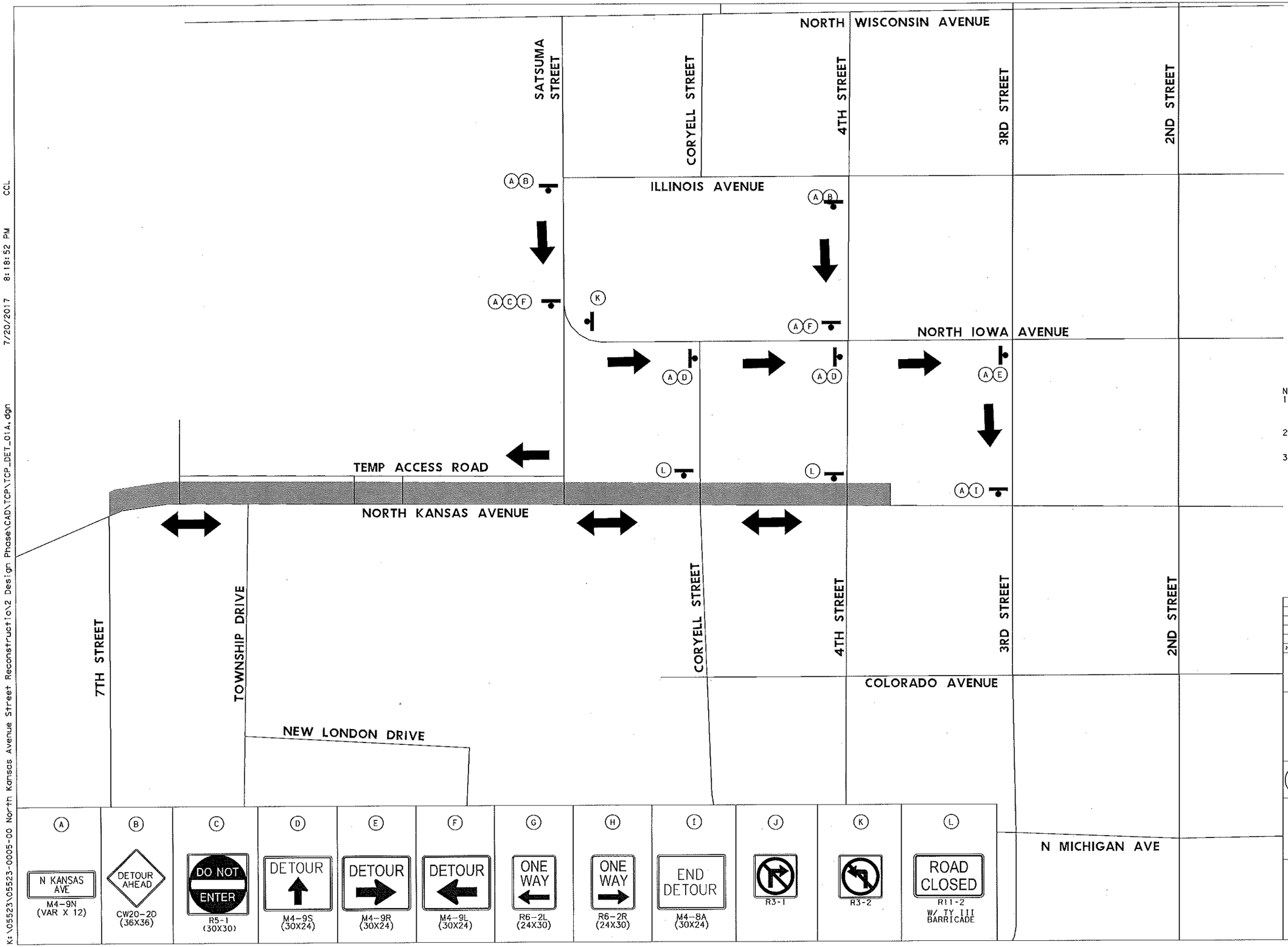
JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
BELL ANDREA CHENG RAFT
86219
LICENSED
PROFESSIONAL ENGINEER
7/20/17

SHEET NO. 17 OF 118

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\TCP\N_KAN_TCP_P2_03.dgn 7/20/2017 8:18:41 PM CCL



SPACING

Posted Speed	Sign Spacing "X"
MPH	Feet (Apprx.)
25	100
30	120
35	160
40	240

NOTES:
1. REFER TO TCP STANDARD TCP(2-2)-12 ONE LANE TWO-WAY CONTROL WITH FLAGGERS FOR DAYTIME TRAFFIC CONTROL.
2. CONTRACTOR TO PROVIDE WRITTEN NOTICE TO RESIDENTS ONE-WEEK PRIOR TO NEW TRAFFIC PATTERN.
3. CONTRACTOR TO SHIFT TRAFFIC CONTROL TO NIGHTTIME TRAFFIC CONTROL DETOUR PLAN PRIOR TO DAYTIME OPERATIONS.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION
TRAFFIC CONTROL
PHASE 3 DETOUR PLAN
FOR DAYTIME

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

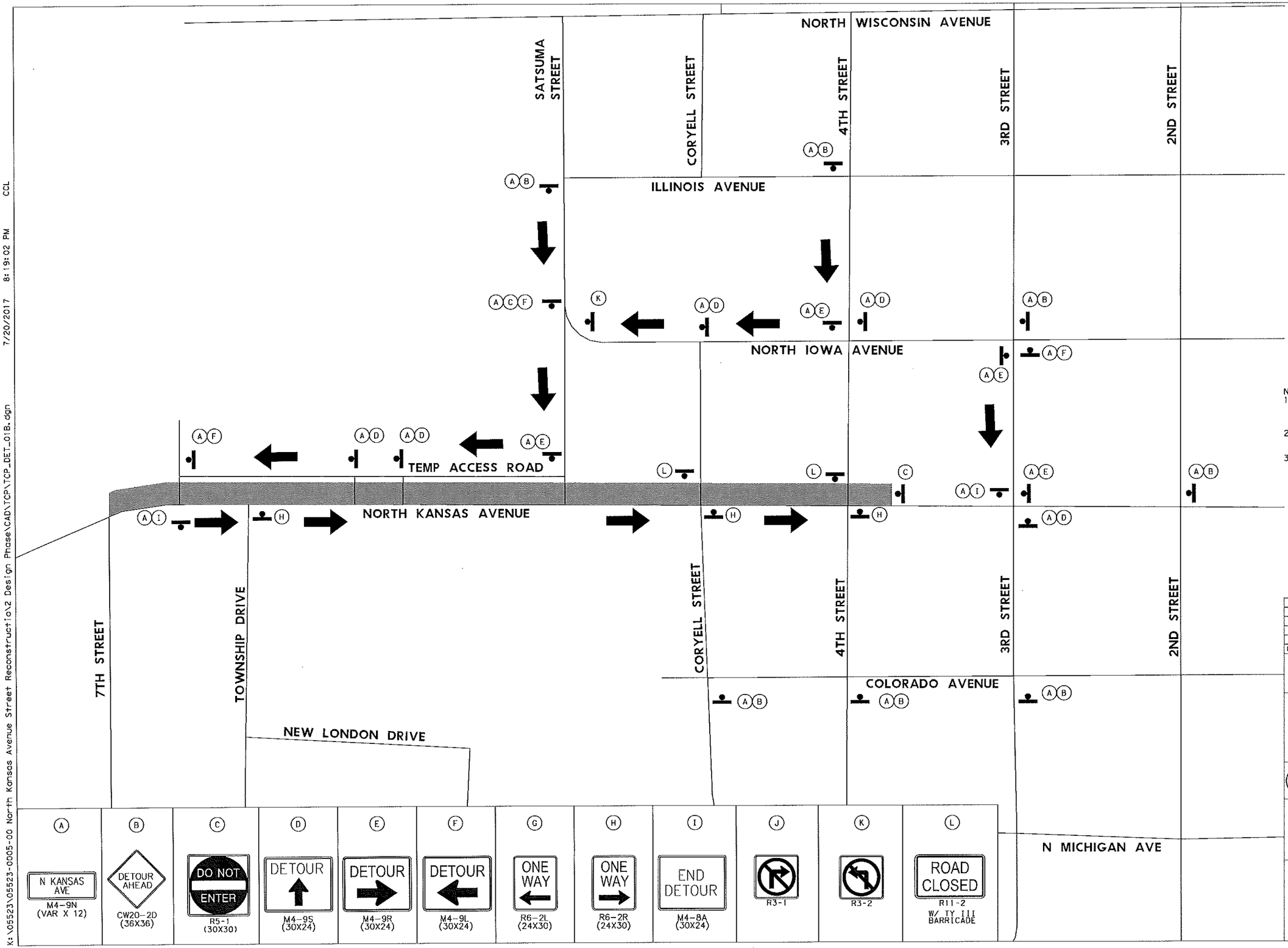
SCALE:
DGN. BY:
DATE: 7/20/2017
DWN. BY: CCL
JOB NO. 05523-0005-00
DWG. NO.
SUBMITTED:
SURV. BY:
F.B. NO.

STATE OF TEXAS
BELL ANDREA OENG RAFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

SHEET NO. 18 OF 118

A	B	C	D	E	F	G	H	I	J	K	L
N KANSAS AVE	DETOUR AHEAD	DO NOT ENTER	DETOUR	DETOUR	DETOUR	ONE WAY	ONE WAY	END DETOUR			ROAD CLOSED
M4-9N (VAR X 12)	CW20-2D (36X36)	R5-1 (30X30)	M4-9S (30X24)	M4-9R (30X24)	M4-9L (30X24)	R6-2L (24X30)	R6-2R (24X30)	M4-8A (30X24)	R3-1	R3-2	R11-2 W/ TY III BARRICADE

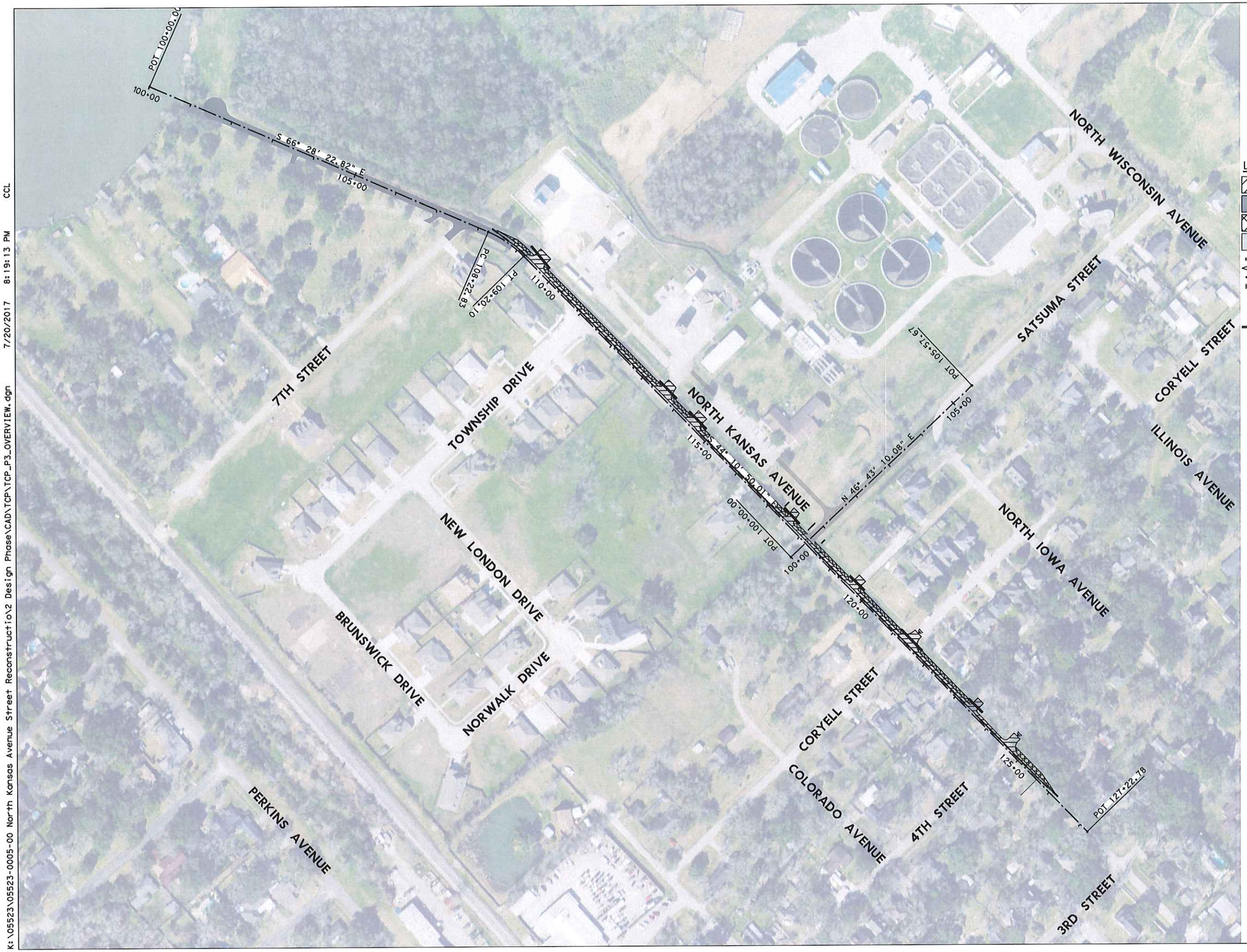
K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\TCP\TCP_DET_01A.dgn 7/20/2017 8:18:52 PM CCL



Posted Speed	Sign Spacing "X"
MPH	Feet (Apprx.)
25	100
30	120
35	160
40	240

A	B	C	D	E	F	G	H	I	J	K	L
N KANSAS AVE	DETOUR AHEAD	DO NOT ENTER	DETOUR	DETOUR	DETOUR	ONE WAY	ONE WAY	END DETOUR			ROAD CLOSED
M4-9N (VAR X 12)	CW20-2D (36X36)	R5-1 (30X30)	M4-9S (30X24)	M4-9R (30X24)	M4-9L (30X24)	R6-2L (24X30)	R6-2R (24X30)	M4-8A (30X24)	R3-1	R3-2	R11-2 W/ TY III BARRICADE

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\TCP\TCP_P3_OVERVIEW.dgn 7/20/2017 8:19:13 PM CCL



N

0 200 400 600

SCALE: 1" = 200'

LEGEND

- PROPOSED CONSTRUCTION (THIS PHASE)
- COMPLETED CONSTRUCTION
- TEMP PAVEMENT WIDENING (THIS PHASE)
- EXIST TEMP PAVEMENT (PREVIOUS PHASE)
- EXIST TRAFFIC FLOW
- ONE LANE TWO-WAY TRAFFIC FLOW
- PROP TRAFFIC FLOW
- TYPE III BARRICADE
- SIGN
- CHANNELIZING DEVICE
- LPCB

NOTES:
1. CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY EXISTING DRIVEWAYS DAMAGED DURING CONSTRUCTION WITHOUT EXTRA PAY.
2. CONTRACTOR SHALL PROVIDE ACCESS TO DRIVEWAYS THROUGHOUT CONSTRUCTION.
3. RESIDENTS TO BE NOTIFIED IN WRITING ONE-WEEK PRIOR TO ANY TEMPORARY ROAD CLOSURES OR TRAFFIC SWITCHES ALONG N. KANSAS AVE.

NO.	DATE	REVISIONS	APP.

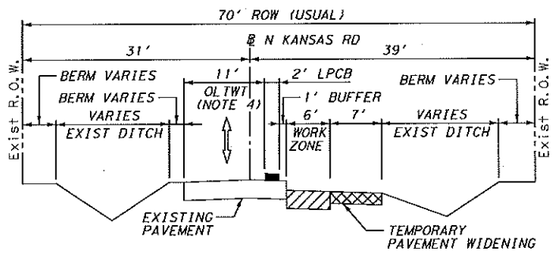
CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION
TRAFFIC CONTROL PLAN PHASE 3 OVERVIEW

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: _____ SURV. BY: _____
F.B. NO. _____

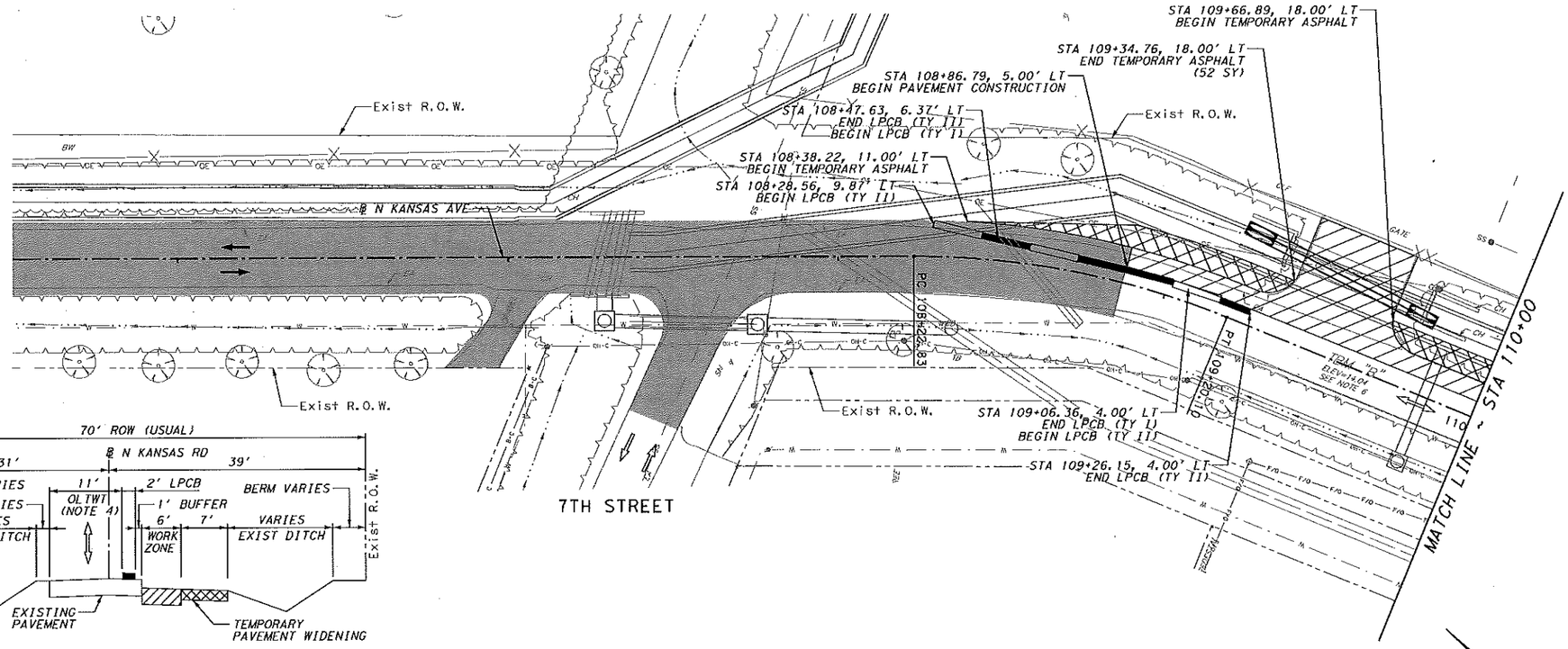
STATE OF TEXAS
NELL ANDREA CHENG RANFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

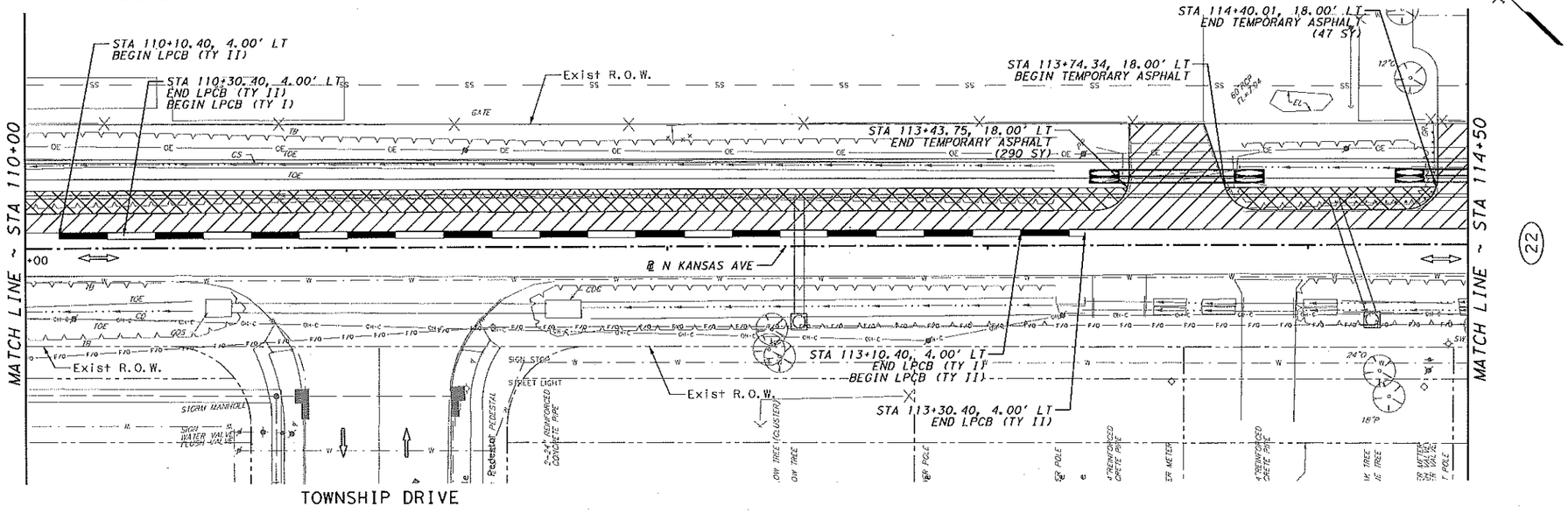


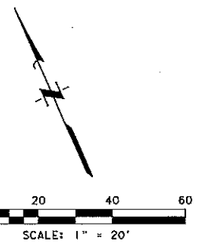
TCP PHASE 3 TYPICAL SECTION

N. T. S.

OLTWT = ONE LANE TWO-WAY TRAFFIC







LEGEND

- PROPOSED CONSTRUCTION (THIS PHASE)
- COMPLETED CONSTRUCTION
- TEMP PAVEMENT WIDENING (THIS PHASE)
- EXIST TEMP PAVEMENT (PREVIOUS PHASE)
- EXIST TRAFFIC FLOW
- ONE LANE TWO-WAY TRAFFIC FLOW
- PROP TRAFFIC FLOW
- TYPE III BARRICADE
- SIGN
- CHANNELIZING DEVICE
- LPCB

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY EXISTING DRIVEWAYS DAMAGED DURING CONSTRUCTION WITHOUT EXTRA PAY.
2. CONTRACTOR SHALL PROVIDE ACCESS TO DRIVEWAYS THROUGHOUT CONSTRUCTION.
3. RESIDENTS TO BE NOTIFIED IN WRITING ONE-WEEK PRIOR TO ANY TEMPORARY ROAD CLOSURES OR TRAFFIC SWITCHES ALONG N. KANSAS AVE.
4. ONE LANE TWO-WAY TRAFFIC IS FOR DAYTIME OPERATIONS ONLY. SB TRAFFIC ONLY WILL OCCUR FOR NIGHTTIME TRAFFIC.
5. TCP SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. CONTRACTOR CAN WORK IN SECTIONS AND OPEN ROADWAY WHEN COMPLETE.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE
RECONSTRUCTION

TRAFFIC CONTROL PLAN PHASE 3

BEGIN TO STA 114+50

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

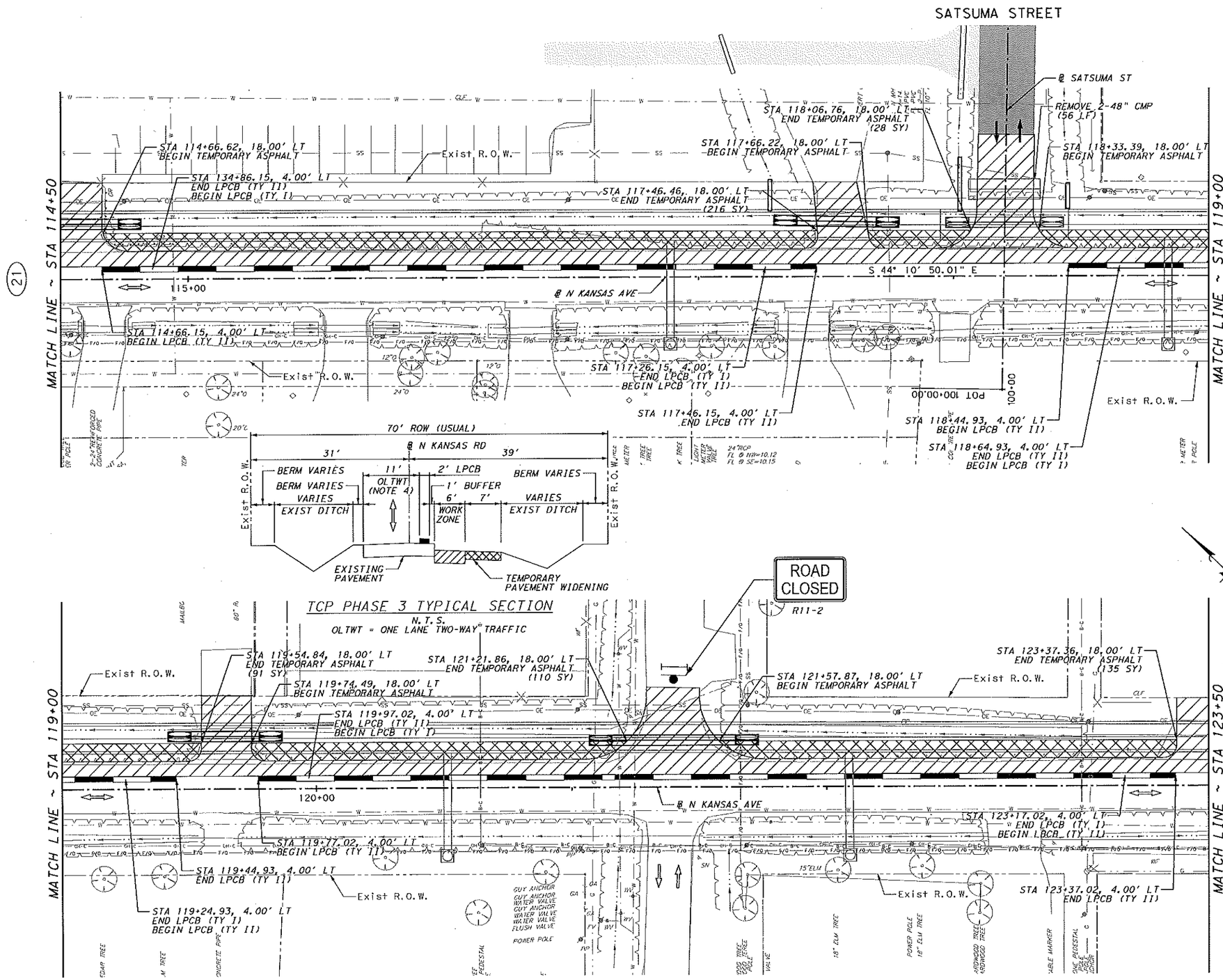
SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: _____ SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
BELL ANDREA CHENG RAFFT
86219
LICENSED
PROFESSIONAL ENGINEER
7/20/17

SHEET NO. 21 OF 118

(22)

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\TCP\N_KAN_TCP_P3_01.dgn 7/20/2017 8:19:33 PM CCL



LEGEND

- PROPOSED CONSTRUCTION (THIS PHASE)
- COMPLETED CONSTRUCTION
- TEMP PAVEMENT WIDENING (THIS PHASE)
- EXIST TEMP PAVEMENT (PREVIOUS PHASE)
- EXIST TRAFFIC FLOW
- ONE LANE TWO-WAY TRAFFIC FLOW
- PROP TRAFFIC FLOW
- TYPE III BARRICADE
- SIGN
- CHANNELIZING DEVICE
- LPCB

NOTES:
1. CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY EXISTING DRIVEWAYS DAMAGED DURING CONSTRUCTION WITHOUT EXTRA PAY.
2. CONTRACTOR SHALL PROVIDE ACCESS TO DRIVEWAYS THROUGHOUT CONSTRUCTION.
3. RESIDENTS TO BE NOTIFIED IN WRITING ONE-WEEK PRIOR TO ANY TEMPORARY ROAD CLOSURES OR TRAFFIC SWITCHES ALONG N. KANSAS AVE.
4. ONE LANE TWO-WAY TRAFFIC IS FOR DAYTIME OPERATIONS ONLY. SB TRAFFIC ONLY WILL OCCUR FOR NIGHTTIME TRAFFIC.
5. TCP SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. CONTRACTOR CAN WORK IN SECTIONS AND OPEN ROADWAY WHEN COMPLETE.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

TRAFFIC CONTROL PLAN PHASE 3
STA 114+50 TO STA 123+50

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

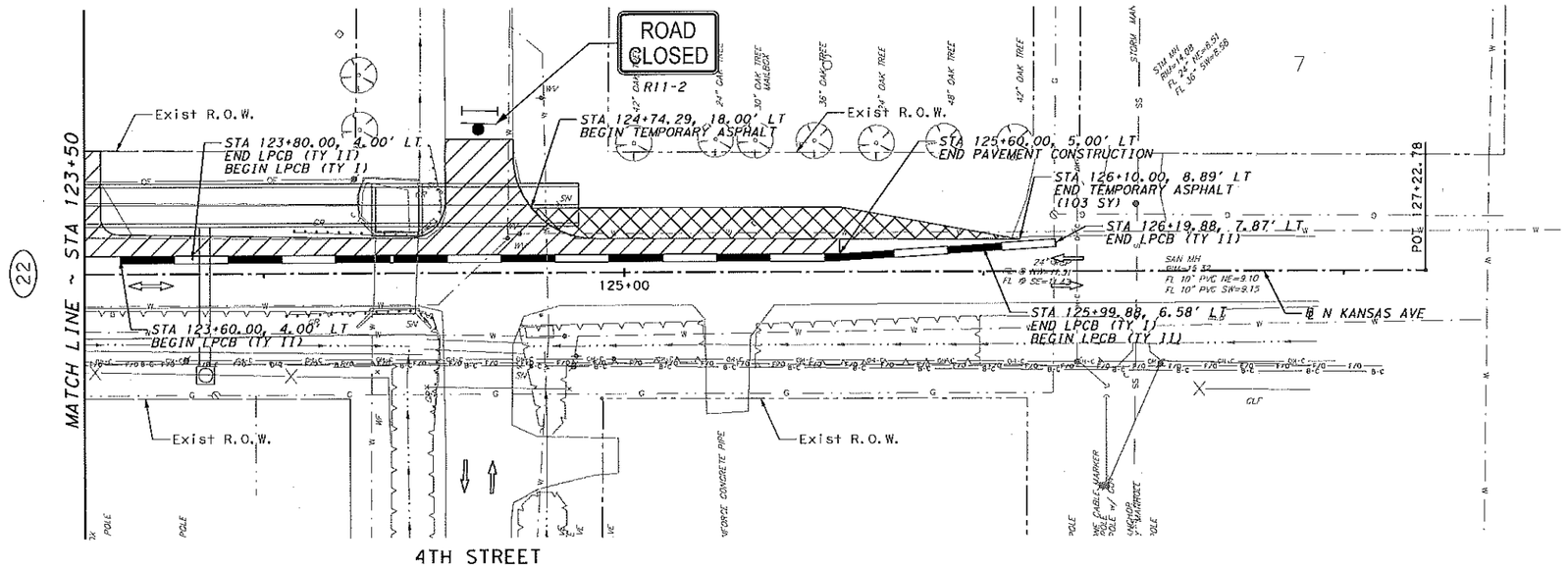
SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

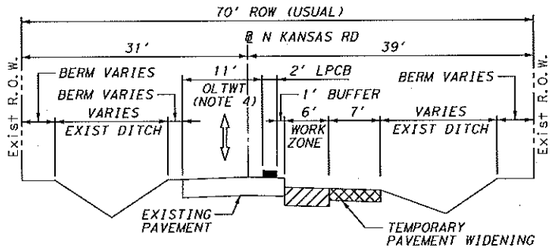
STATE OF TEXAS
BELL ANDREA CHENG RANFT
86219
LICENSED
PROFESSIONAL ENGINEER
7/20/17

SHEET NO. 22 OF 118

(21) (23)

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\TCP\N_KAN_TCP_P3_02.dgn 7/20/2017 8:19:44 PM CCL

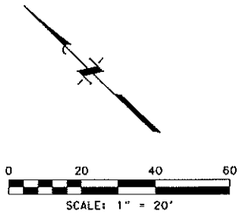




TCP PHASE 3 TYPICAL SECTION

N.T.S.

OLTWT = ONE LANE TWO-WAY TRAFFIC



LEGEND

- PROPOSED CONSTRUCTION (THIS PHASE)
- COMPLETED CONSTRUCTION
- TEMP PAVEMENT WIDENING (THIS PHASE)
- EXIST TEMP PAVEMENT (PREVIOUS PHASE)
- EXIST TRAFFIC FLOW
- ONE LANE TWO-WAY TRAFFIC FLOW
- PROP TRAFFIC FLOW
- TYPE III BARRICADE
- SIGN
- CHANNELIZING DEVICE
- LPCB

NOTES:
1. CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY EXISTING DRIVEWAYS DAMAGED DURING CONSTRUCTION WITHOUT EXTRA PAY.
2. CONTRACTOR SHALL PROVIDE ACCESS TO DRIVEWAYS THROUGHOUT CONSTRUCTION.
3. RESIDENTS TO BE NOTIFIED IN WRITING ONE-WEEK PRIOR TO ANY TEMPORARY ROAD CLOSURES OR TRAFFIC SWITCHES ALONG N. KANSAS AVE.
4. ONE LANE TWO-WAY TRAFFIC IS FOR DAYTIME OPERATIONS ONLY. SB TRAFFIC ONLY WILL OCCUR FOR NIGHTTIME TRAFFIC.
5. TCP SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. CONTRACTOR CAN WORK IN SECTIONS AND OPEN ROADWAY WHEN COMPLETE.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE
RECONSTRUCTION

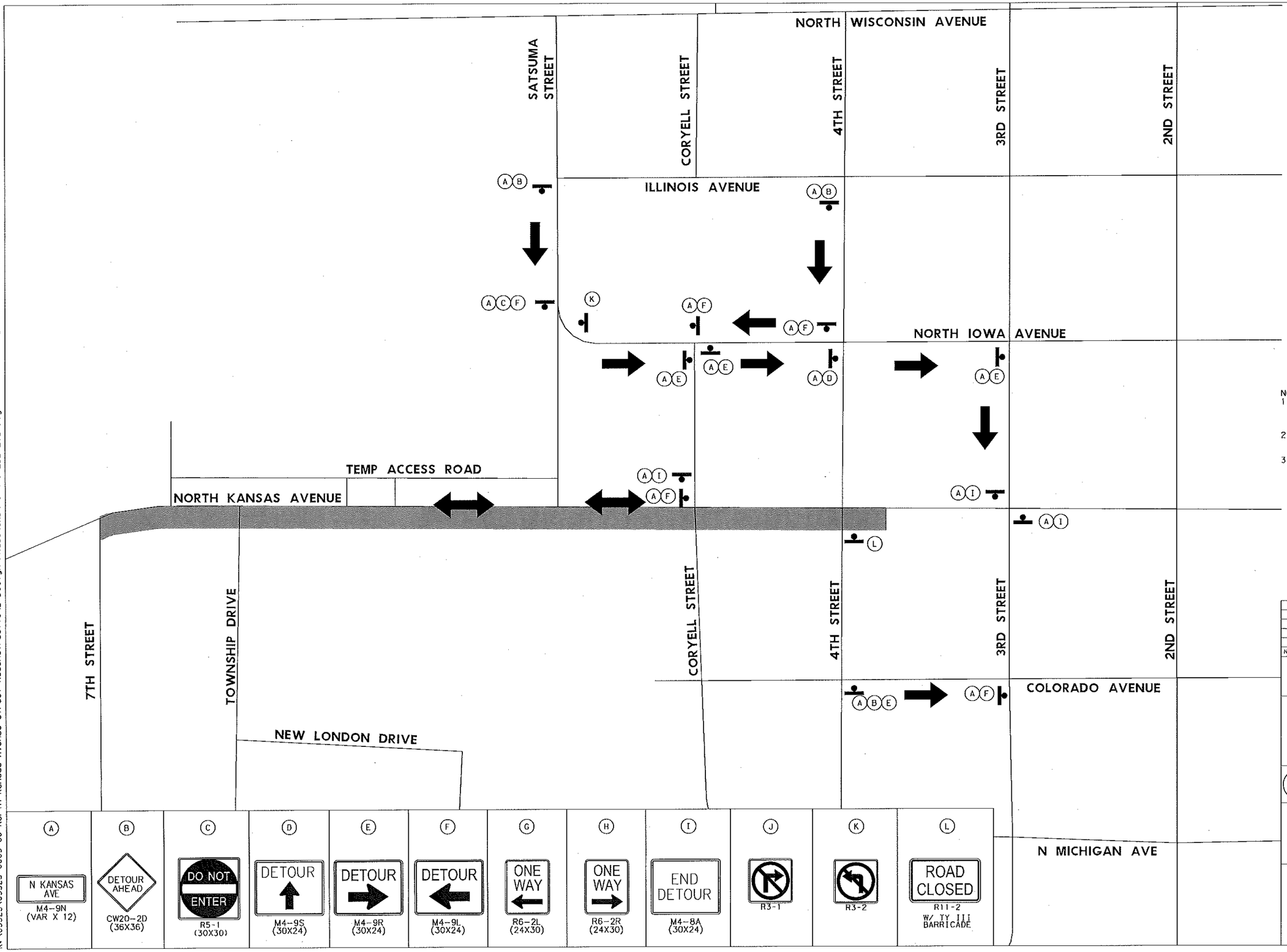
TRAFFIC CONTROL PLAN
PHASE 3
STA 123+50 TO END

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
NELL ANDREA CHENG RAFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\TCP\N_KAN_TCP_P3_03.dgn 7/20/2017 8:19:55 PM CCL



LEGEND

WORK ZONE

SPACING

Posted Speed	Sign Spacing "X"
MPH	Feet (Apprx.)
25	100
30	120
35	160
40	240

NOTES:
1. REFER TO TCP STANDARD TCP(2-2)-12 ONE LANE TWO-WAY CONTROL WITH FLAGGERS FOR DAYTIME TRAFFIC CONTROL.
2. CONTRACTOR TO PROVIDE WRITTEN NOTICE TO RESIDENTS ONE-WEEK PRIOR TO NEW TRAFFIC PATTERN.
3. CONTRACTOR TO SHIFT TRAFFIC CONTROL TO NIGHTTIME TRAFFIC CONTROL DETOUR PLAN PRIOR TO DAYTIME OPERATIONS.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION
TRAFFIC CONTROL
PHASE 4 DETOUR PLAN FOR DAYTIME

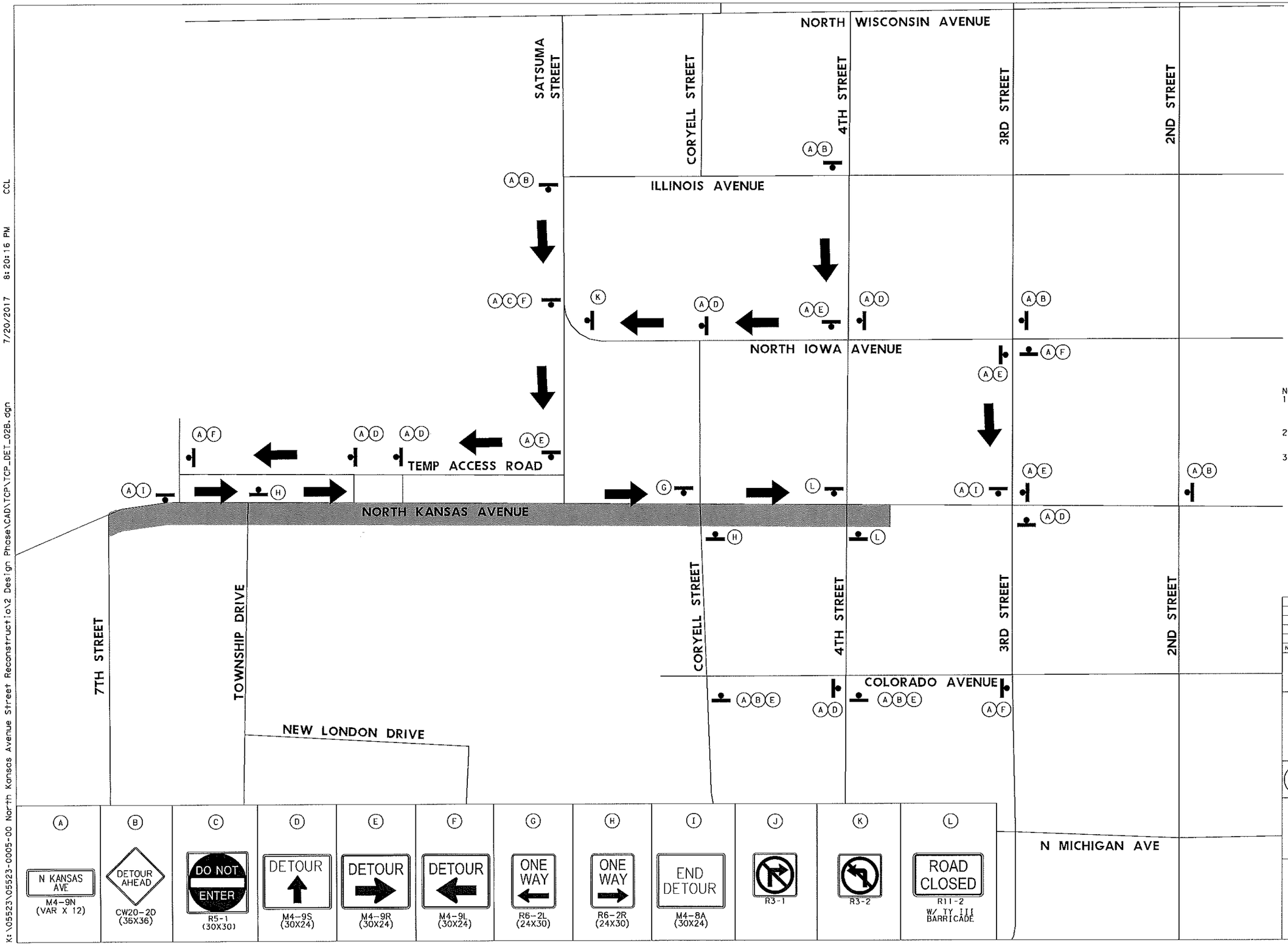
JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: DGN. BY:
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

SHEET NO. 24 OF 118

A	B	C	D	E	F	G	H	I	J	K	L
N KANSAS AVE M4-9N (VAR X 12)	DETOUR AHEAD CW20-2D (36X36)	DO NOT ENTER R5-1 (30X30)	DETOUR M4-9S (30X24)	DETOUR M4-9R (30X24)	DETOUR M4-9L (30X24)	ONE WAY R6-2L (24X30)	ONE WAY R6-2R (24X30)	END DETOUR M4-8A (30X24)	R3-1	R3-2	ROAD CLOSED R11-2 W/ TY III BARRICADE

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\TCP\TCP_DET_02A.dgn 7/20/2017 8:20:06 PM CCL



LEGEND

WORK ZONE

SPACING

Posted Speed	Sign Spacing "X"
MPH	Feet (Apprx.)
25	100
30	120
35	160
40	240

NOTES:
1. REFER TO TCP STANDARD TCP(2-2)-12 ONE LANE TWO-WAY CONTROL WITH FLAGGERS FOR DAYTIME TRAFFIC CONTROL.
2. CONTRACTOR TO PROVIDE WRITTEN NOTICE TO RESIDENTS ONE-WEEK PRIOR TO NEW TRAFFIC PATTERN.
3. CONTRACTOR TO SHIFT TRAFFIC CONTROL TO NIGHTTIME TRAFFIC CONTROL DETOUR PLAN PRIOR TO DAYTIME OPERATIONS.

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
N KANSAS AVE	DETOUR AHEAD	DO NOT ENTER	DETOUR	DETOUR	DETOUR	ONE WAY	ONE WAY	END DETOUR			ROAD CLOSED
M4-9N (VAR X 12)	CW20-2D (36X36)	R5-1 (30X30)	M4-9S (30X24)	M4-9R (30X24)	M4-9L (30X24)	R6-2L (24X30)	R6-2R (24X30)	M4-8A (30X24)	R3-1	R3-2	R11-2 W/ TY III BARRICADE

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION
TRAFFIC CONTROL
PHASE 4 DETOUR PLAN
FOR NIGHTTIME

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: DGN. BY:
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

STATE OF TEXAS
BELL ANDREA CHENG RAFT
86219
LICENSED
PROFESSIONAL ENGINEER

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\TCP\TCP_P4_OVERVIEW.dgn 7/20/2017 8:20:26 PM CCL

0 200 400 600

SCALE: 1" = 200'

LEGEND

- PROPOSED CONSTRUCTION (THIS PHASE)
- COMPLETED CONSTRUCTION
- TEMP PAVEMENT WIDENING (THIS PHASE)
- EXIST TEMP PAVEMENT (PREVIOUS PHASE)
- EXIST TRAFFIC FLOW
- ONE LANE TWO-WAY TRAFFIC FLOW
- PROP TRAFFIC FLOW
- TYPE III BARRICADE
- SIGN
- CHANNELIZING DEVICE
- LPCB

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY EXISTING DRIVEWAYS DAMAGED DURING CONSTRUCTION WITHOUT EXTRA PAY.
2. CONTRACTOR SHALL PROVIDE ACCESS TO DRIVEWAYS THROUGHOUT CONSTRUCTION.
3. RESIDENTS TO BE NOTIFIED IN WRITING ONE-WEEK PRIOR TO ANY TEMPORARY ROAD CLOSURES OR TRAFFIC SWITCHES ALONG N. KANSAS AVE.

NO.	DATE	REVISIONS	APP.

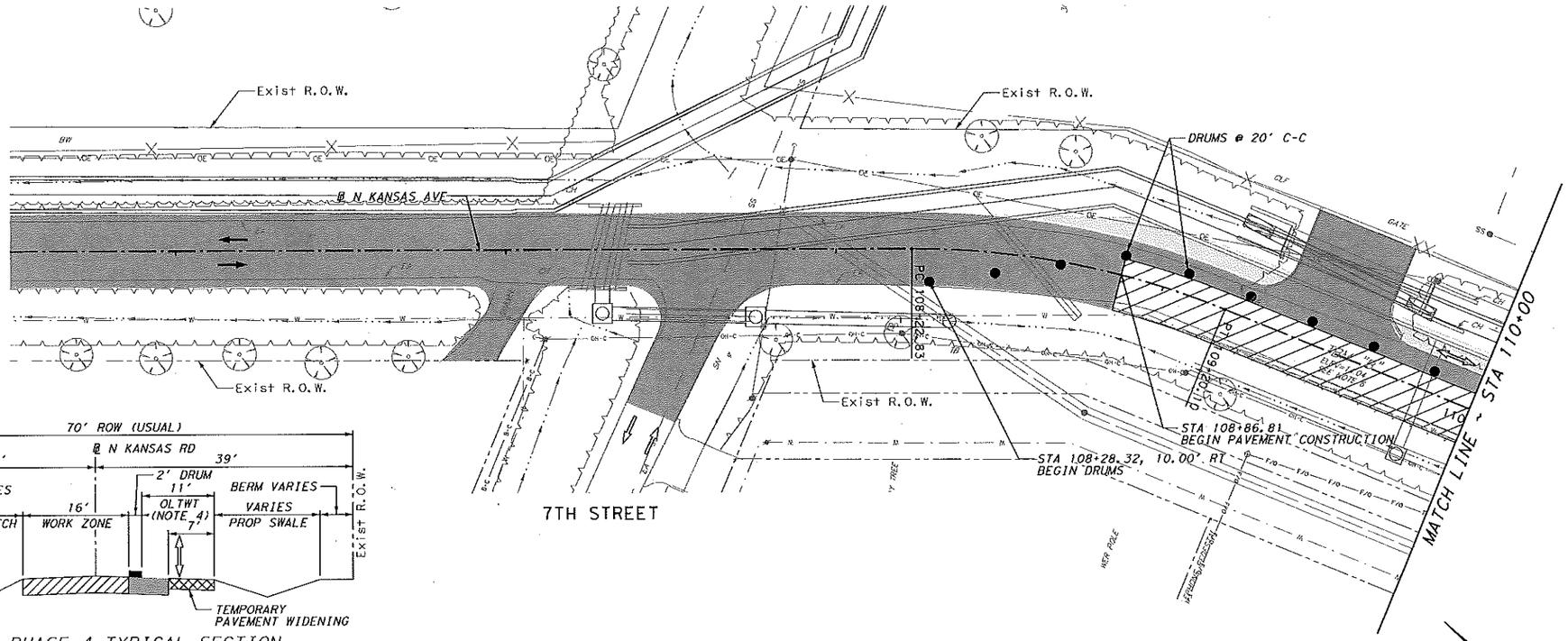
CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

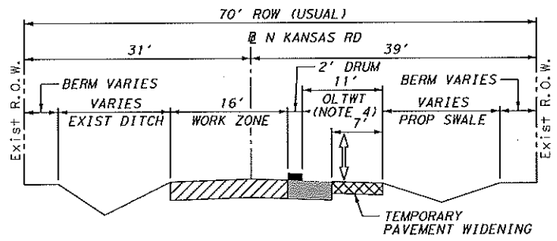
NORTH KANSAS AVENUE RECONSTRUCTION
TRAFFIC CONTROL PLAN PHASE 4 OVERVIEW

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: ______ DGN. BY: ______
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. ______
SUBMITTED: SURV. BY: ______
F.B. NO. ______

STATE OF TEXAS
BELL ANDREA CHENG RANFT
86219
LICENSED
PROFESSIONAL ENGINEER
7/20/17





TCP PHASE 4 TYPICAL SECTION

N. T. S.

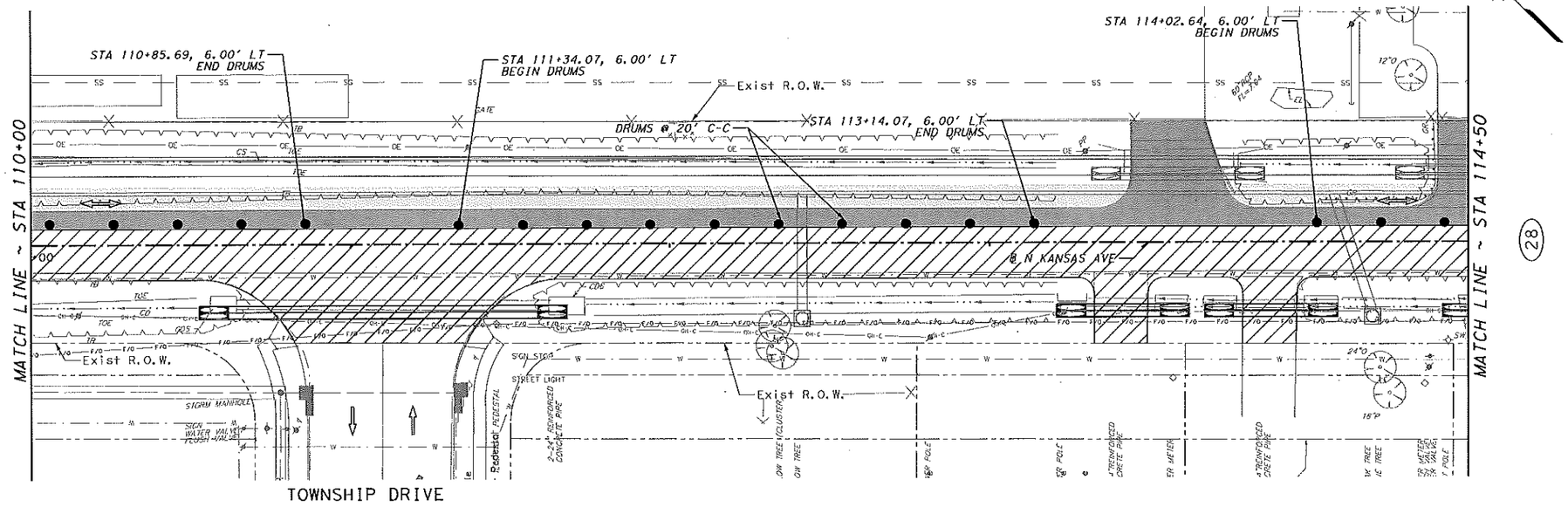
OLTWT = ONE LANE TWO-WAY TRAFFIC

LEGEND

- PROPOSED CONSTRUCTION (THIS PHASE)
- COMPLETED CONSTRUCTION
- TEMP PAVEMENT WIDENING (THIS PHASE)
- EXIST TEMP PAVEMENT (PREVIOUS PHASE)
- EXIST TRAFFIC FLOW
- ONE LANE TWO-WAY TRAFFIC FLOW
- PROP TRAFFIC FLOW
- TYPE III BARRICADE
- SIGN
- CHANNELIZING DEVICE
- LPCB

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY EXISTING DRIVEWAYS DAMAGED DURING CONSTRUCTION WITHOUT EXTRA PAY.
2. CONTRACTOR SHALL PROVIDE ACCESS TO DRIVEWAYS THROUGHOUT CONSTRUCTION.
3. RESIDENTS TO BE NOTIFIED IN WRITING ONE-WEEK PRIOR TO ANY TEMPORARY ROAD CLOSURES OR TRAFFIC SWITCHES ALONG N. KANSAS AVE.
4. ONE LANE TWO-WAY TRAFFIC IS FOR DAYTIME OPERATIONS ONLY. SB TRAFFIC ONLY WILL OCCUR FOR NIGHTTIME TRAFFIC.
5. TCP SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. CONTRACTOR CAN WORK IN SECTIONS AND OPEN ROADWAY WHEN COMPLETE.



28

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

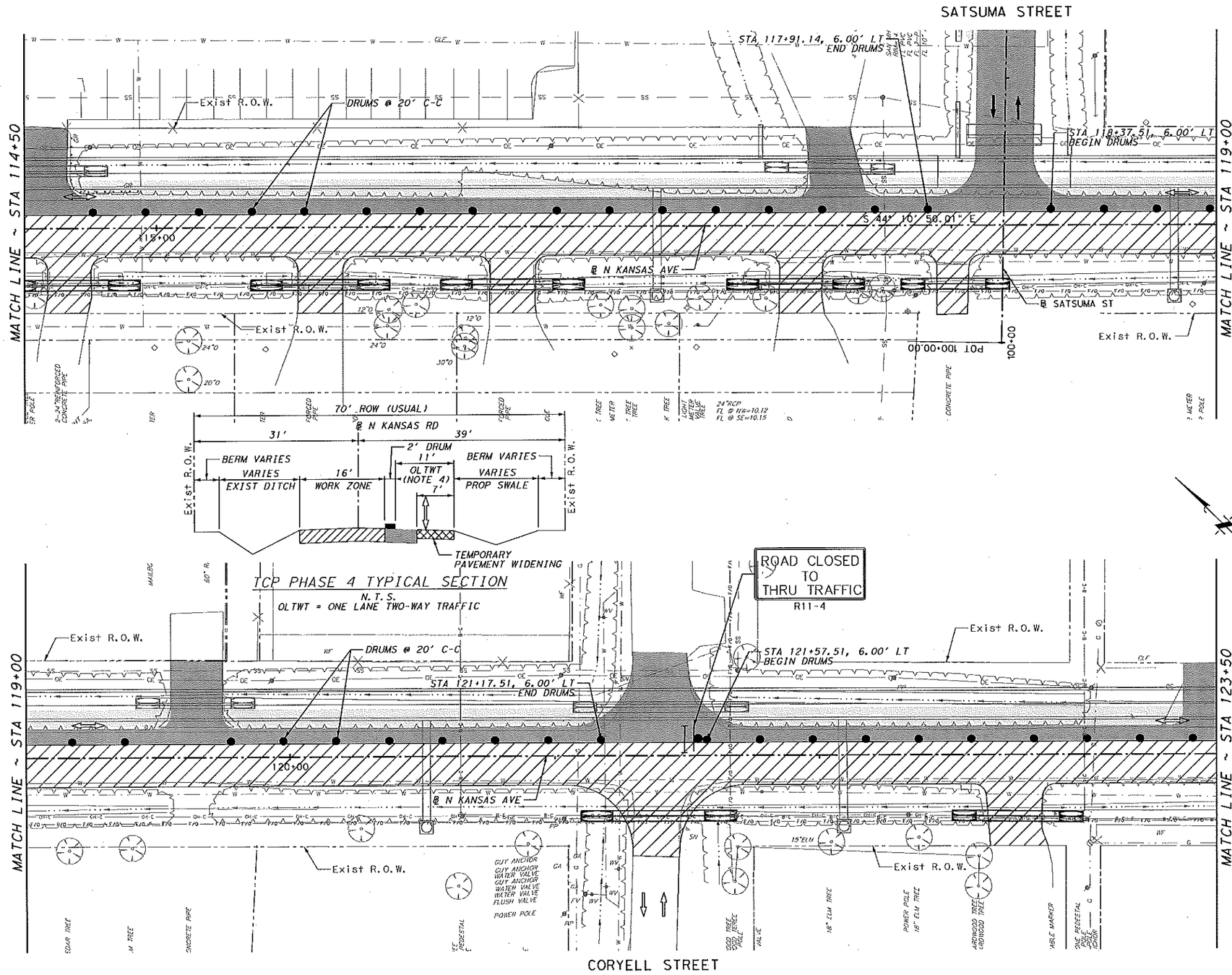
NORTH KANSAS AVENUE RECONSTRUCTION

TRAFFIC CONTROL PLAN PHASE 4

BEGIN TO STA 114+50

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: DGN. BY:
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.



0 20 40 60
SCALE: 1" = 20'

LEGEND

- PROPOSED CONSTRUCTION (THIS PHASE)
- COMPLETED CONSTRUCTION
- TEMP PAVEMENT WIDENING (THIS PHASE)
- EXIST TEMP PAVEMENT (PREVIOUS PHASE)
- EXIST TRAFFIC FLOW
- ONE LANE TWO-WAY TRAFFIC FLOW
- PROP TRAFFIC FLOW
- TYPE III BARRICADE
- SIGN
- CHANNELIZING DEVICE
- LPCB

NOTES:
1. CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY EXISTING DRIVEWAYS DAMAGED DURING CONSTRUCTION WITHOUT EXTRA PAY.
2. CONTRACTOR SHALL PROVIDE ACCESS TO DRIVEWAYS THROUGHOUT CONSTRUCTION.
3. RESIDENTS TO BE NOTIFIED IN WRITING ONE-WEEK PRIOR TO ANY TEMPORARY ROAD CLOSURES OR TRAFFIC SWITCHES ALONG N. KANSAS AVE.
4. ONE LANE TWO-WAY TRAFFIC IS FOR DAYTIME OPERATIONS ONLY. SB TRAFFIC ONLY WILL OCCUR FOR NIGHTTIME TRAFFIC.
5. TCP SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. CONTRACTOR CAN WORK IN SECTIONS AND OPEN ROADWAY WHEN COMPLETE.
6. CONTRACTOR TO MAINTAIN ACCESS TO RESIDENTIAL DRIVEWAYS DURING CONSTRUCTION.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

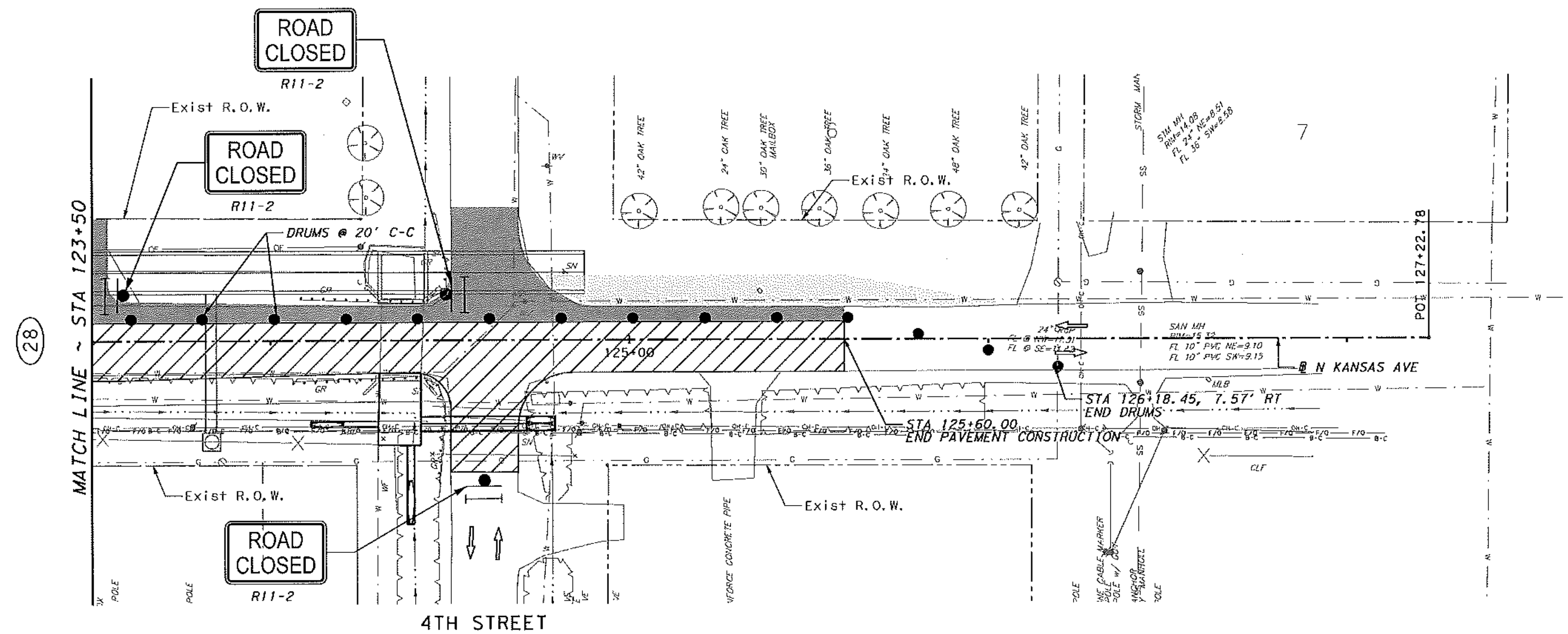
NORTH KANSAS AVENUE
RECONSTRUCTION

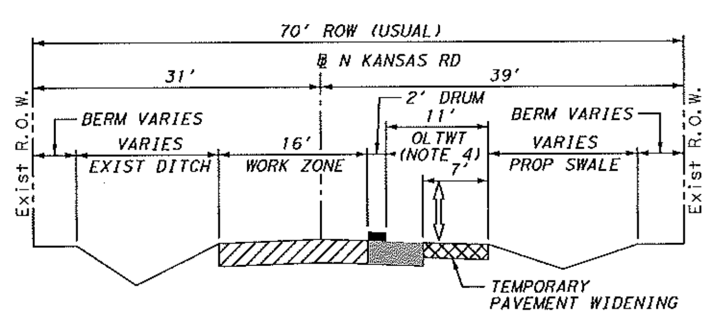
TRAFFIC CONTROL PLAN
PHASE 4
STA 114+50 TO STA 123+50

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: DGN. BY:
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

STATE OF TEXAS
BELL ANDREA CHENG RANT
86219
LICENSED
PROFESSIONAL ENGINEER
7/20/17





TCP PHASE 4 TYPICAL SECTION

N.T.S.

OLTWT = ONE LANE TWO-WAY TRAFFIC

SCALE: 1" = 20'

LEGEND

- PROPOSED CONSTRUCTION (THIS PHASE)
- COMPLETED CONSTRUCTION
- TEMP PAVEMENT WIDENING (THIS PHASE)
- EXIST TEMP PAVEMENT (PREVIOUS PHASE)
- EXIST TRAFFIC FLOW
- ONE LANE TWO-WAY TRAFFIC FLOW
- PROP TRAFFIC FLOW
- TYPE III BARRICADE
- SIGN
- CHANNELIZING DEVICE
- LPCB

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY EXISTING DRIVEWAYS DAMAGED DURING CONSTRUCTION WITHOUT EXTRA PAY.
2. CONTRACTOR SHALL PROVIDE ACCESS TO DRIVEWAYS THROUGHOUT CONSTRUCTION.
3. RESIDENTS TO BE NOTIFIED IN WRITING ONE-WEEK PRIOR TO ANY TEMPORARY ROAD CLOSURES OR TRAFFIC SWITCHES ALONG N. KANSAS AVE.
4. ONE LANE TWO-WAY TRAFFIC IS FOR DAYTIME OPERATIONS ONLY. SB TRAFFIC ONLY WILL OCCUR FOR NIGHTTIME TRAFFIC.
5. TCP SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. CONTRACTOR CAN WORK IN SECTIONS AND OPEN ROADWAY WHEN COMPLETE.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

TRAFFIC CONTROL PLAN
PHASE 4
STA 123+50 TO END

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: DGN. BY:
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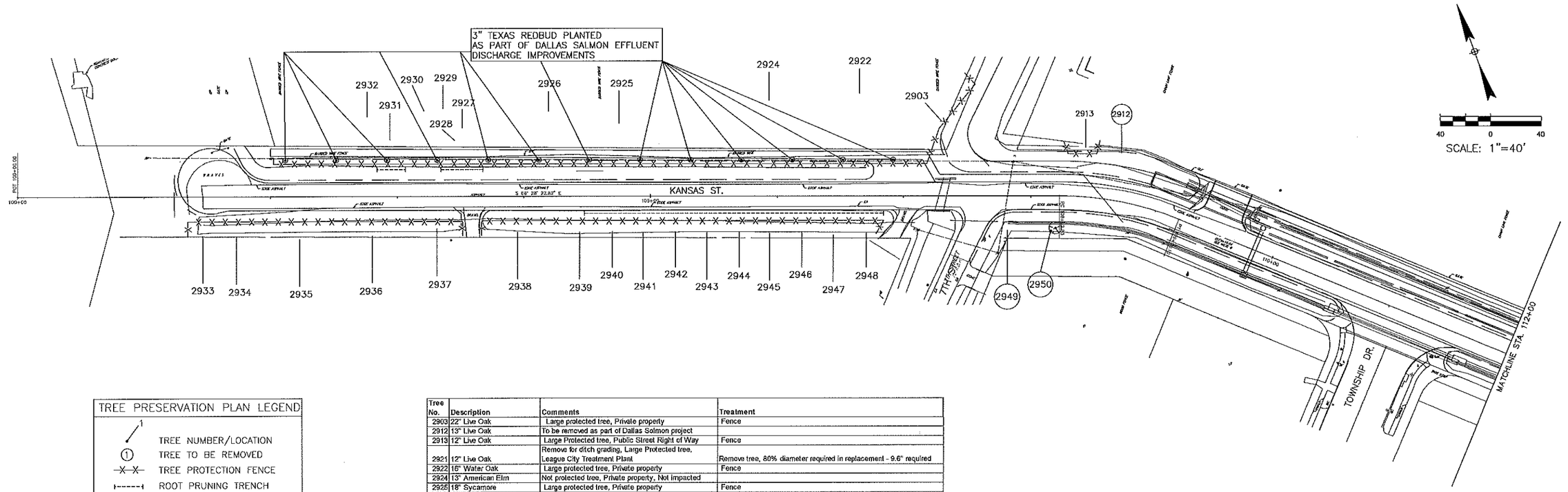
SUBMITTED: SURV. BY:
F.B. NO.

STATE OF TEXAS — BELL ANDREA CHENG RAFT — 86219 — LICENSED PROFESSIONAL ENGINEER

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstructio\2 Design Phase\CAD\TCP\N_KAN_TCP_P4_03.dgn 7/20/2017 8:21:08 PM CCL

0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

$USER$
$TIME$
$DATE$



TREE PRESERVATION PLAN LEGEND

- 1 — TREE NUMBER/LOCATION
- ① — TREE TO BE REMOVED
- -X-X- — TREE PROTECTION FENCE
- I------I — ROOT PRUNING TRENCH
- ⊙ — REPLACEMENT PLANTING SPECIES AND SIZE/TYPE

NOTE:

1. THIS TREE PROTECTION PLAN WAS DEVELOPED WITH INFORMATION PROVIDED BY DESIGN ENGINEER IN DRAWINGS DATED JULY 2017. THE PLAN CONSIDERS ALL FITTINGS, VERTICAL OFFSETS AND AREAS OF NECESSARY EXCAVATION. CHANGES MADE TO DESIGN MAY COMPROMISE THE TREE PROTECTION PLAN. REFER SPECIFICATIONS 01535 AND 02915. CONDITION OF EACH TREE IS BASED ON VISUAL EVALUATION AT TIME OF DESIGN. CONDITION AND STRUCTURAL INTEGRITY OF EACH TREE IS NOT GUARANTEED BY DESIGNER AT ANY POINT IN THE FUTURE, AS ENVIRONMENTAL AND MAINTENANCE INFLUENCES ON EACH TREE CAN NOT BE DETERMINED BY DESIGNER.
2. IN AREAS WHERE INDIVIDUAL TREES HAVE NOT BEEN TIED IN BY SURVEY APPROXIMATE LOCATION IS INDICATED ON TPP. ACCURACY OF REPRESENTED LOCATION CANT, AND IS NOT GUARANTEED BY DESIGNER.
3. THE CONTRACTOR'S ARBORIST WILL MARK LOCATIONS OF THE NEW TREES AND OBTAIN APPROVAL BY THE CITY ENGINEER AND CITY ARBORIST BEFORE PURCHASING AND PLANTING TREES.

Tree No.	Description	Comments	Treatment
2903	22" Live Oak	Large protected tree, Private property	Fence
2912	13" Live Oak	To be removed as part of Dallas Salmon project	
2913	12" Live Oak	Large Protected tree, Public Street Right of Way	Fence
2921	12" Live Oak	Remove for ditch grading, Large Protected tree, League City Treatment Plant	Remove tree, 80% diameter required in replacement - 9.6" required
2922	16" Water Oak	Large protected tree, Private property	Fence
2924	13" American Elm	Not protected tree, Private property, Not impacted	
2925	18" Sycamore	Large protected tree, Private property	Fence
2926	16" Live Oak	Large protected tree, Private property	Fence
2927	12" Live Oak	Large protected tree, Private property	Fence
2928	16" Live Oak	Large protected tree, Private property	Fence
2929	15" Water Oak	Large protected tree, Private property	Fence
2930	15" Water Oak	Large protected tree, Private property	Fence
2931	12" American Elm	Not protected tree, Private property, Not impacted	
2932	42" Live Oak	Large protected tree, Private property	Fence
2933	16" Live Oak	Large Protected tree, Public Street Right of Way	Fence, Clearance prune
2934	12" Live Oak	Large Protected tree, Public Street Right of Way	Fence, Clearance prune
2935	15" Live Oak	Large Protected tree, Public Street Right of Way	Fence, Clearance prune
2936	12" Live Oak	Large Protected tree, Public Street Right of Way	Fence, Clearance prune
2937	16" Live Oak	Large Protected tree, Public Street Right of Way	Fence, Clearance prune
2938	13" Live Oak	Large Protected tree, Public Street Right of Way	Fence, Clearance prune
2939	12" Live Oak	Large Protected tree, Public Street Right of Way	Fence, Clearance prune
2940	23" Sycamore	Large Protected tree, Public Street Right of Way	Fence, Clearance prune
2941	12" Live Oak	Large Protected tree, Public Street Right of Way	Fence, Clearance prune
2942	26" Sycamore	Large Protected tree, Public Street Right of Way	Fence, Clearance prune
2943	13" Live Oak	Large Protected tree, Public Street Right of Way	Fence, Clearance prune
2944	23" Sycamore	Large Protected tree, Public Street Right of Way	Fence, Clearance prune
2945	12" Live Oak	Large Protected tree, Public Street Right of Way	Fence, Clearance prune
2948	21" Sycamore	Trunk cavity, Poor condition, Large protected tree, Public Street Right of Way	Fence, Clearance prune
2947	13" Live Oak	Large Protected tree, Public Street Right of Way	Fence, Clearance prune
2948	30" Sycamore	*Hypoxylon*, Poor condition, Public Street Right of Way	Fence, Clearance prune
2949	22" Eastern Red Cedar	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2950	6" Sugarberry	Not protected tree, Remove for ditch grading	Remove tree, no replacement required

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

C.N. Koehl
Urban Forestry, Inc.
210 Stone Bush Ct. • Katy, Texas 77493
281-391-0022 ckoehl@koehlurbanforestry.com

APPROVED Craig N. Koehl 7-18-2017

NORTH KANSAS AVENUE RECONSTRUCTION

TREE PROTECTION PLAN

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: _____ DWN. BY: _____
JOB NO. 05523-0004-00 DWG. NO. _____
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F.B. NO. _____

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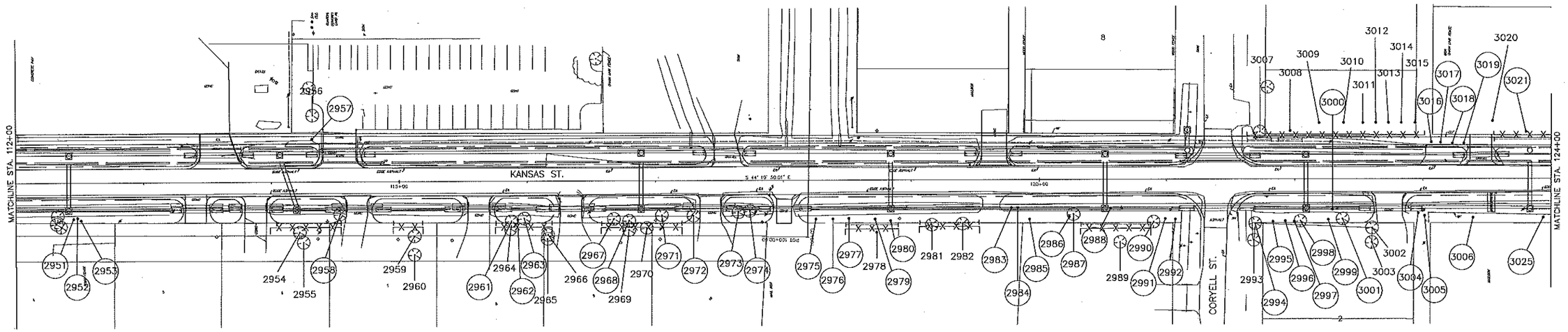
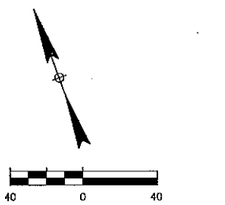


Tree No.	Description	Comments	Treatment
2951	14" Ligustrum	Invasive tree, Remove for ditch grading	Remove tree, no replacement required
2952	16" Water Oak	Remove for ditch grading, large protected tree	Remove tree, 100% diameter required in replacement - 16" required
2953	10" Tallow	Invasive tree, Remove for ditch grading	Remove tree, no replacement required
2954	27" Live Oak	50% deback, Poor, Large protected tree, Private property	Root prune for ditch grading, Fence, Clearance prune
2955	22" Pecan	50% deback, Poor, Large protected tree, Private property	Root prune for ditch grading, Fence, Clearance prune
2956	14" Live Oak	Large protected tree, Private property	
2957	10" Palm	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2958	6" Pear	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2959	15" Water Oak	Large protected tree, Private property	Root prune for ditch grading, Fence, Clearance prune
2960	20" Water Oak	50% deback, Poor, Large protected tree, Private property	
2961	12" Live Oak	50% dead, Poor, Large protected tree, Remove for ditch grading	Remove tree, no replacement required
2962	6" Yaupon Holly	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2963	12" Live Oak	50% dead, Poor, Large protected tree, Remove for ditch grading	Remove tree, no replacement required
2964	24" Live Oak	50% deback, Poor, Large protected tree, Private property	Root prune for ditch grading, Fence, Clearance prune
2965	21" Live Oak	50% deback, Poor, Large protected tree, Private property	Root prune for ditch grading, Fence, Clearance prune
2966	11" Live Oak	50% deback, Poor, Large protected tree, Private property	
2967	14" Live Oak	50% dead, Poor, Large protected tree, Remove for ditch grading	Remove tree, no replacement required
2968	5" Live Oak	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2969	20" Live Oak	Large protected tree, Private property	Root prune for ditch grading, Fence, Clearance prune
2970	22" Live Oak	Large protected tree, Private property	Root prune for ditch grading, Fence, Clearance prune
2971	14" American Elm	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2972	24" Live Oak	Remove for ditch grading, large protected tree	Remove tree, 130% diameter required in replacement - 31.2" required
2973	22" Cottonwood	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2974	12" Black Willow	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2975	6" Ligustrum	Invasive tree, Remove for ditch grading	Remove tree, no replacement required
2976	5" Ligustrum	Invasive tree, Remove for ditch grading	Remove tree, no replacement required
2977	5" Ligustrum	Invasive tree, Remove for ditch grading	Remove tree, no replacement required
2978	20" Sugarberry	Not protected tree, private property	Root prune for ditch grading, Fence, Clearance prune
2979	6" Ligustrum	Invasive tree, Remove for ditch grading	Remove tree, no replacement required
2980	6" Ligustrum	Invasive tree, Remove for ditch grading	Remove tree, no replacement required
2981	8" Eastern Red Cedar	Not protected tree, private property	Root prune for ditch grading, Fence, Clearance prune
2982	12" American Elm	Not protected tree, private property	Root prune for ditch grading, Fence, Clearance prune
2983	10" Ligustrum	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2984	10" Ligustrum	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2985	12" Sugarberry	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2986	8" Ligustrum	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2987	12" Live Oak	Remove for ditch grading, large protected tree	Remove tree, 80% diameter required in replacement - 9.6" required
2988	18" Ligustrum	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2989	26" Water Oak	30% deback, Large protected tree, Private property	Root prune for ditch grading, Fence, Clearance prune
2990	4" Live oak	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2991	2" Yaupon Holly	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2992	6" Ligustrum	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2993	5" Live Oak	Not protected tree	
2994	10" Privet	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2995	10" Privet	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2996	10" Privet	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2997	10" Privet	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2998	16" Sugarberry	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
2999	6" Privet	Not protected tree, Remove for ditch grading	Remove tree, no replacement required

Tree No.	Description	Comments	Treatment
3000	5" Sugarberry	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
3001	24" Sugarberry	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
3002	18" Sugarberry	Not protected tree, private property	Clearance prune
3003	6" Sugarberry	Not protected tree, private property	
3004	5" Privet	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
3005	14" Sugarberry	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
3006	32" Live Oak	Remove for ditch grading, large protected tree	Remove tree, 130% diameter required in replacement - 41.6" required
3007	8" Live Oak	Not protected tree, private property	Root prune for ditch grading, Fence, Clearance prune
3008	6" Magnolia	Not protected tree, private property	Root prune for ditch grading, Fence, Clearance prune
3009	14" Bottlebrush	Not protected tree, private property	Root prune for ditch grading, Fence, Clearance prune
3010	13" Bottlebrush	Not protected tree, private property	Root prune for ditch grading, Fence, Clearance prune
3011	2" Olive	Not protected tree, private property	Fence, Clearance prune
3012	7" Live Oak	Not protected tree, private property	Fence, Clearance prune
3013	3" Citrus	Not protected tree, private property	Fence, Clearance prune
3014	4" Citrus	Not protected tree, private property	Fence, Clearance prune
3015	4" Citrus	Not protected tree, private property	Fence, Clearance prune
3016	16" American Holly	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
3017	10" Ligustrum	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
3018	10" Ligustrum	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
3019	10" Ligustrum	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
3020	40" Water Oak	Large protected tree, Private property	Root prune for ditch grading, Fence, Clearance prune
3021	14" Magnolia	Remove for ditch grading, large protected tree	Remove tree, 80% diameter required in replacement - 11.2" required
3025	38" American Elm	Not protected tree, Remove for ditch grading	Remove tree, no replacement required



TREE PRESERVATION PLAN LEGEND

- 1 — TREE NUMBER/LOCATION
- (1) — TREE TO BE REMOVED
- -X-X- — TREE PROTECTION FENCE
- |------| — ROOT PRUNING TRENCH
- ⊙ — REPLACEMENT PLANTING SPECIES AND SIZE/TYPE

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NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

C.N. Koehl
Urban Forestry, Inc.
210 Stone Bush Ct. • Katy, Texas 77493
281-391-0022 ckoehl@koehlurbanforestry.com

APPROVED Craig N. Koehl 7-18-2017

NORTH KANSAS AVENUE
RECONSTRUCTION

TREE PROTECTION PLAN

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
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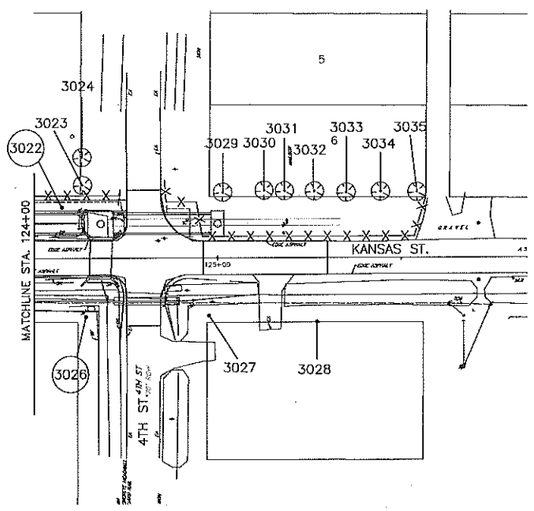
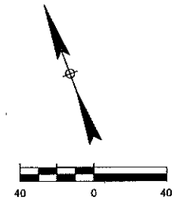
$USER$ $TIME$ $DATE$ $FILE$

0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

$USER$ $TIME$ $DATE$





SCALE: 1"=40'

TREE PRESERVATION PLAN LEGEND

- 1 — TREE NUMBER/LOCATION
- (1) — TREE TO BE REMOVED
- -X-X- — TREE PROTECTION FENCE
- ----- — ROOT PRUNING TRENCH
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Tree No.	Description	Comments	Treatment
3022	15" Ligustrum	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
3023	24" Live Oak	Large protected tree, Private property	Root prune for sidewalk, Fence, Clearance prune
3024	26" Live Oak	Large protected tree, Private property	Fence, Clearance prune
3025	38" American Elm	Not protected tree, Remove for ditch grading	Remove tree, no replacement required
3026	25" Live Oak	Remove for ditch grading, large protected tree	Remove tree, 130% diameter required in replacement - 32.5" required
3027	6" Sago	Not protected tree, private property	
3028	24" Sugarberry	50% dieback, Not protected tree, private property	
3029	38" Live Oak	Private tree, Large protected	Root prune for storm, Fence, Clearance prune
3030	24" Live Oak	Private tree, Large protected	Fence
3031	25" Live Oak	Private tree, Large protected	Fence
3032	36" Live oak	Private tree, Large protected	Fence
3033	16" Live Oak	Private tree, Large protected	Fence
3034	37" Live Oak	Private tree, Large protected	Fence
3035	34" Live Oak	Private tree, Large protected	Fence

NO.	DATE	REVISIONS	APP.

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NORTH KANSAS AVENUE
RECONSTRUCTION

TREE PROTECTION PLAN

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$FILE$

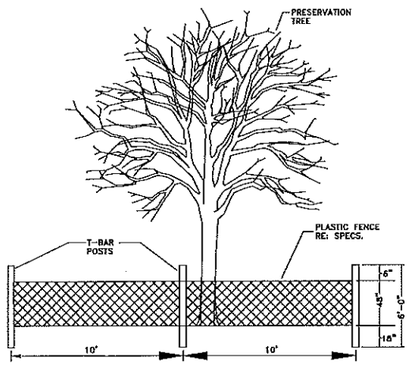
0 1 2 3 4 5 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

$USER$ $TIME$ $DATE$

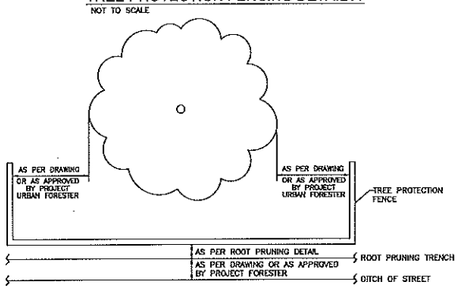
Tree Removal/Tree Replacement Calculations

Protected Trees Scheduled for Removal to be Replaced on Site

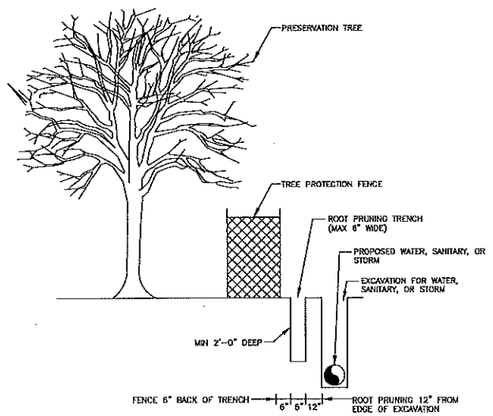
Tree No.	Description	Replacement required per Section 102-12
2921	12" Live Oak	(60% of diameter) 9.6"
2949	22" Eastern Red Cedar	0
2950	6" Sugarberry	0
2951	14" Ligustrum	0
2952	16" Water Oak	(100% of diameter) 16"
2953	10" Tallow	0
2957	10" Palm	0
2958	6" Pear	0
2961	12" Live Oak	0
2962	6" Yaupon Holly	0
2963	12" Live Oak	0
2967	14" Live Oak	0
2968	5" Live Oak	0
2971	14" American Elm	0
2972	24" Live Oak	(130% of diameter) 31.2"
2973	22" Cottonwood	0
2974	12" Black Willow	0
2975	6" Ligustrum	0
2976	6" Ligustrum	0
2977	6" Ligustrum	0
2983	10" Ligustrum	0
2984	10" Ligustrum	0
2985	12" Sugarberry	0
2986	8" Ligustrum	0
2987	12" Live Oak	(80% of diameter) 9.6"
2988	18" Ligustrum	0
2990	4" Live oak	0
2991	2" Yaupon Holly	0
2992	6" Ligustrum	0
2994	10" Privet	0
2995	10" Privet	0
2996	10" Privet	0
2997	10" Privet	0
2998	16" Sugarberry	0
2999	8" Privet	0
3000	5" Sugarberry	0
3001	24" Sugarberry	0
3004	5" Privet	0
3005	14" Sugarberry	0
3006	32" Live Oak	(130% of diameter) 41.6"
3016	18" American Holly	0
3017	10" Ligustrum	0
3018	10" Ligustrum	0
3019	10" Ligustrum	0
3021	14" Magnolia	(80% of diameter) 11.2"
3022	15" Ligustrum	0
3025	38" American Elm	0
3026	25" Live Oak	(130% of diameter) 49.4"



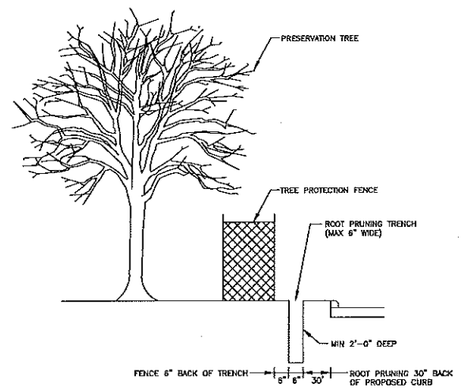
TREE PROTECTION FENCING DETAIL A
NOT TO SCALE



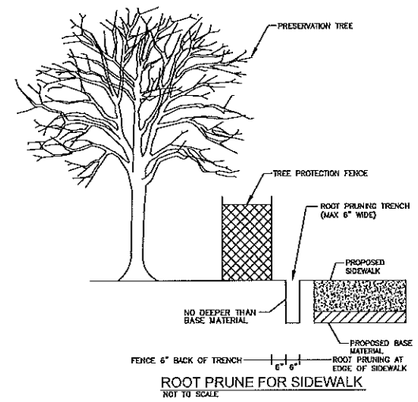
TREE PROTECTION FENCING DETAIL B
NOT TO SCALE



ROOT PRUNE FOR WATER, SANITARY, OR STORM LINE
NOT TO SCALE



ROOT PRUNE FOR STREET-CURB & GUTTER - NO OCC
NOT TO SCALE



ROOT PRUNE FOR SIDEWALK
NOT TO SCALE

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

C.N. Koehl
Urban Forestry, Inc.
210 Stone Bush Ct. • Katy, Texas 77493
281-391-0022 ckoehl@koehlurbanforestry.com

APPROVED Craig N. Koehl 7-18-2017

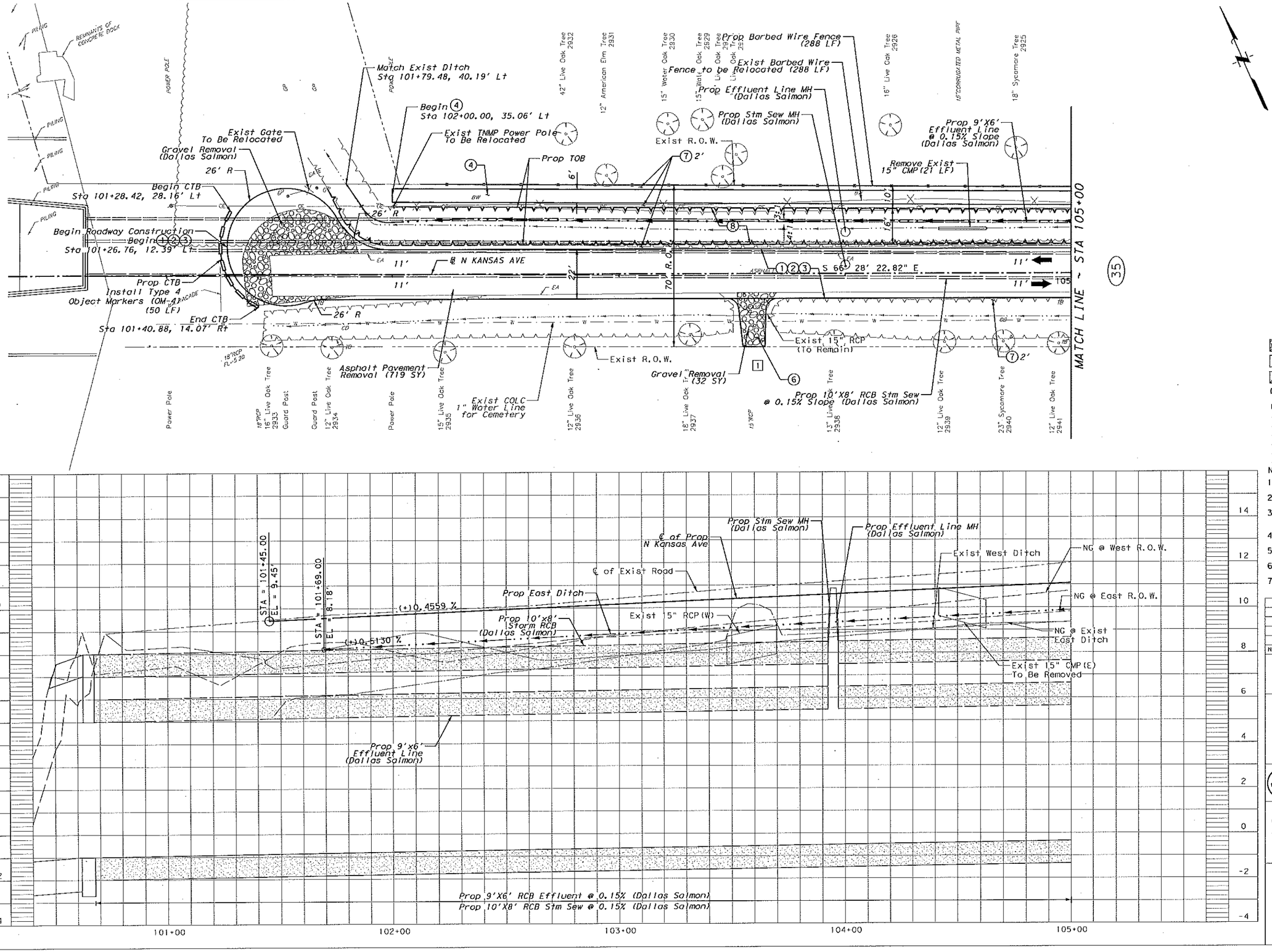
NORTH KANSAS AVENUE RECONSTRUCTION

TREE PROTECTION PLAN

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: DGN. BY:
DATE: DWN. BY:
JOB NO. 05523-0004-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

$FILE$



LEGEND

1. 6" LIME TREATED SUBGRADE
2. 8" CRUSHED CONCRETE BASE
3. 2" HMAC
4. 6" CONCRETE TRAIL
5. CONCRETE DRIVEWAY
6. ASPHALT DRIVEWAY
7. BLOCK SODDING
8. HYDROMULCH SEEDING
9. REFL PAV MRK (W) 24" (SLD)
10. REFL PAV MRK (W) 12" (SLD)
11. 4" 2-WAY REFL BLUE PAV MRKR
12. PROPOSED TYPE 4 CURB RAMP
13. RELOCATED STOP SIGN
14. PROP 2" GATE VALVE & BOX
15. PROP 2" WET CONNECTION
16. PROP 2"X45° BEND, AB
17. PROP 2"X2" TEE, AB
18. REMOVE GATE VALVE & BOX
19. RELOCATE WATER LINE SEE DETAIL SHEET W-03

[#] DRIVEWAY #

GRAVEL REMOVAL

CONCRETE PAVEMENT REMOVAL

MILL AND ASPHALT OVERLAY

EXIST TRAFFIC FLOW

PROP TRAFFIC FLOW

—— OE —— OVERHEAD ELECTRIC
—— OH-C —— OVERHEAD COPPER
—— B-C —— BURIED COPPER
—— F/O —— BURIED FIBER OPTIC
-SS- — — SS — SANITARY SEWER
— — W — — COLC WATER LINE

NOTES:

1. GRAVEL REMOVAL PAID UNDER ITEM 105 6021
2. SAWCUTS ARE INCIDENTAL TO VARIOUS BID ITEMS
3. POWER POLES AND UTILITY POLES TO BE RELOCATED BY OTHERS
4. ALL PAVEMENT MARKINGS WILL BE REFLECTORIZED THERMOPLASTIC
5. ALL WATER LINE FITTINGS INCIDENTAL TO VARIOUS BID ITEMS
6. TYPE E INLETS PAID UNDER ITEM 465 6154
7. REFL BLUE PAV MRKRS PAID UNDER ITEM 0672 6009

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

NORTH KANSAS AVENUE PLAN AND PROFILE

BEGIN TO STA 105+50

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
BELL ANDREA CHENG RANFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

SHEET NO. 34 OF 118

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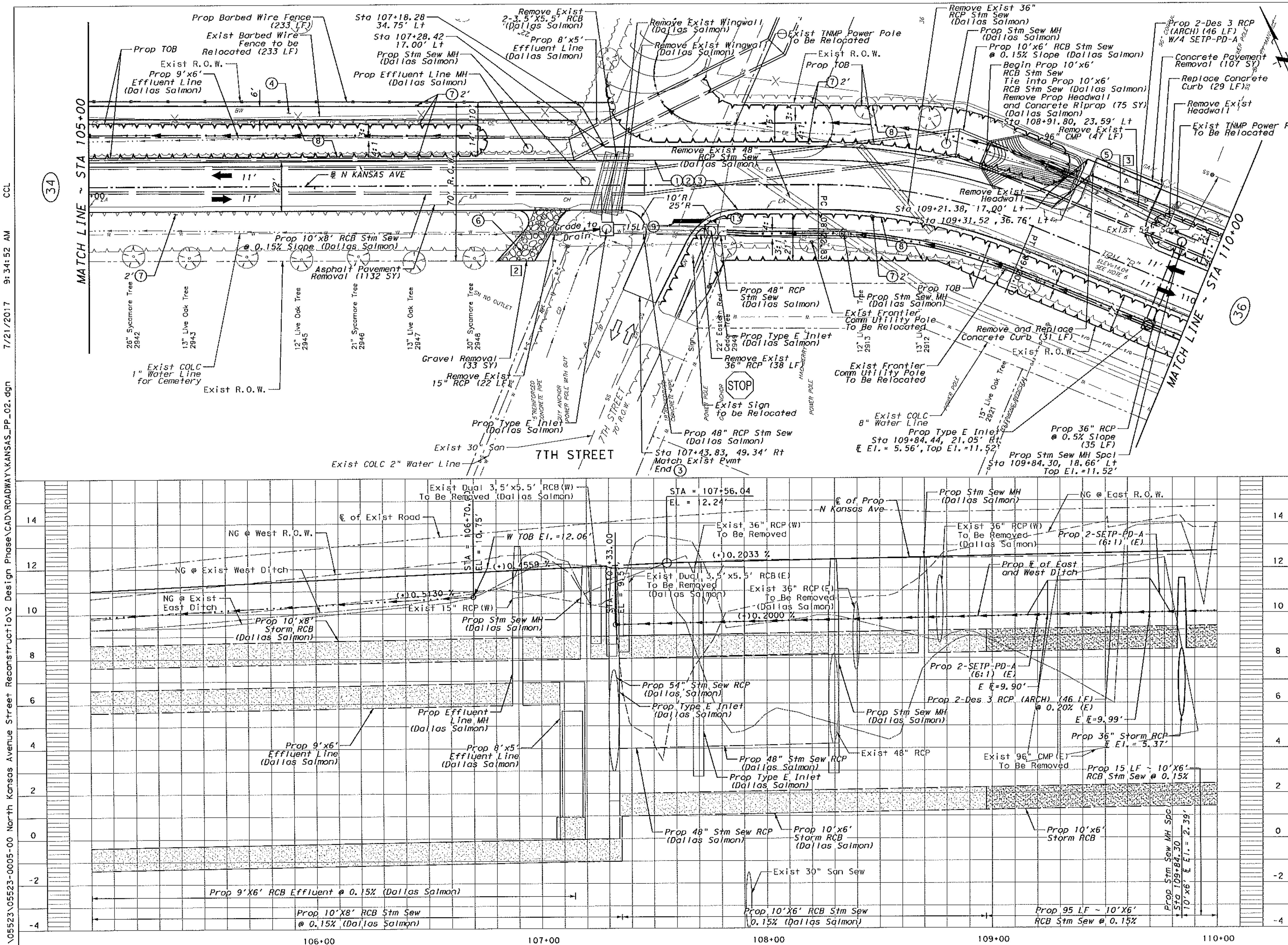

SCALE: 1" = 20'

LEGEND

1. 6" LIME TREATED SUBGRADE
2. 8" CRUSHED CONCRETE BASE
3. 2" HMAC
4. 6" CONCRETE TRAIL
5. CONCRETE DRIVEWAY
6. ASPHALT DRIVEWAY
7. BLOCK SODDING
8. HYDROMULCH SEEDING
9. REFL PAV MRK (W) 24" (SLD)
10. REFL PAV MRK (W) 12" (SLD)
11. 4" 2-WAY REFL BLUE PAV MRKR
12. PROPOSED TYPE 4 CURB RAMP
13. RELOCATED STOP SIGN
14. PROP 2" GATE VALVE & BOX
15. PROP 2" WET CONNECTION
16. PROP 2"X45° BEND, AB
17. PROP 2"X2" TEE, AB
18. REMOVE GATE VALVE & BOX
19. RELOCATE WATER LINE SEE DETAIL SHEET W-03

- [#] DRIVEWAY #
- GRAVEL REMOVAL
- CONCRETE PAVEMENT REMOVAL
- MILL AND ASPHALT OVERLAY
- EXIST TRAFFIC FLOW
- PROP TRAFFIC FLOW
- OE — OVERHEAD ELECTRIC
- OH-C — OVERHEAD COPPER
- B-C — BURIED COPPER
- F/O — BURIED FIBER OPTIC
- SS — SANITARY SEWER
- W — COLC WATER LINE

NOTES:

1. GRAVEL REMOVAL PAID UNDER ITEM 105 6021
2. SAWCUTS ARE INCIDENTAL TO VARIOUS BID ITEMS
3. POWER POLES AND UTILITY POLES TO BE RELOCATED BY OTHERS
4. ALL PAVEMENT MARKINGS WILL BE REFLECTORIZED THERMOPLASTIC
5. ALL WATER LINE FITTINGS INCIDENTAL TO VARIOUS BID ITEMS
6. TYPE E INLETS PAID UNDER ITEM 465 6154
7. REFL BLUE PAV MRKS PAID UNDER ITEM 0672 6009

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

NORTH KANSAS AVENUE PLAN AND PROFILE

STA 105+50 TO STA 110+00

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE:		DGN. BY:	
DATE:	7/21/2017	DWN. BY:	CCL
JOB NO.	05523-0005-00	DWG. NO.	
SUBMITTED:		SURV. BY:	
		F.B. NO.	

STATE OF TEXAS — BELL ANDREA CHENG RANT — 86219 — LICENSED PROFESSIONAL ENGINEER

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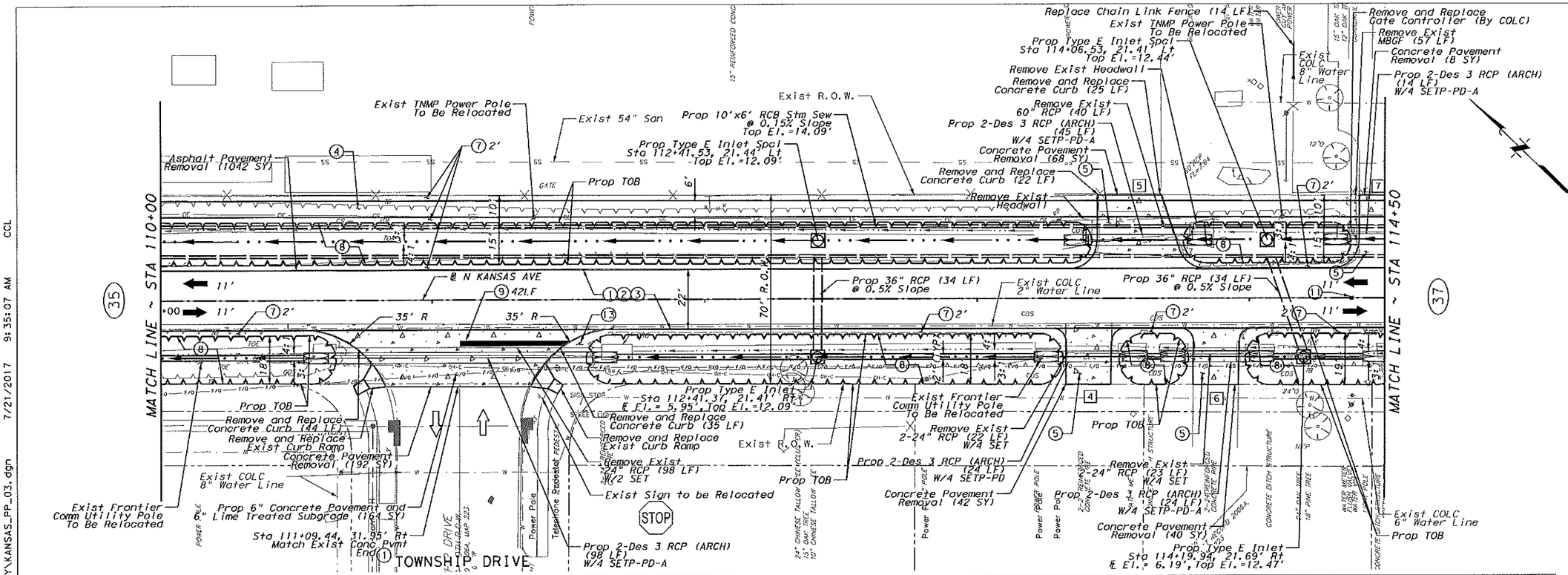

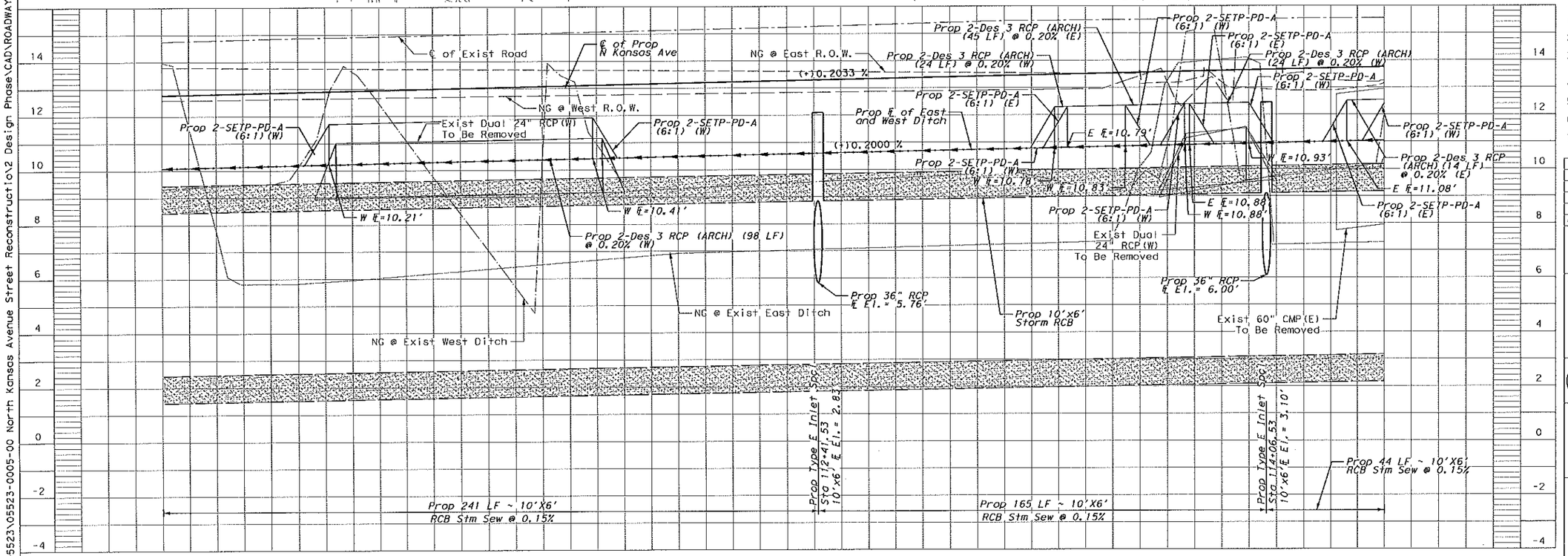

0 20 40 60
SCALE: 1" = 20'

LEGEND

1. 6" LIME TREATED SUBGRADE
2. 8" CRUSHED CONCRETE BASE
3. 2" HMAC
4. 6" CONCRETE TRAIL
5. CONCRETE DRIVEWAY
6. ASPHALT DRIVEWAY
7. BLOCK SODDING
8. HYDROMULCH SEEDING
9. REFL PAV MRK (W) 24" (SLD)
10. REFL PAV MRK (W) 12" (SLD)
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13. RELOCATED STOP SIGN
14. PROP 2" GATE VALVE & BOX
15. PROP 2" WET CONNECTION
16. PROP 2"X45° BEND, AB
17. PROP 2"X2" TEE, AB
18. REMOVE GATE VALVE & BOX
19. RELOCATE WATER LINE SEE DETAIL SHEET W-03

[#] DRIVEWAY #

GRAVEL REMOVAL
CONCRETE PAVEMENT REMOVAL
MILL AND ASPHALT OVERLAY
EXIST TRAFFIC FLOW
PROP TRAFFIC FLOW

OE OVERHEAD ELECTRIC
OH-C OVERHEAD COPPER
B-C BURIED COPPER
F/O BURIED FIBER OPTIC
SS SANITARY SEWER
W COLC WATER LINE

NOTES:

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6. TYPE E INLETS PAID UNDER ITEM 465 6154
7. REFL BLUE PAV MRKRS PAID UNDER ITEM 0672 6009

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

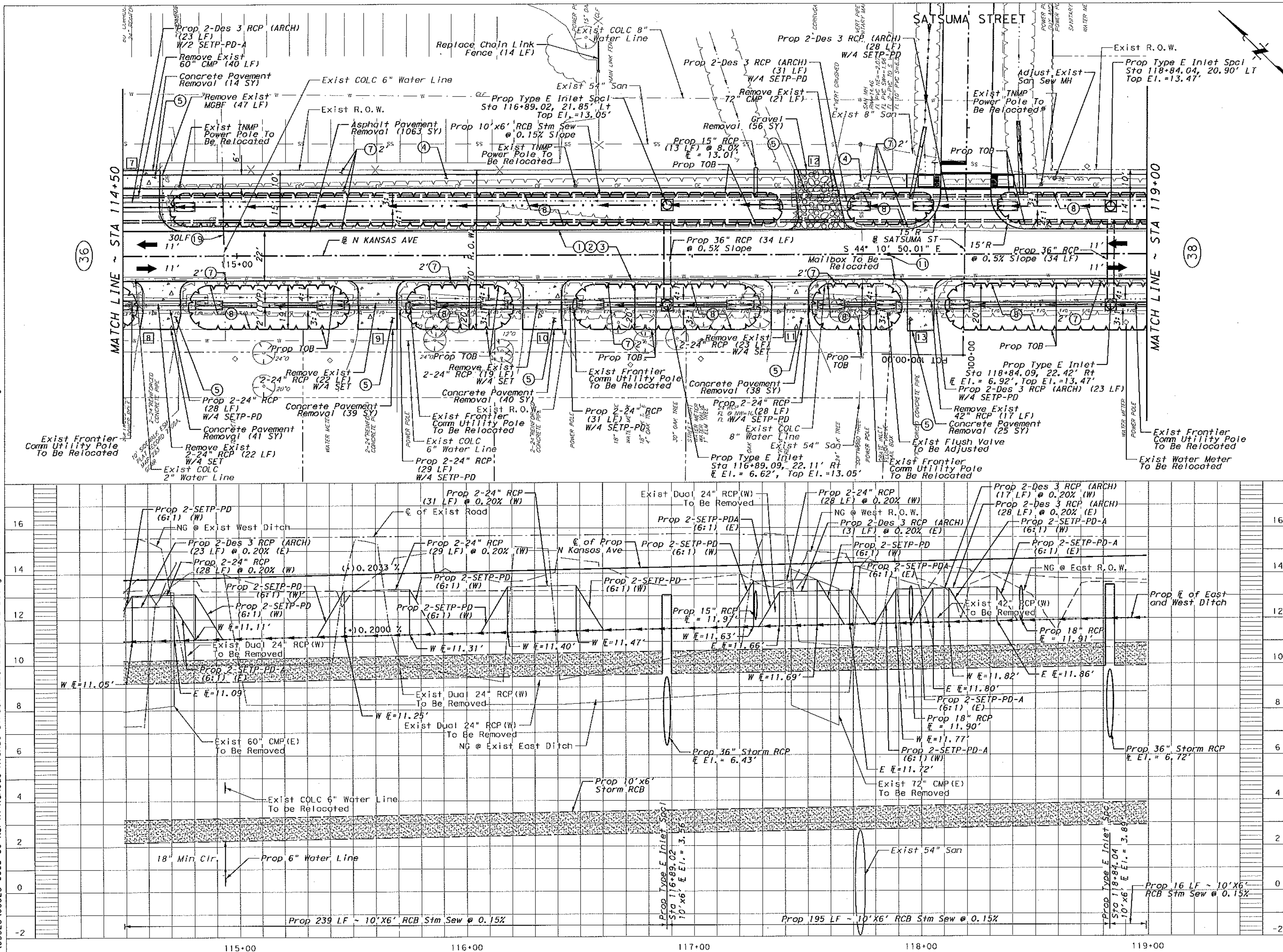
NORTH KANSAS AVENUE PLAN AND PROFILE

STA 110+00 TO STA 114+50

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: DGN. BY:
DATE: 7/21/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

STATE OF TEXAS
BELL ANDREA CHENG RAFT
86219
LICENSED
PROFESSIONAL ENGINEER
7/20/17



LEGEND

1. 6" LIME TREATED SUBGRADE
2. 8" CRUSHED CONCRETE BASE
3. 2" HMAC
4. 6" CONCRETE TRAIL
5. CONCRETE DRIVEWAY
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- [#] DRIVEWAY #
- GRAVEL REMOVAL
- CONCRETE PAVEMENT REMOVAL
- MILL AND ASPHALT OVERLAY
- EXIST TRAFFIC FLOW
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- — OE — OVERHEAD ELECTRIC
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NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

NORTH KANSAS AVENUE PLAN AND PROFILE

STA 114+50 TO STA 119+00

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: DGN. BY:
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

STATE OF TEXAS — NEIL ANDREA CHENG RAHT — 86219 — LICENSED PROFESSIONAL ENGINEER

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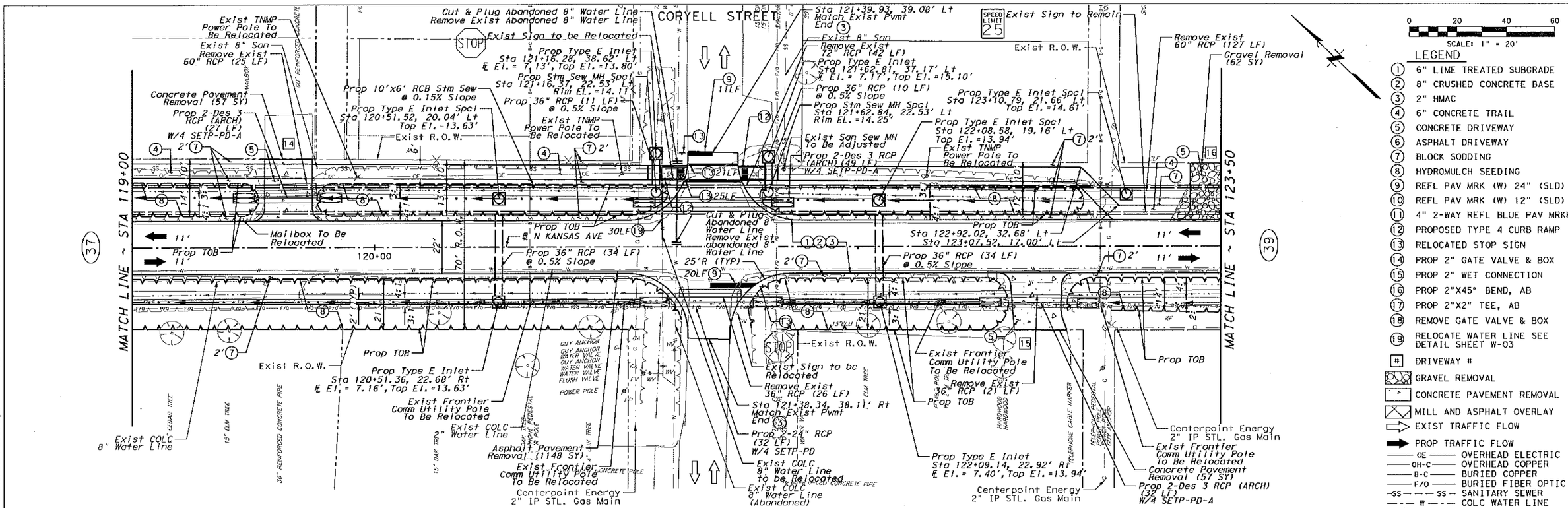

0 20 40 60
SCALE: 1" = 20'

LEGEND

1. 6" LIME TREATED SUBGRADE
2. 8" CRUSHED CONCRETE BASE
3. 2" HMAC
4. 6" CONCRETE TRAIL
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[#] DRIVEWAY #

GRAVEL REMOVAL
CONCRETE PAVEMENT REMOVAL
MILL AND ASPHALT OVERLAY
EXIST TRAFFIC FLOW
PROP TRAFFIC FLOW
OE OVERHEAD ELECTRIC
OH-C OVERHEAD COPPER
B-C BURIED COPPER
F/O BURIED FIBER OPTIC
SS SANITARY SEWER
W COLC WATER LINE

NOTES:

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7. REFL BLUE PAV MRKRS PAID UNDER ITEM 0672 6009

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

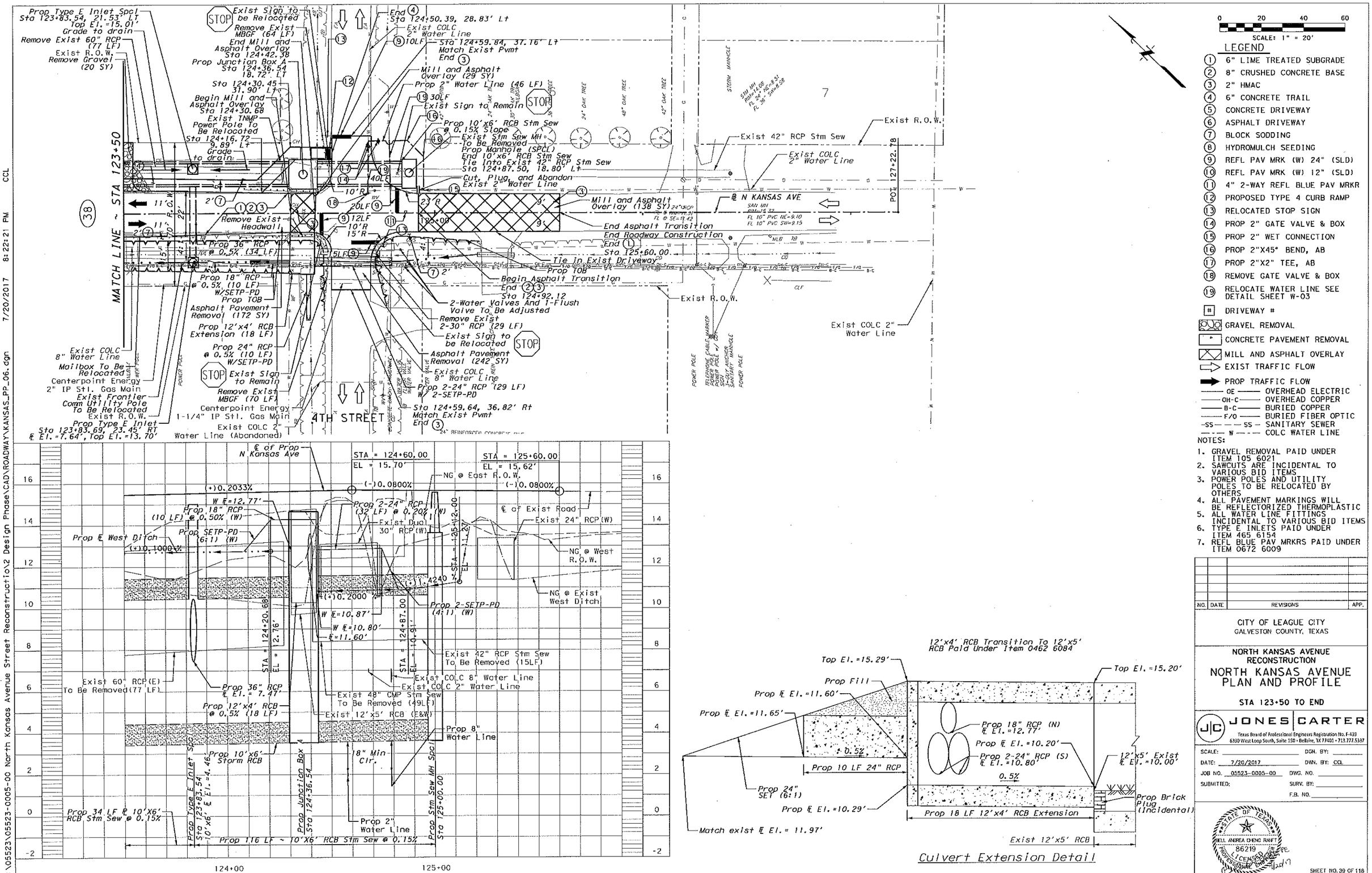
NORTH KANSAS AVENUE PLAN AND PROFILE

STA 119+00 TO STA 123+50

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
BELL ANDREA CHENG RAFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17



NOTES:

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Culvert Extension Detail

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

NORTH KANSAS AVENUE PLAN AND PROFILE

STA 123+50 TO END

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: DGN. BY:
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

STATE OF TEXAS
BELL ANDREA CHENG RAFT
86219
LICENSED PROFESSIONAL ENGINEER

SHEET NO. 39 OF 118

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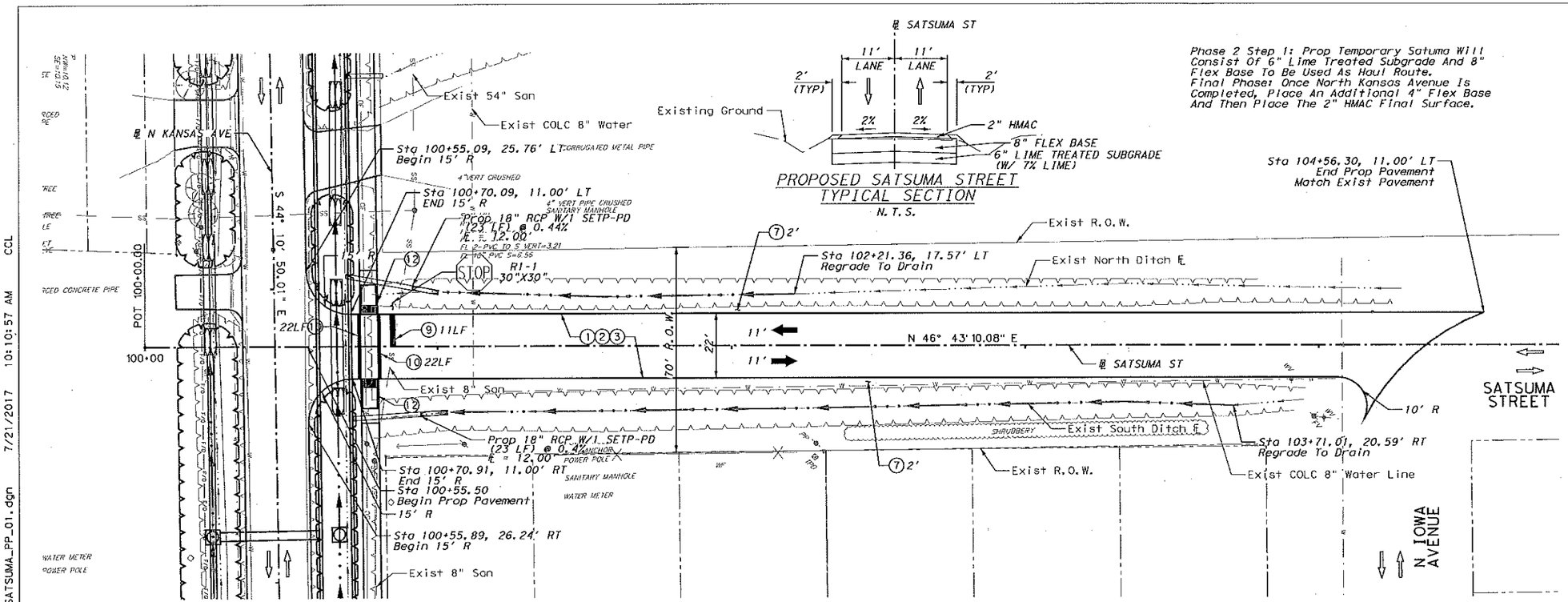
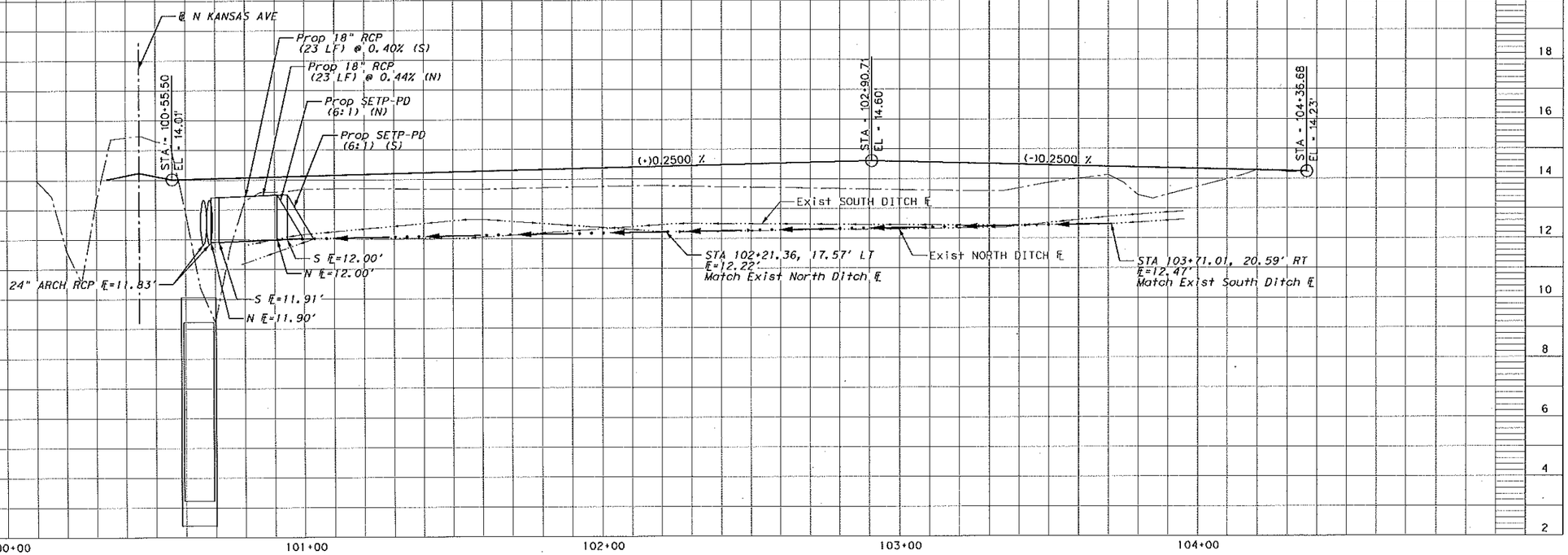
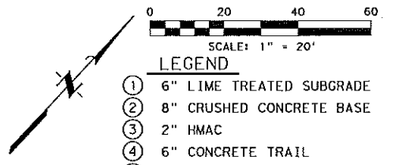


PROPOSED SATSUMA STREET
TYPICAL SECTION
N.T.S.

Phase 2 Step 1: Prop Temporary Satuma Will Consist Of 6" Lime Treated Subgrade And 8" Flex Base To Be Used As Haul Route. Final Phase: Once North Kansas Avenue Is Completed, Place An Additional 4" Flex Base And Then Place The 2" HMAC Final Surface.





LEGEND

1. 6" LIME TREATED SUBGRADE
2. 8" CRUSHED CONCRETE BASE
3. 2" HMAC
4. 6" CONCRETE TRAIL
5. CONCRETE DRIVEWAY
6. ASPHALT DRIVEWAY
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[#] DRIVEWAY #

GRAVEL REMOVAL

CONCRETE PAVEMENT REMOVAL

MILL AND ASPHALT OVERLAY

EXIST TRAFFIC FLOW

PROP TRAFFIC FLOW

OE — OVERHEAD ELECTRIC
OH-C — OVERHEAD COPPER
B-C — BURIED COPPER
F/O — BURIED FIBER OPTIC
SS — SANITARY SEWER
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NOTES:

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NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION
SATSUMA STREET PLAN & PROFILE

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/21/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
BELL ANDREA CHENG RAFT
86219
LICENSED PROFESSIONAL ENGINEER
07/21/17

SHEET NO.40 OF 118

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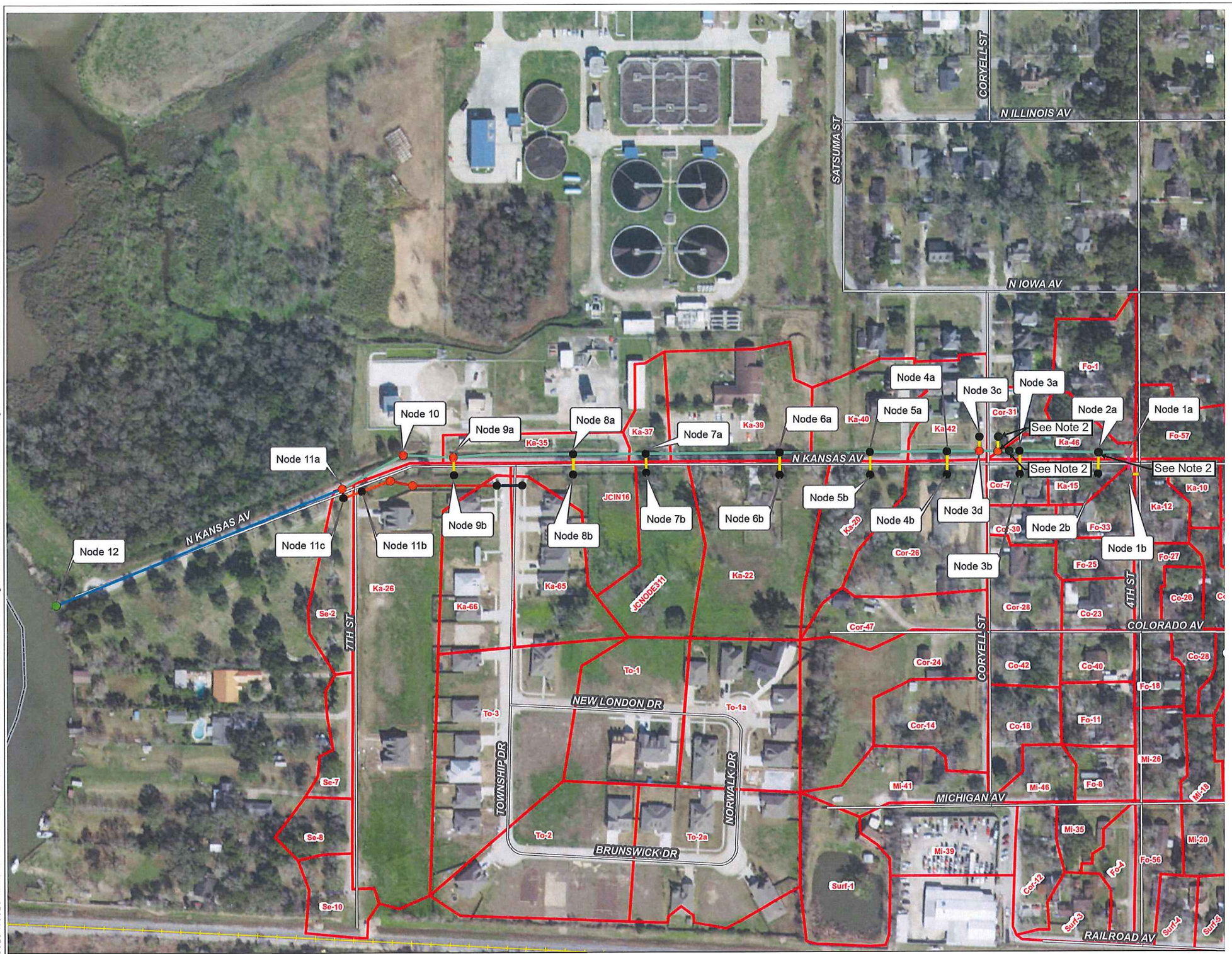


NORTH
SCALE: 1" = 200'
0 200 400 600

LEGEND

- Railroad

Nodes

- Other
- Inlet
- Manhole
- Outlet

SIZE

- 10'X6'
- 10'X8'
- 12'x5' (Existing)
- 30" (Existing)
- 36"
- 48"
- 48" (Existing)
- 54"
- Contributing Drainage Areas
- County Line

NOTES:

1. REFER TO "DRAINAGE REPORT FOR NORTH KANSAS ROADWAY IMPROVEMENTS" FOR FURTHER INFORMATION.
2. ADDITIONAL INLETS WERE ADDED DURING DETAILED DESIGN THAT ARE NOT REFLECTED IN THE DRAINAGE MODEL OR STUDY. THE INLETS ARE WITHIN EXISTING DRAINAGE AREAS.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

DRAINAGE AREAS

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

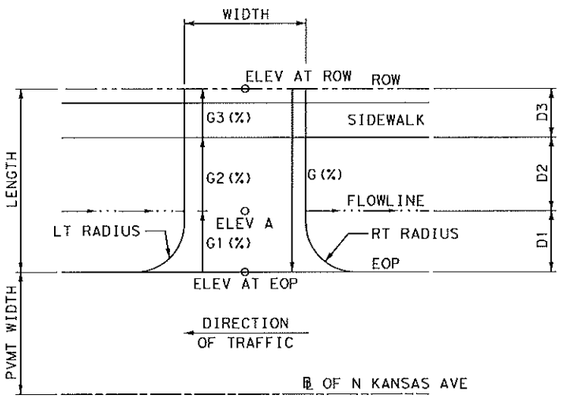
STATE OF TEXAS
STEPHEN C. REITER
102348
LICENSED PROFESSIONAL ENGINEER

SHEET NO. 41 OF 118

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\ROADWAY\DNG_AREAS.dgn 7/20/2017 8:22:42 PM CCL

DRIVEWAY SUMMARY

SHEET NO.	NO.	BL STATION	OFFSET	SIDE	WIDTH (FT)	LENGTH (FT)	LT RADIUS (FT)	RT RADIUS (FT)	CENTERLINE ELEV	D1 (FT)	D2 (FT)	D3 (FT)	ELEV AT ROW	ELEV OF FLOWLINE	ELEV AT A	ELEV AT EDGE OF PVMT*	G1(%)	G2(%)	G3(%)	AREA (SY)
1	1	103+59.14	11	RT	10	24.5	5	5	10.42	7.16	14.19	0	10.18		10.19	10.20	-0.08	-0.08		27.65
2	2	107+01.66	11	RT	17	26	5	5	11.99	12.16	14.78	0	12.61		12.16	11.77	3.23	3.23		35.78
2	7th St	107+50.56	11	RT	17	39	25	10	12.21	9.75	32.46	0	13.54	9.98	12.38	11.99	5.04	3.24		89.15
2	3	109+58.19	10.86	LT	31.5	28	10	10	12.65	14.09	5.67	8	14.23	10.61	13.34	12.43	8.52	8.52	1.5	101.25
3	Township	111+10.09	11	RT	54	20	35	35	12.90	12.35	7.49	0	13.16	10.86	12.98	12.68	5.52	-2.70		156.78
3	4	113+42.05	11	RT	16.5	21	5	5	13.34	12.35	8.30	0	13.27	11.24	13.21	13.12	5.07	-5.69		39.57
3	5	113+56.99	11	LT	23.5	27	10	10	13.46	10.68	8.45	8	13.09	11.27	13.18	13.24	4.92	-8.03	0	87.31
3	6	113+87.95	11	RT	16.5	21	5	5	13.42	12.35	8.46	0	14.75	11.32	14.11	13.20	7.36	7.36		39.86
3	7	114+53.32	11	LT	26	27	10	10	13.54	10.61	8.17	8	13.64	11.42	13.45	13.32	5.65	-3.49	0	81.56
4	8	114+67.09	11	RT	16.5	21	5	5	13.57	12.35	8.74	0	14.38	11.45	13.95	13.35	8.88	-0.79		39.97
4	9	115+62.02	11	RT	17	21.5	5	5	13.75	12.35	9.08	0	14.69	11.59	14.19	13.53	8.59	1.10		41.39
4	10	116+34.46	11	RT	17.5	22	5	5	13.88	13.25	8.43	0	14.45	11.69	14.13	13.66	7.75	-2.90		42.18
4	11	117+43.21	11	RT	17	22	5	5	14.09	15.42	6.64	0	14.74	11.84	14.48	13.87	6.33	-1.55		40.95
4	12	117+56.67	11	LT	17	26	5	5	14.11	10.70	7.70	8	14.51	11.86	14.14	13.89	4.39	1.84	0	56.03
4	13	118+00.62	11	RT	11.5	23	5	5	14.20	15.47	7.16	0	14.05	11.93	14.03	13.98	2.91	-5.18		30.91
5	14	119+64.66	11	LT	21	25.5	5	5	14.50	9.82	7.92	8	14.12	12.16	14.22	14.28	3.81	-6.75	0	56.89
5	Coryell	121+38.41	11	RT	17.5	27	25	25	14.83	15.80	11.32	0	15.03	12.41	14.86	14.61	1.88	1.12		82.47
5	Coryell	121+39.86	11	LT	21	28	25	25	14.83	8.37	11.73	8	14.48	12.41	14.57	14.61	3.51	-3.64	0	94.42
5	15	122+73.60	11	RT	22	23.5	5	5	15.08	12.52	10.96	0	14.47	12.59	14.65	14.86	1.85	-5.71		55.09
5	16	123+45.94	11	LT	17	23.5	5	5	15.22	7.98	7.40	8	14.25	12.70	14.74	15.00	2.49	-11.22	-1.5	45.81
6	4th St	124+59.27	11	RT	19	26	20	10	15.43	9.54	16.48	0	15.24		15.22	15.21	0.11	0.11		65.55
6	4th St	124+59.47	11	LT	12	26	20	10	15.43	10.22	10.40	8	15.26		15.23	15.21	0.19	0.19	0.19	66.61



NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

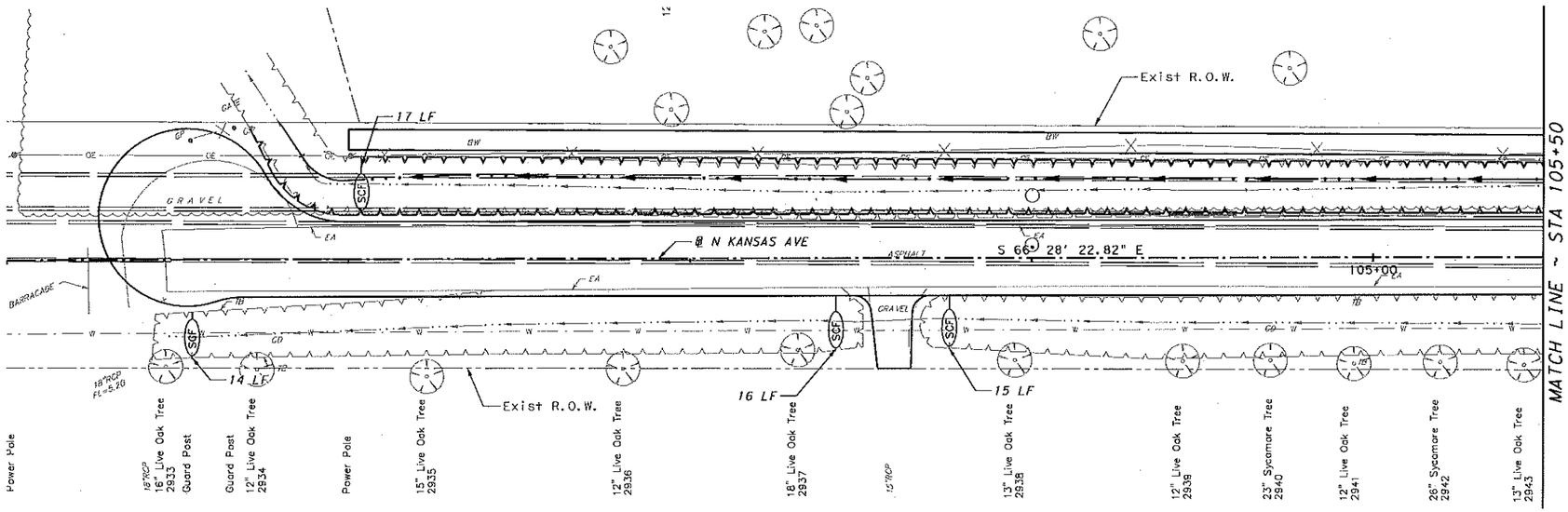
DRIVEWAY SUMMARY

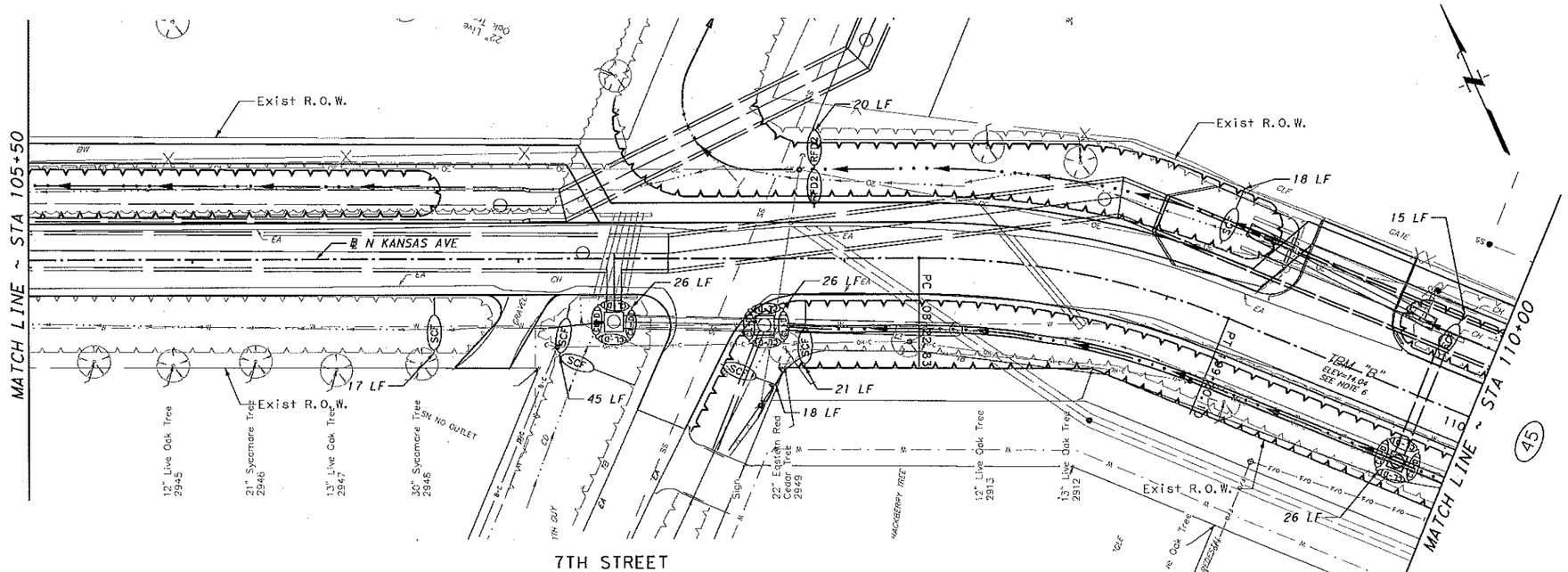
JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
BELL ANDREA CHENG RANFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\ROADWAY\DWY_TABLE.dgn 7/20/2017 8:23:29 PM CCL





0 20 40 60
SCALE: 1" = 20'

LEGEND

- SCF — EROSION CONTROL FENCE
- RFD2 — ROCK FILTER DAM
- CL-D — EROSION CONTROL LOG

NOTES:

1. CONTRACTOR SHALL COORDINATE LOCATION OF CONSTRUCTION EXITS WITH ENGINEER.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

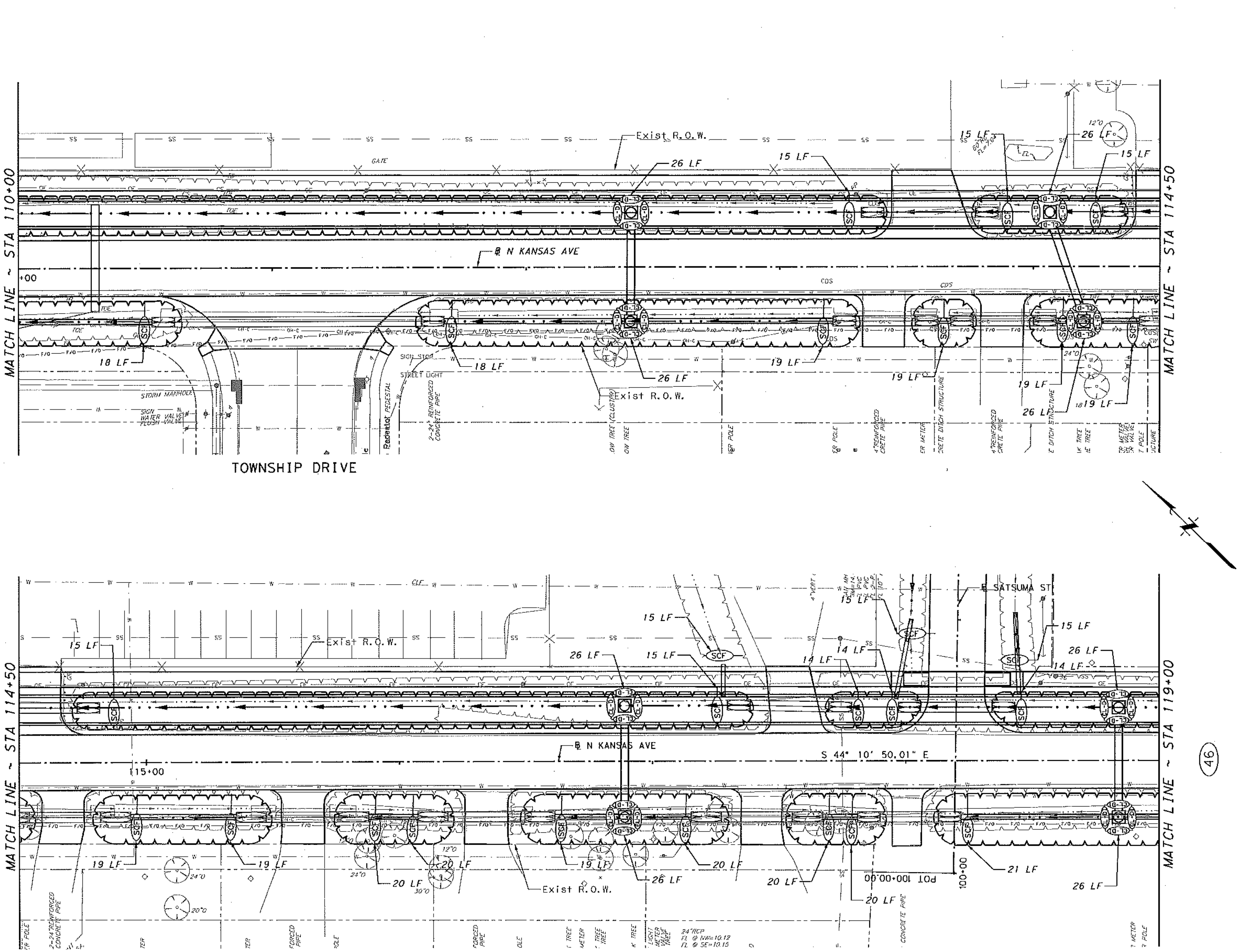
STORM WATER POLLUTION PREVENTION PLAN
BEGIN TO STA 110+00

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: DGN. BY:
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

STATE OF TEXAS
BELL ANDREA CHENG RANT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\ROADWAY\KANSAS_SWPPP_01.dgn 7/20/2017 8:23:49 PM CCL



SCALE: 1" = 20'

LEGEND

- SCF — EROSION CONTROL FENCE
- RFD2 — ROCK FILTER DAM
- CL-D — EROSION CONTROL LOG

NOTES:

1. CONTRACTOR SHALL COORDINATE LOCATION OF CONSTRUCTION EXITS WITH ENGINEER.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

STORM WATER POLLUTION PREVENTION PLAN
STA 110+00 TO STA 119+00

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: | DGN. BY:
DATE: 7/20/2017 | DWN. BY: CCL
JOB NO. 05523-0005-00 | DWG. NO.
SUBMITTED: | SURV. BY:
F.B. NO.

STATE OF TEXAS — BELL ANDREA CHENG RANT — 86219 — LICENSED PROFESSIONAL ENGINEER — 7/20/17

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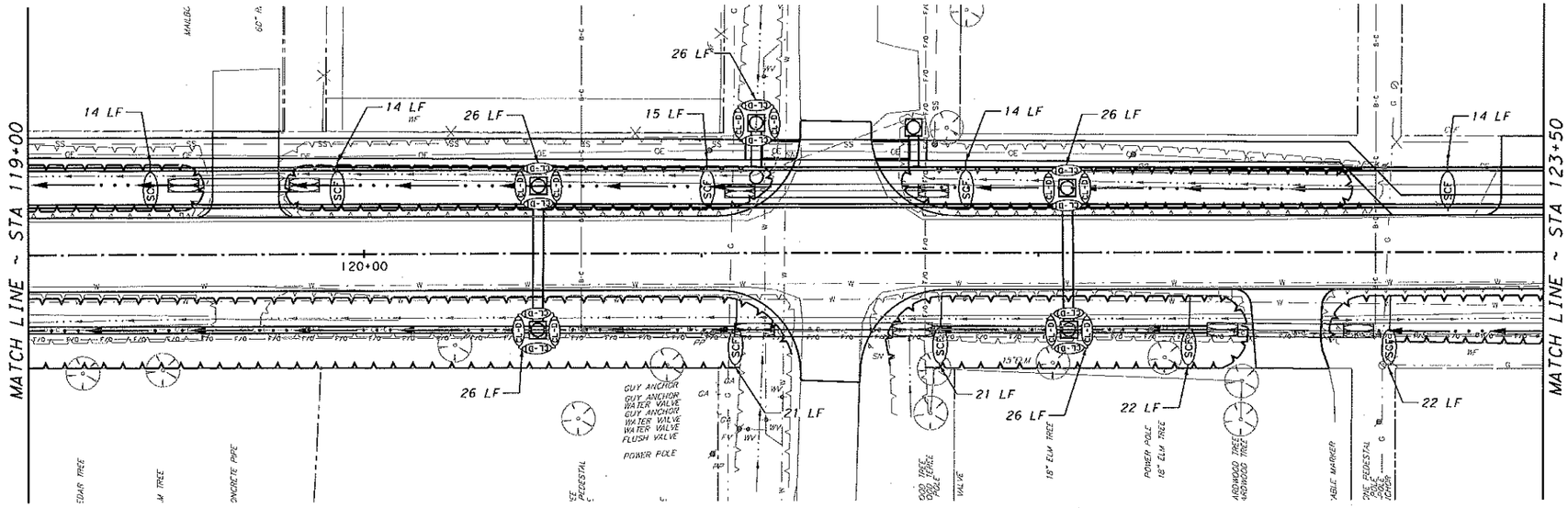
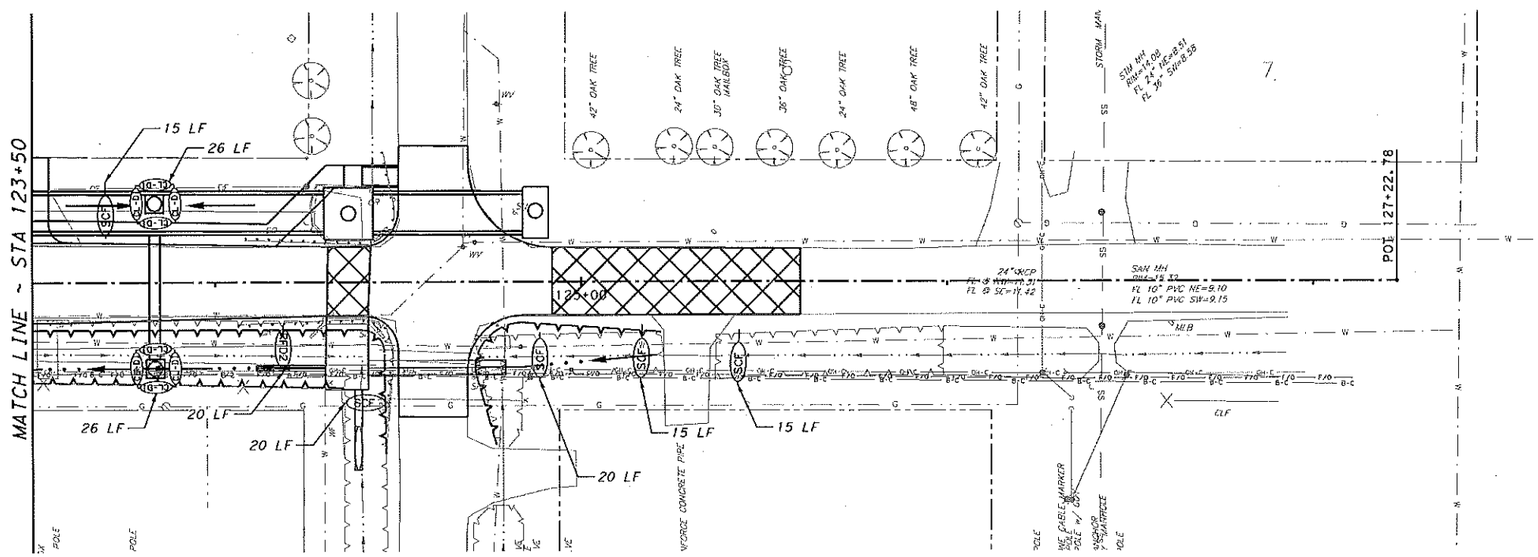




0 20 40 60
SCALE: 1" = 20'

LEGEND

- SCF — EROSION CONTROL FENCE
- RFD2 — ROCK FILTER DAM
- CL-D — EROSION CONTROL LOG

NOTES:

1. CONTRACTOR SHALL COORDINATE LOCATION OF CONSTRUCTION EXITS WITH ENGINEER.

NO.	DATE	REVISIONS	APP.

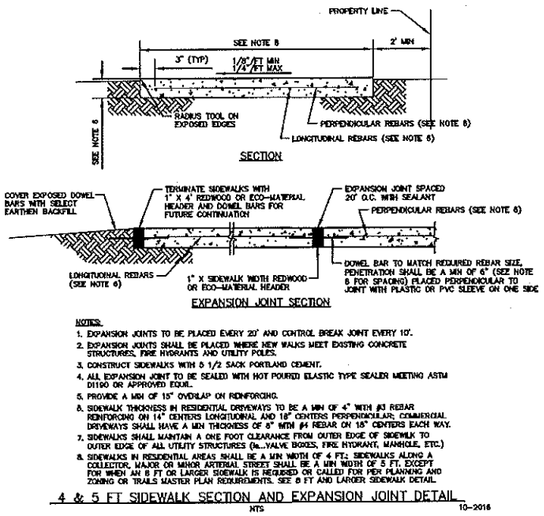
CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE
RECONSTRUCTION

STORM WATER POLLUTION PREVENTION PLAN
STA 119+00 TO END

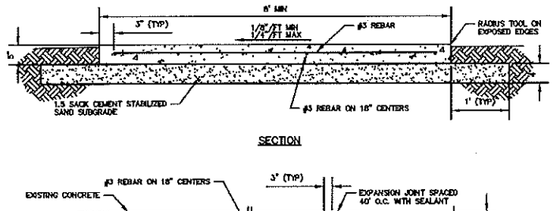
JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____



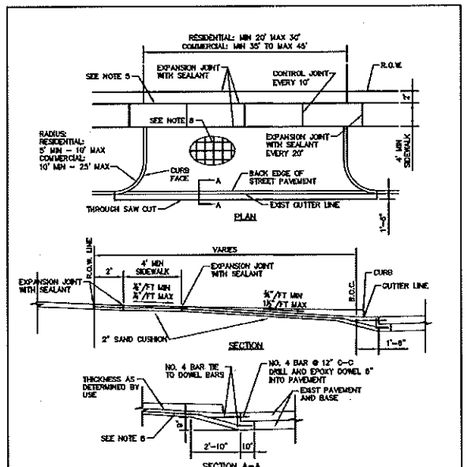
NOTES:
1. EXPANSION JOINTS TO BE PLACED EVERY 20' AND CONTROL BREAK JOINT EVERY 10'.
2. EXPANSION JOINTS SHALL BE PLACED WHERE NEW WALKS MEET EXISTING CONCRETE STRUCTURES, FIRE HYDRANTS AND UTILITY POLES.
3. CONSTRUCT SIDEWALKS WITH 5 1/2 SACK PORTLAND CEMENT.
4. ALL EXPANSION JOINT TO BE SEALED WITH HOT POURED ELASTIC TYPE SEALER MEETING ASTM D1190 OR APPROVED EQUIL.
5. PROVIDE A MIN OF 15" OVERLAP ON REINFORCING.
6. SIDEWALK THICKNESS IN RESIDENTIAL DRIVEWAYS TO BE A MIN OF 4" WITH #3 REBAR REINFORCING ON 14" CENTERS LONGITUDINAL AND 18" CENTERS PERPENDICULAR; COMMERCIAL DRIVEWAYS SHALL HAVE A MIN THICKNESS OF 8" WITH #4 REBAR ON 18" CENTERS EACH WAY.
7. SIDEWALKS SHALL MAINTAIN A ONE FOOT CLEARANCE FROM OUTER EDGE OF SIDEWALK TO OUTER EDGE OF ALL UTILITY STRUCTURES (ie...VALVE BOXES, FIRE HYDRANT, MANHOLE, ETC.)
8. SIDEWALKS IN RESIDENTIAL AREAS SHALL BE A MIN WIDTH OF 4 FT. SIDEWALKS ALONG A COLLECTOR, MAJOR OR MINOR ARTERIAL STREET SHALL BE A MIN WIDTH OF 5 FT. EXCEPT FOR WHEN AN 8 FT OR LARGER SIDEWALK IS REQUIRED OR CALLED FOR PER PLANNING AND ZONING OR TRAILS MASTER PLAN REQUIREMENTS. SEE 8 FT AND LARGER SIDEWALK DETAIL.

4 & 5 FT SIDEWALK SECTION AND EXPANSION JOINT DETAIL
NTS 10-2016



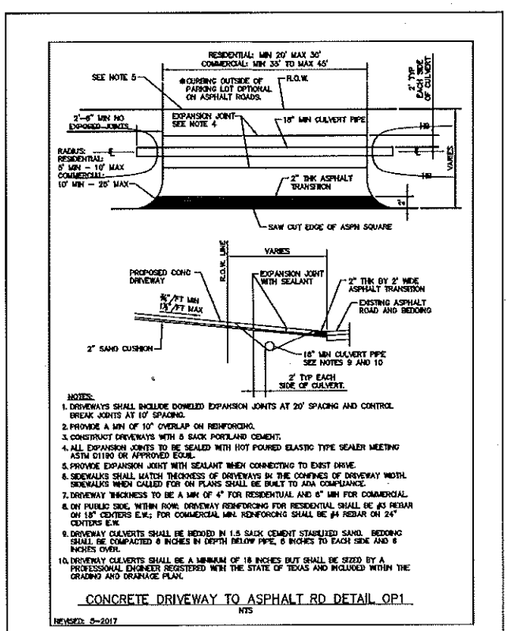
NOTES:
1. 1" EXPANSION JOINTS TO BE PLACED EVERY 40' AND SAWED CONTROL JOINT EVERY 8'.
2. EXPANSION JOINTS SHALL BE PLACED WHERE NEW WALKS MEET EXISTING CONCRETE STRUCTURES, FIRE HYDRANTS AND UTILITY POLES.
3. CONSTRUCT SIDEWALKS WITH 5 1/2 SACK PORTLAND CEMENT.
4. ALL EXPANSION/CONSTRUCTION JOINT TO BE SEALED WITH HOT POURED ELASTIC TYPE SEALER MEETING ASTM D1190 OR APPROVED EQUIL.
5. PROVIDE A MIN OF 20" OVERLAP ON REINFORCING.
6. SIDEWALKS SHALL MAINTAIN A ONE FOOT CLEARANCE FROM OUTER EDGE OF SIDEWALK TO OUTER EDGE OF ALL UTILITY STRUCTURES (ie...VALVE BOXES, FIRE HYDRANT, MANHOLE, ETC.)

8 FT & LARGER SIDEWALK SECTION AND EXPANSION JOINT DETAIL
NTS 10-2016



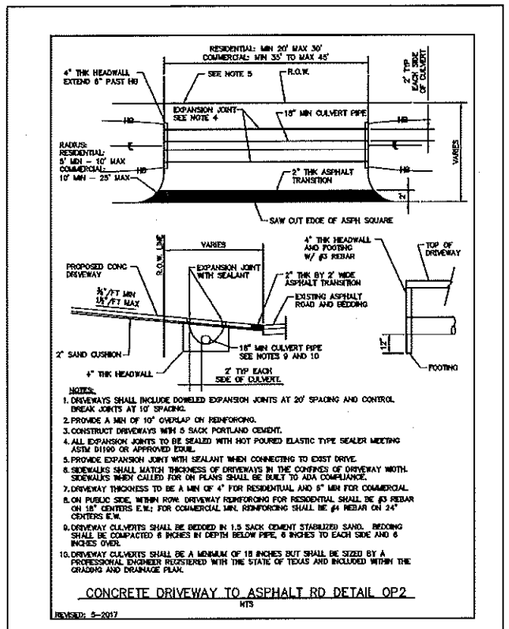
NOTES:
1. ON PRIVATE SIDE: DRIVEWAYS SHALL INCLUDE DOWELED EXPANSION JOINTS AT 20' SPACING AND CONTROL BREAK JOINTS AT 10' SPACING. REINFORCING TO BE EITHER 6X6, 8 GA WELDED WIRE MESH OR #3 REBAR ON 18" CENTERS E.W. FOR RESIDENTIAL; SEE ENGINEERED SITE DRAWINGS FOR COMMERCIAL PAVING REQUIREMENTS.
2. PROVIDE A MIN OF 10" OVERLAP ON REINFORCING.
3. CONSTRUCT DRIVEWAYS WITH 5# SACK PORTLAND CEMENT.
4. ALL EXPANSION JOINT TO BE SEALED WITH HOT POURED ELASTIC TYPE SEALER MEETING ASTM D1190 OR APPROVED EQUIL.
5. PROVIDE EXPANSION JOINT WITH SEALANT WHEN CONNECTING TO EXIST DRIVE.
6. SIDEWALKS SHALL MATCH THICKNESS OF DRIVEWAYS IN THE CONFINES OF DRIVEWAY WIDTH.
7. DRIVEWAY THICKNESS TO BE A MIN OF 4" FOR RESIDENTIAL AND 6" MIN FOR COMMERCIAL OR AS CALLED OUT ON APPROVED ENGINEERED PLANS.
8. ON PUBLIC SIDE, WITHIN ROW, DRIVEWAY REINFORCING FOR RESIDENTIAL SHALL BE #3 REBAR ON 18" CENTERS E.W.; FOR COMMERCIAL MIN. REINFORCING SHALL BE #4 REBAR ON 24" CENTERS E.W.

CONCRETE DRIVEWAY DETAIL
NTS
REVISED: 1-2015



NOTES:
1. DRIVEWAYS SHALL INCLUDE DOWELED EXPANSION JOINTS AT 20' SPACING AND CONTROL BREAK JOINTS AT 10' SPACING.
2. PROVIDE A MIN OF 10" OVERLAP ON REINFORCING.
3. CONSTRUCT DRIVEWAYS WITH 5 SACK PORTLAND CEMENT.
4. ALL EXPANSION JOINTS TO BE SEALED WITH HOT POURED ELASTIC TYPE SEALER MEETING ASTM D1190 OR APPROVED EQUIL.
5. PROVIDE EXPANSION JOINT WITH SEALANT WHEN CONNECTING TO EXIST DRIVE.
6. SIDEWALKS SHALL MATCH THICKNESS OF DRIVEWAYS IN THE CONFINES OF DRIVEWAY WIDTH. SIDEWALKS WHEN CALLED FOR ON PLANS SHALL BE BUILT TO ADA COMPLIANCE.
7. DRIVEWAY THICKNESS TO BE A MIN OF 4" FOR RESIDENTIAL AND 6" MIN FOR COMMERCIAL.
8. ON PUBLIC SIDE, WITHIN ROW, DRIVEWAY REINFORCING FOR RESIDENTIAL SHALL BE #3 REBAR ON 18" CENTERS E.W.; FOR COMMERCIAL MIN. REINFORCING SHALL BE #4 REBAR ON 24" CENTERS E.W.
9. DRIVEWAY CULVERTS SHALL BE BEDDED IN 1.5 SACK CEMENT STABILIZED SAND. BEDDING SHALL BE COMPACTED 6 INCHES IN DEPTH BELOW PIPE, 6 INCHES TO EACH SIDE AND 6 INCHES OVER.
10. DRIVEWAY CULVERTS SHALL BE OF A MINIMUM OF 18 INCHES BUT SHALL BE SIZED BY A PROFESSIONAL ENGINEER REGISTERED WITH THE STATE OF TEXAS AND INCLUDED WITHIN THE GRADING AND DRAINAGE PLAN.

CONCRETE DRIVEWAY TO ASPHALT RD DETAIL OP1
NTS
REVISED: 5-2017



NOTES:
1. DRIVEWAYS SHALL INCLUDE DOWELED EXPANSION JOINTS AT 20' SPACING AND CONTROL BREAK JOINTS AT 10' SPACING.
2. PROVIDE A MIN OF 10" OVERLAP ON REINFORCING.
3. CONSTRUCT DRIVEWAYS WITH 5 SACK PORTLAND CEMENT.
4. ALL EXPANSION JOINTS TO BE SEALED WITH HOT POURED ELASTIC TYPE SEALER MEETING ASTM D1190 OR APPROVED EQUIL.
5. PROVIDE EXPANSION JOINT WITH SEALANT WHEN CONNECTING TO EXIST DRIVE.
6. SIDEWALKS SHALL MATCH THICKNESS OF DRIVEWAYS IN THE CONFINES OF DRIVEWAY WIDTH. SIDEWALKS WHEN CALLED FOR ON PLANS SHALL BE BUILT TO ADA COMPLIANCE.
7. DRIVEWAY THICKNESS TO BE A MIN OF 4" FOR RESIDENTIAL AND 6" MIN FOR COMMERCIAL.
8. ON PUBLIC SIDE, WITHIN ROW, DRIVEWAY REINFORCING FOR RESIDENTIAL SHALL BE #3 REBAR ON 18" CENTERS E.W.; FOR COMMERCIAL MIN. REINFORCING SHALL BE #4 REBAR ON 24" CENTERS E.W.
9. DRIVEWAY CULVERTS SHALL BE BEDDED IN 1.5 SACK CEMENT STABILIZED SAND. BEDDING SHALL BE COMPACTED 6 INCHES IN DEPTH BELOW PIPE, 6 INCHES TO EACH SIDE AND 6 INCHES OVER.
10. DRIVEWAY CULVERTS SHALL BE A MINIMUM OF 18 INCHES BUT SHALL BE SIZED BY A PROFESSIONAL ENGINEER REGISTERED WITH THE STATE OF TEXAS AND INCLUDED WITHIN THE GRADING AND DRAINAGE PLAN.

CONCRETE DRIVEWAY TO ASPHALT RD DETAIL OP2
NTS
REVISED: 5-2017

DISCLAIMER:
THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING ACT". NO WARRANTY OF ANY KIND IS MADE BY COLG FOR ANY PURPOSE WHATSOEVER. COLG ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

SIDEWALK AND DRIVEWAY DETAILS
SHEET 1 OF 1

League City TEXAS

P-02

Project No.	00000		
Drawn	ARN	Checked	XXX
Scale	NTS	Date	MAY 2017
Sheet	0	Of	00

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

SIDEWALK AND DRIVEWAY DETAILS

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

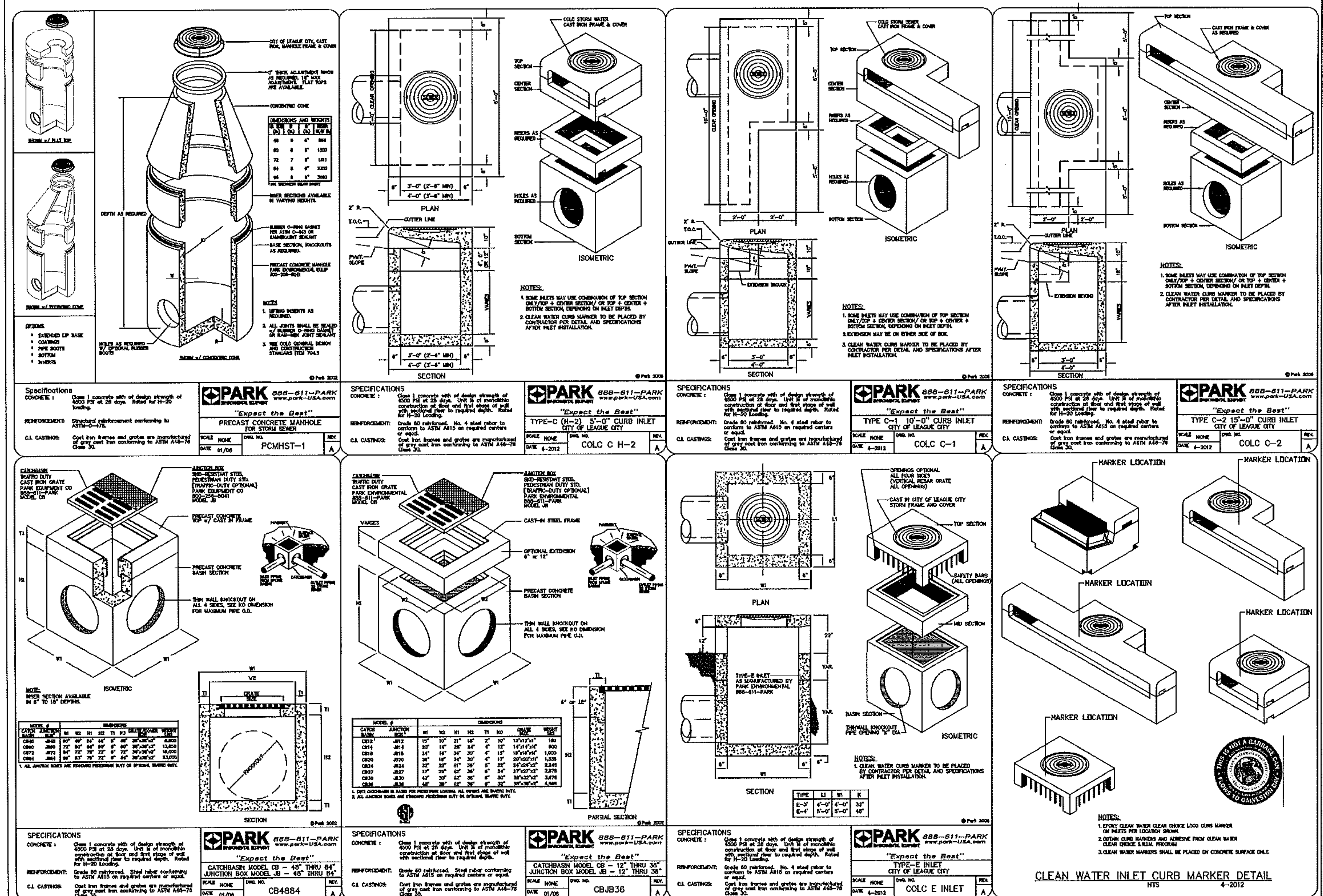
STATE OF TEXAS
BELL ANDREA CHENG RWFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

SHEET NO. 46 OF 118

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\02 Design Phase\CAD\Standards\Roadway\SIDEWALK AND DRIVEWAY DETAILS.dgn CCL

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\Standards\Drainage\STW-01.dgn 7/20/2017 8:24:48 PM CCL

STORM WATER DETAILS
SHEET 1 OF 3



League City TEXAS

NOTE:
THESE PARK EQUIPMENT DETAILS ARE A BASIC COLLECTION OF DESIGNS ALLOWED BY THE CITY OF LEAGUE CITY. IF SPECIFIC DETAILS (NOT SHOWN HERE) ARE REQUIRED FOR THE CONSTRUCTION OF A PROJECT, SHOULD BE EITHER OBTAINED FROM PARK EQUIPMENT OR SUPPLIED BY ADDITIONAL ENGINEERED DETAILS AND SUBMITTED FOR APPROVAL.

STW-01

Project No.	00000		
Drawn	ARN	Checked	XXX
Scale	NTS	Date	OCT 2011
Sheet	0	Of	00

DISCLAIMER:
THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING ACT". NO WARRANTY OF ANY KIND IS MADE BY COLC FOR ANY PURPOSE WHATSOEVER. COLC ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

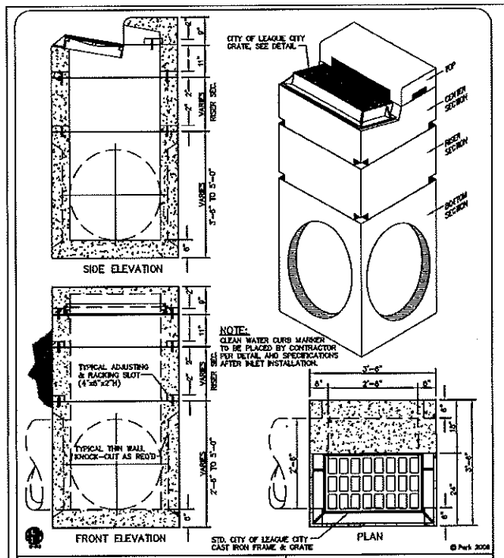
NORTH KANSAS AVENUE RECONSTRUCTION

STORM SEWER DETAILS
SHEET 1 OF 4

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: DGN. BY:
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

STATE OF TEXAS
BELL ANDREA CHENG RANFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17



SPECIFICATIONS

CONCRETE : Class S concrete with at design strength of 4500 PSI at 28 days. Unit is of monolithic construction at floor and first stage of wall with sectioned joint to required depth. Rated for H-20 Loading.

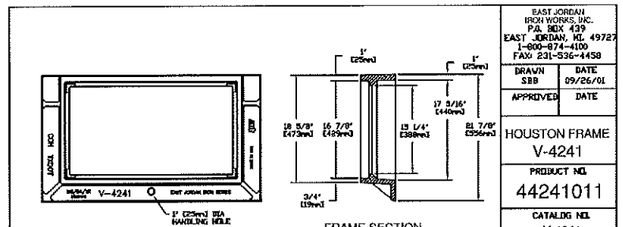
REINFORCEMENT: Grade 60 reinforced. No. 4 steel rebar to conform to ASTM A615 on required centers or equal.

C.I. CASTINGS: Cast iron frames and grates are manufactured of gray cast iron conforming to ASTM A48-76 Class 30.

PARK 888-611-PARK www.park-USA.com
"Expect the Best"

TYPE 'B' CURB INLET w/GRATE
CITY OF LEAGUE CITY

SCALE	NONE	DWG. NO.	REV.
DATE	4-2012	COLCBIG-2	A



EAST JORDAN IRON WORKS, INC.
P.O. BOX 439
EAST JORDAN, MI. 49727
1-800-874-4100
FAX 231-536-4458

DRAWN	DATE
SBB	09/26/01
APPROVED	DATE

HOUSTON FRAME
V-4241

PRODUCT NO.
44241011

CATALOG NO.
V-4241

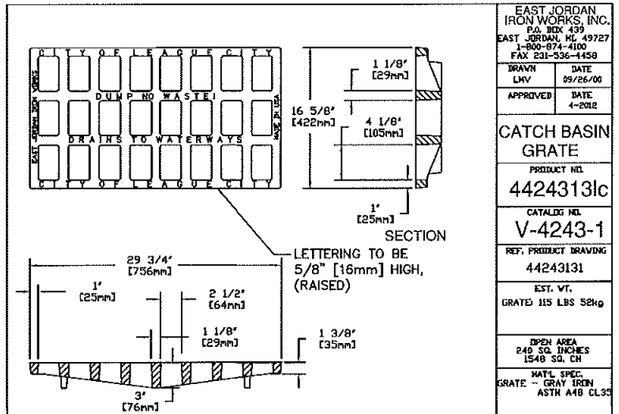
REF. PRODUCT DRAWING
44241011

EST. WT.
FRAME: 180 LBS 82kg

OPEN AREA
N/A

MAT'L SPEC.
FRAME - GRAY IRON ASTM A48 CL35

LOAD RATING
HEAVY DUTY



EAST JORDAN IRON WORKS, INC.
P.O. BOX 439
EAST JORDAN, MI. 49727
1-800-874-4100
FAX 231-536-4458

DRAWN	DATE
LMV	09/26/00
APPROVED	DATE 4-2012

CATCH BASIN GRATE

PRODUCT NO.
4424313lc

CATALOG NO.
V-4243-1

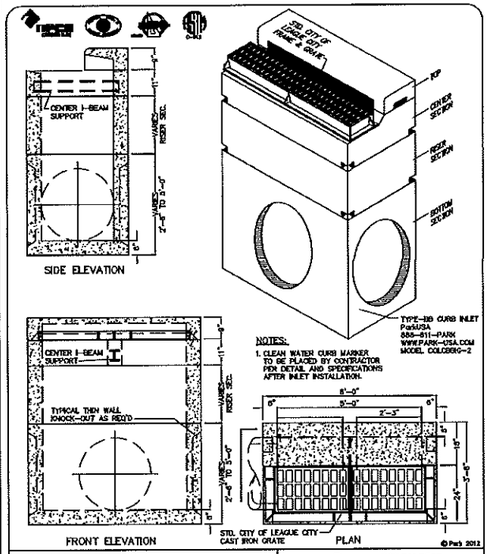
REF. PRODUCT DRAWING
44243131

EST. WT.
GRATE: 115 LBS 52kg

OPEN AREA
240 SQ. INCHES
1548 SQ. CM

MAT'L SPEC.
GRATE - GRAY IRON ASTM A48 CL35

LOAD RATING
HEAVY DUTY



SPECIFICATIONS

CONCRETE : Class S concrete with at design strength of 4500 PSI at 28 days. Unit is of monolithic construction at floor and first stage of wall with sectioned joint to required depth. Rated for H-20 Loading.

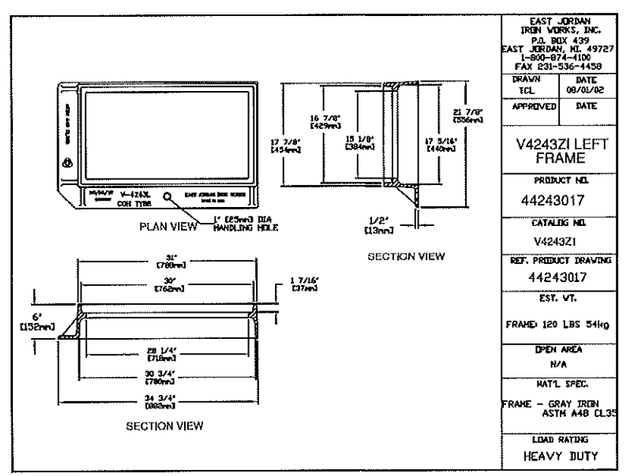
REINFORCEMENT: Grade 60 reinforced. No. 4 steel rebar to conform to ASTM A615 on required centers or equal.

C.I. CASTINGS: Cast iron frames and grates are manufactured of gray cast iron conforming to ASTM A48-76 Class 30.

PARK 888-611-PARK www.park-USA.com
Design for Value

TYPE-BB CURB INLET-GRATES
CITY OF LEAGUE CITY - MODEL COLCBBIG-2

SCALE	NONE	DWG. NO.	REV.
DATE	2012	COLCBBIG-2	A



EAST JORDAN IRON WORKS, INC.
P.O. BOX 439
EAST JORDAN, MI. 49727
1-800-874-4100
FAX 231-536-4458

DRAWN	DATE
TCL	08/01/02
APPROVED	DATE

V4243ZI LEFT FRAME

PRODUCT NO.
44243017

CATALOG NO.
V4243ZI

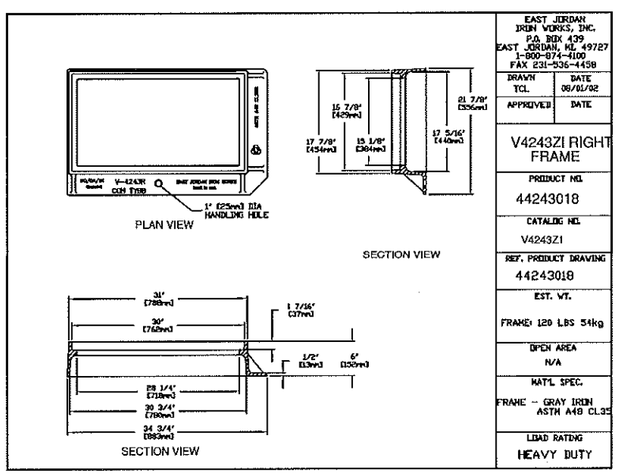
REF. PRODUCT DRAWING
44243017

EST. WT.
FRAME: 120 LBS 54kg

OPEN AREA
N/A

MAT'L SPEC.
FRAME - GRAY IRON ASTM A48 CL35

LOAD RATING
HEAVY DUTY



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P.O. BOX 439
EAST JORDAN, MI. 49727
1-800-874-4100
FAX 231-536-4458

DRAWN	DATE
TCL	08/01/02
APPROVED	DATE

V4243ZI RIGHT FRAME

PRODUCT NO.
44243018

CATALOG NO.
V4243ZI

REF. PRODUCT DRAWING
44243018

EST. WT.
FRAME: 120 LBS 54kg

OPEN AREA
N/A

MAT'L SPEC.
FRAME - GRAY IRON ASTM A48 CL35

LOAD RATING
HEAVY DUTY

DISCLAIMER:
THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING ACT". NO WARRANTY OF ANY KIND IS MADE BY COLC FOR ANY PURPOSE WHATSOEVER. COLC ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

STORM WATER DETAILS
SHEET 2 OF 3

League City TEXAS

NOTE:
THESE PARK EQUIPMENT DETAILS ARE A BASIC COLLECTION OF DESIGNS ALLOWED BY THE CITY OF LEAGUE CITY. IF SPECIFIC DETAILS (NOT SHOWN HERE) ARE REQUIRED FOR THE CONSTRUCTION OF A PROJECT, SHOULD BE EITHER OBTAINED FROM PARK EQUIPMENT OR SUPPLIED BY ADDITIONAL ENGINEERED DETAILS AND SUBMITTED FOR APPROVAL.

STW-02

Project No.	00000		
Drawn	ARN	Checked	XXX
Scale	NTS	Date	OCT 2011
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NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

STORM SEWER DETAILS
SHEET 2 OF 4

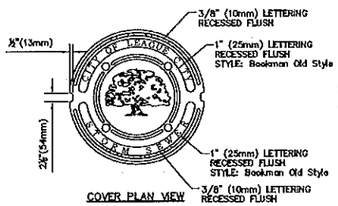
JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

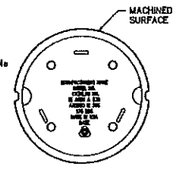
STATE OF TEXAS
KELL ANDREA CHENG RANFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

SHEET NO. 48 OF 118

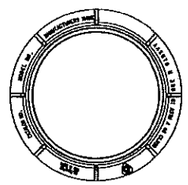
K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\Standards\Drainage\STW-02.dgn 7/20/2017 8:25:15 PM CCL



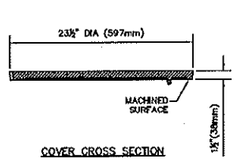
COVER PLAN VIEW



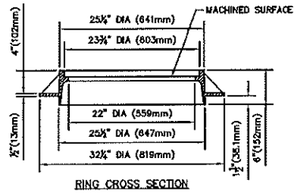
COVER BOTTOM VIEW



RING PLAN VIEW



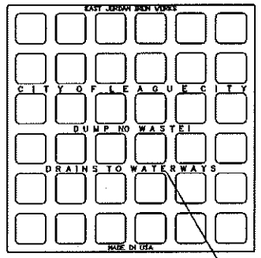
COVER CROSS SECTION

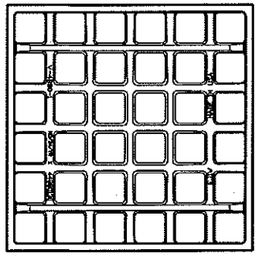


RING CROSS SECTION

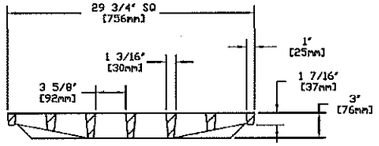
NOTES:
1. Ring and Cover Material Specs: Gray Iron ASTM A 48 CL35B, and Shall Meet All AASHTO M 306 Proof-load Specifications and Requirments.
2. For Use On Public Storm Sewers Only; For Private Mains Use Generic Coves That Meet Above Specification.
3. Refer To City of League City General Design and Construction Standards Book Item 704.5.3 For More Information.

HEAVY DUTY
STORM SEWER 23-1/2"
MANHOLE RING AND COVER DETAIL
N.T.S.





BOTTOM VIEW OF GRATE



GRATE SECTION

EAST JORDAN IRON WORKS, INC.
P.O. BOX 439
EAST JORDAN, MI 49727
1-800-874-4100
FAX 231-536-4458

DRAWN	DATE
SBB	12/04/01
APPROVED	DATE

GRATE

PRODUCT NO.
44880130(c

CATALOG NO.
V-4880-1

REF. PRODUCT DRAWING
44880130

EST. WT.
GRATE: 200 LBS 91kg

OPEN AREA
473 SQ IN (3051 SQ cm)

MAT'L SPEC.
GRATE - GRAY IRON ASTM A48 CL35

LOAD RATING
HEAVY DUTY

DISCLAIMER:
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STW-03

Project No.	00000		
Drawn	ARN	Checked	XXX
Scale	NTS	Date	OCT 2011
Sheet	0	Of	00

STORM WATER DETAILS
SHEET 3 OF 3

League City TEXAS

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE
RECONSTRUCTION

STORM SEWER
DETAILS
SHEET 3 OF 4

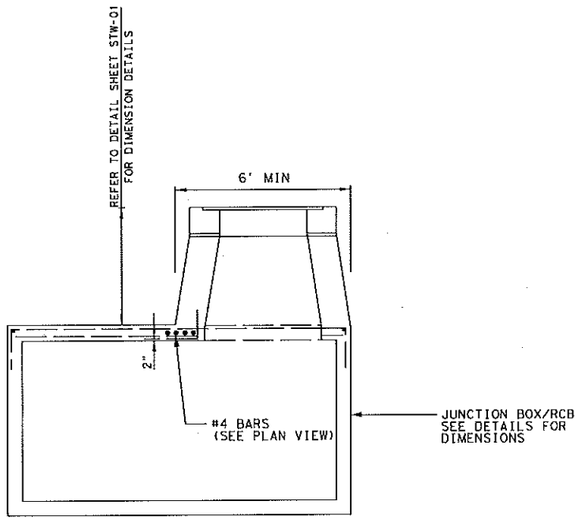
JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

STATE OF TEXAS
BELL ANDREA CHENG RAHT
86219
LICENSED
PROFESSIONAL ENGINEER
7/20/17

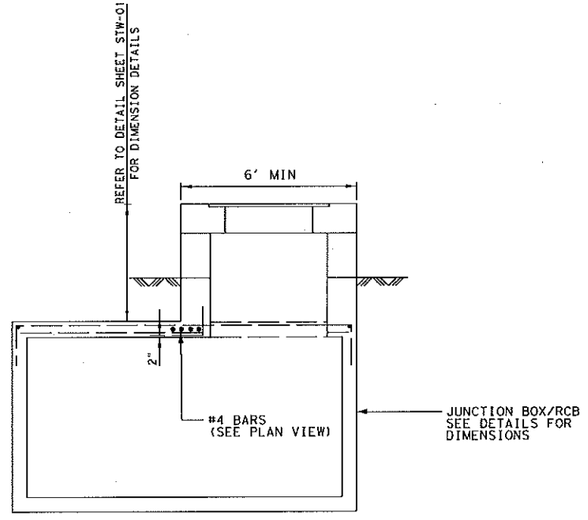
SHEET NO. 49 OF 118

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\Standards\Drainage\STW-03.dgn 7/20/2017 8:25:38 PM CCL



PRECAST CONCRETE MANHOLE SPCL

N. T. S.



TYPE E INLET SPCL

N. T. S.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE
RECONSTRUCTION

STORM SEWER
DETAILS
SHEET 4 OF 4

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
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SCALE: _____ DGN. BY: _____
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JOB NO. 05523-0005-00 DWG. NO. _____
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STATE OF TEXAS
BELL ANDREA CHENG RAFT
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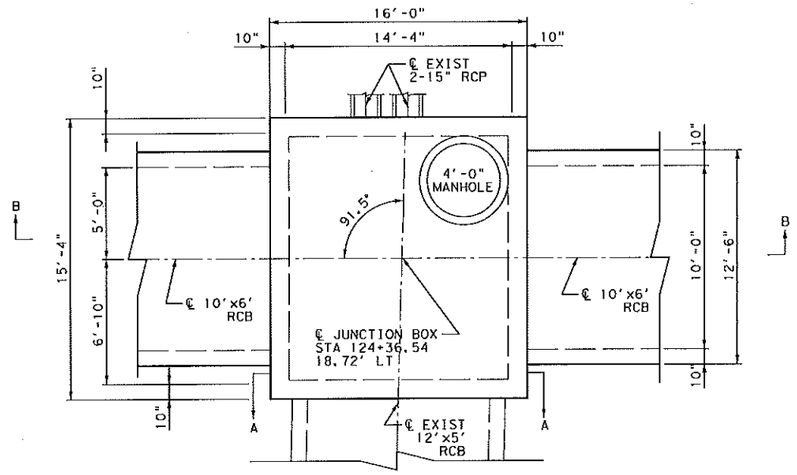
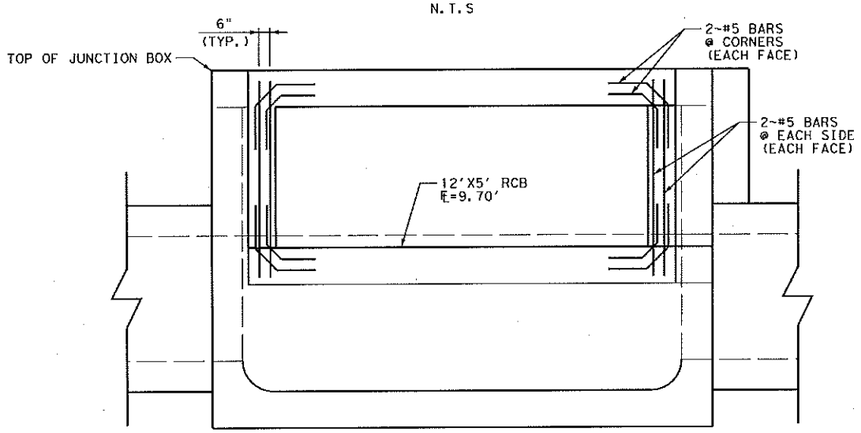
LICENSED PROFESSIONAL ENGINEER
7/20/17



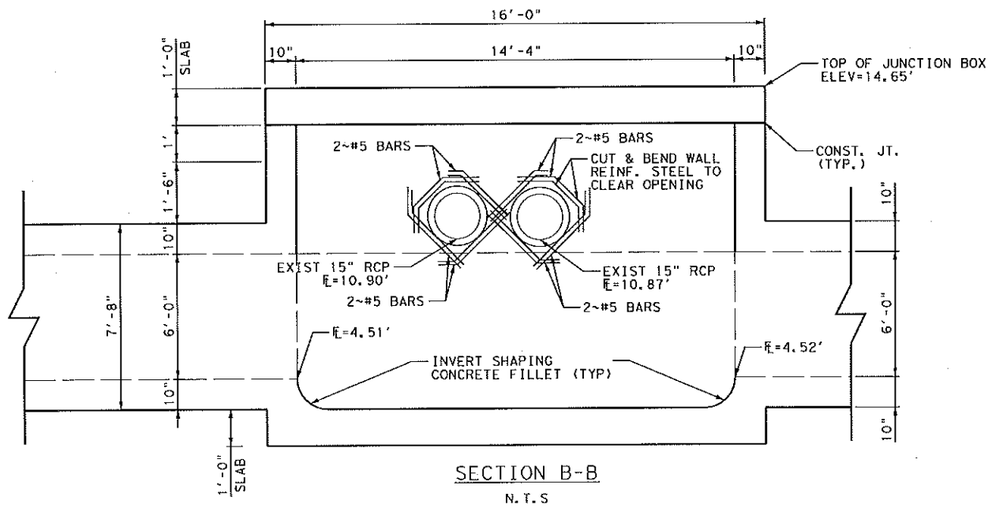
JUNCTION BOX PLAN

N.T.S



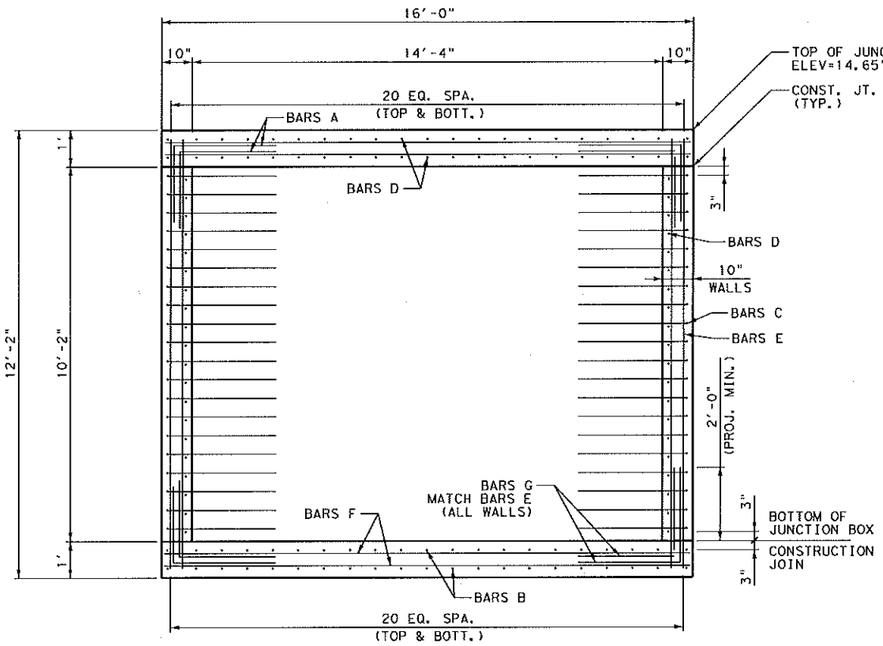
SECTION A-A

N.T.S



SECTION B-B

N.T.S



BARS C

N.T.S

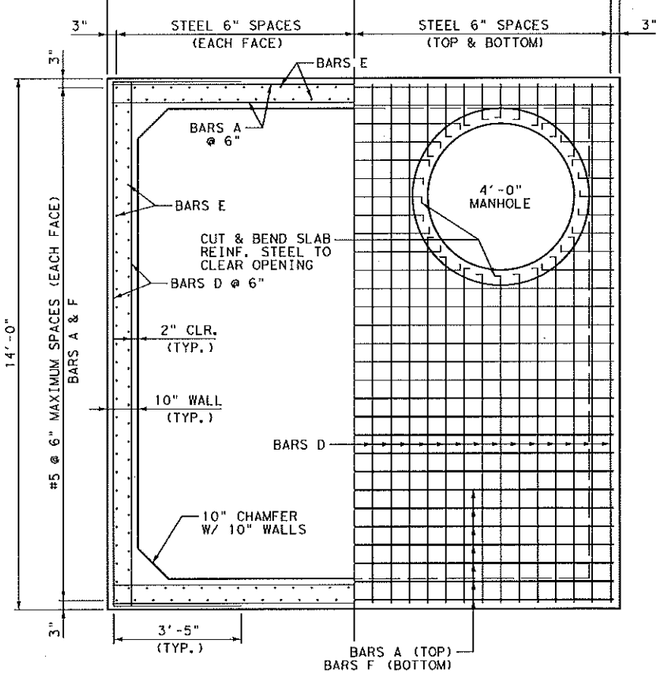
BARS G

N.T.S

TYPICAL REINFORCING DETAIL

N.T.S

BAR TABLE	
BARS	SIZE
A	#6
B	#5
C	#5
D	#5
E	#6
F	#6
G	#6
H	#5



TOP SLAB/WALL SECTION

N.T.S

NOTES:
1. ALL ELEVATIONS TO BE FIELD VERIFIED.
2. ALL DIMENSION RELATIVE TO REINFORCING STEEL ARE TO THE CENTER OF THE BARS UNLESS OTHERWISE NOTED ON THE PLANS.
3. ALL CONCRETE SHALL BE CLASS "C". ALL EXPOSED CORNERS SHALL BE CHAMFERED ¾".
4. ALTERNATIVE DESIGN DRAWINGS BEARING THE SEAL OF A REGISTERED OR LICENSED ENGINEER WILL BE ACCEPTED FOR CAST-IN-PLACE CONSTRUCTION OF THE JUNCTION BOX.

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE
RECONSTRUCTION

JUNCTION BOX A
DETAILS

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: DGN. BY:
DATE: 7/21/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

STATE OF TEXAS
KELL ANDREA OKENG RAFT
86219
LICENSED PROFESSIONAL ENGINEER
7/21/17

SHEET NO.51 OF 118

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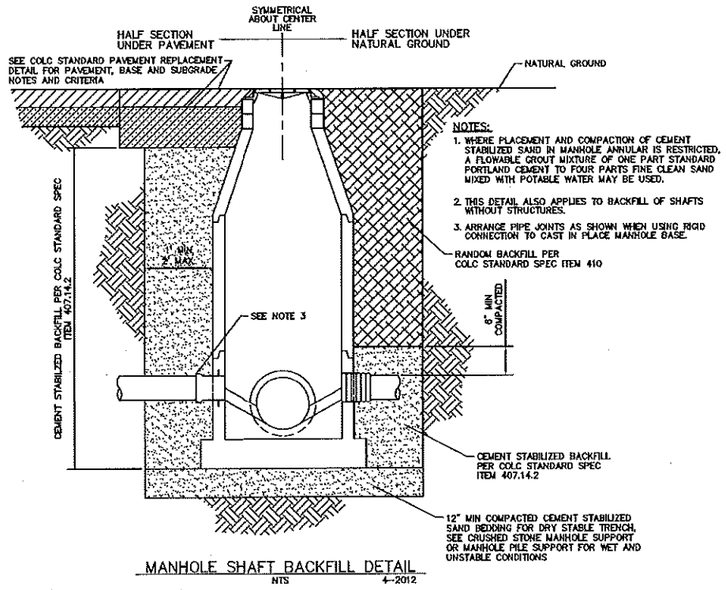
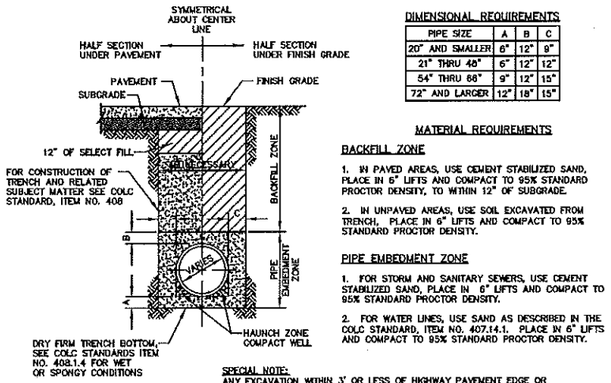


MANHOLE SHAFT BACKFILL DETAIL
NTS 4-2012



DIMENSIONAL REQUIREMENTS

PIPE SIZE	A	B	C
20" AND SMALLER	6"	12"	9"
21" THRU 48"	6"	12"	12"
54" THRU 66"	9"	12"	15"
72" AND LARGER	12"	18"	15"

MATERIAL REQUIREMENTS

BACKFILL ZONE

1. IN PAVED AREAS, USE CEMENT STABILIZED SAND, PLACE IN 6" LIFTS AND COMPACT TO 95% STANDARD PROCTOR DENSITY, TO WITHIN 12" OF SUBGRADE.
2. IN UNPAVED AREAS, USE SOIL EXCAVATED FROM TRENCH, PLACE IN 6" LIFTS AND COMPACT TO 95% STANDARD PROCTOR DENSITY.

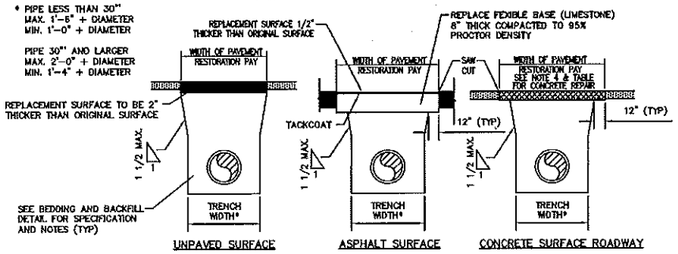
PIPE EMBEDMENT ZONE

1. FOR STORM AND SANITARY SEWERS, USE CEMENT STABILIZED SAND, PLACE IN 6" LIFTS AND COMPACT TO 95% STANDARD PROCTOR DENSITY.
2. FOR WATER LINES, USE SAND AS DESCRIBED IN THE COLC STANDARD, ITEM NO. 407.14.1. PLACE IN 6" LIFTS AND COMPACT TO 95% STANDARD PROCTOR DENSITY.

SPECIAL NOTE:
ANY EXCAVATION WITHIN 3' OR LESS OF HIGHWAY PAVEMENT EDGE OR CITY STREET SHALL REQUIRE 1-1/2 SACK CEMENT STABILIZED BACKFILL UP TO ROAD BASE. COMPACTED IN 8" LIFTS WITH VIBRATORY PLATE.

WATER, SANITARY AND STORM BEDDING AND BACKFILL FOR DRY STABLE TRENCH
NTS 4-2012

SPECIAL NOTE: ALL CONCRETE DRIVEWAY REPAIR TO BE A MINIMUM OF 6" THK. WITH #3 REBAR ON 12" CENTERS WITH PLASTIC CHAIRS.



UNPAVED SURFACE ASPHALT SURFACE CONCRETE SURFACE ROADWAY

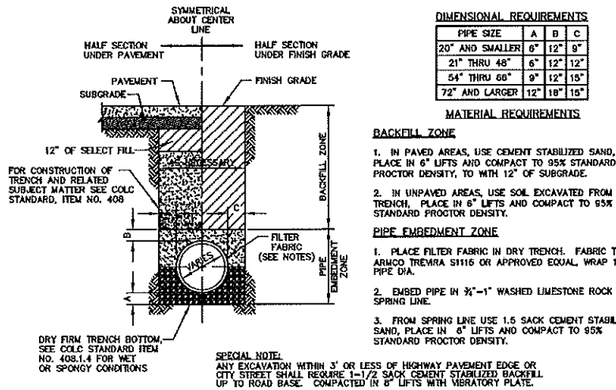
TABLE OF SLAB DEPTH & REINFORCEMENT

Min. Depth of Slab	Width of Trench	Size of Bar	Spacing	Length of Bar
6"	18"	4	9"	40"
6"	24"	4	8"	46"
6"	30"	4	7"	52"
6"	36"	4	6"	58"
10"	42"	4	8 1/2"	64"
10"	48"	4	7 1/2"	70"
10"	54"	4	7"	76"
10"	60"	4	6 1/2"	82"
10"	66"	5	9"	88"
10"	72"	6	8 1/2"	94"
10"	78"	6	8"	100
10"	84"	6	7 1/2"	106

NOTES

1. PAVEMENT REPAIR SHALL BE MADE TO THE LIMITS OF EXISTING PAVEMENT SECTION WITH LIKE MATERIALS UNLESS NOTED OTHERWISE.
2. UNPAVED DRIVEWAYS, NOT SURFACED WITH ASPHALT, SHALL BE REPAIRED WITH MINIMUM 6" CRUSHED LIMESTONE.
3. NEW PAVEMENT SHALL BE SUPPORTED ON MINIMUM 12" EACH SIDE ON UNDISTURBED SOIL.
4. SAW CUT EXISTING CONCRETE PAVEMENT EXPOSING 12" OF REBAR; BEND STEEL BACK OUT OF THE WAY & CONSTRUCT TRENCH. BEND STEEL BACK TO ORIGINAL POSITION AND SPLICE; SEE "TABLE OF SLAB DEPTHS & REINFORCEMENT" FOR BAR SIZE AND SPACING. WHERE REBAR IS REMOVED, THE CONTRACTOR SHALL DRILL 12" INTO THE CENTER OF EXISTING CONCRETE AND SECURE A 24", DEFORMED STEEL BAR ON 24" CENTERS WITH CEMENT GROUT OR SUITABLE EPOXY, THEN PLACE AND TIE IN REBAR. REPLACE CONCRETE 2" THICKER THAN ORIGINAL. ANY PAVEMENT REMOVED IN STATE R.O.W. SHALL BE REPLACED TO STATE SPECIFICATIONS.
5. ALL CONCRETE TO BE FIVE SACK MIX, 3,000 PSI MIN. AT 28 DAYS.
6. LIMITS OF SAW CUT TO BE VARIFIED BY CITY OF LEAGUE CITY OFFICIALS.

PAVEMENT REPLACEMENT DETAIL
NTS 4-2012



DIMENSIONAL REQUIREMENTS

PIPE SIZE	A	B	C
20" AND SMALLER	6"	12"	9"
21" THRU 48"	6"	12"	12"
54" THRU 66"	9"	12"	15"
72" AND LARGER	12"	18"	15"

MATERIAL REQUIREMENTS

BACKFILL ZONE

1. IN PAVED AREAS, USE CEMENT STABILIZED SAND, PLACE IN 6" LIFTS AND COMPACT TO 95% STANDARD PROCTOR DENSITY, TO WITH 12" OF SUBGRADE.
2. IN UNPAVED AREAS, USE SOIL EXCAVATED FROM TRENCH, PLACE IN 6" LIFTS AND COMPACT TO 95% STANDARD PROCTOR DENSITY.

PIPE EMBEDMENT ZONE

1. PLACE FILTER FABRIC IN DRY TRENCH. FABRIC TO BE AMOCO TREVIRA S1115 OR APPROVED EQUAL, WRAP 1½ PIPE DIA.
2. EMBED PIPE IN ¾"-1" WASHED LIMESTONE ROCK TO SPRING LINE.
3. FROM SPRING LINE USE 1.5 SACK CEMENT STABILIZED SAND, PLACE IN 6" LIFTS AND COMPACT TO 95% STANDARD PROCTOR DENSITY.

SPECIAL NOTE:
ANY EXCAVATION WITHIN 3' OR LESS OF HIGHWAY PAVEMENT EDGE OR CITY STREET SHALL REQUIRE 1-1/2 SACK CEMENT STABILIZED BACKFILL UP TO ROAD BASE. COMPACTED IN 8" LIFTS WITH VIBRATORY PLATE.

BEDDING AND BACKFILL FOR STORM AND SANITARY WITH GEOTEXTILE
NTS 4-2012

DISCLAIMER:
THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING ACT". NO WARRANTY OF ANY KIND IS MADE BY COLC FOR ANY PURPOSE WHATSOEVER. COLC ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

BEDDING AND BACKFILL DETAILS 1 OF 2

BB-01

Project No.	00000		
Drawn	ARN	Checked	XXX
Scale	NTS	Date	OCT 2011
Sheet	0	Of	00

League City TEXAS

NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

BEDDING AND BACKFILL DETAILS

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 350 • Bellaire, TX 77401 • 713.777.5337

SCALE: DGN. BY:
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

STATE OF TEXAS
BELL ANDREA CHENG RAFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

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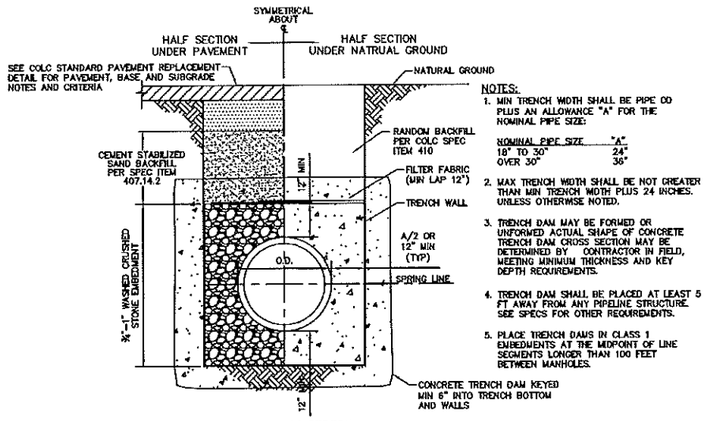


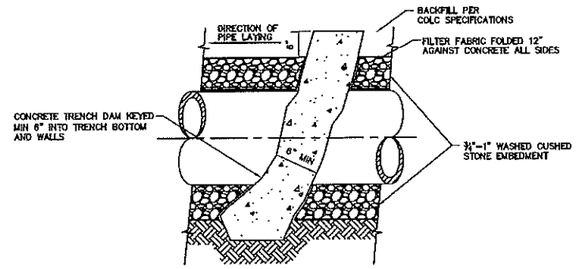
NOTES:

1. MIN TRENCH WIDTH SHALL BE PIPE OD PLUS AN ALLOWANCE "A" FOR THE NOMINAL PIPE SIZE:

NOMINAL PIPE SIZE	"A"
18" TO 30"	24"
OVER 30"	36"

2. MAX TRENCH WIDTH SHALL BE NOT GREATER THAN MIN TRENCH WIDTH PLUS 24 INCHES. UNLESS OTHERWISE NOTED.
3. TRENCH DAM MAY BE FORMED OR UNFORMED ACTUAL SHAPE OF CONCRETE TRENCH DAM CROSS SECTION MAY BE DETERMINED BY CONTRACTOR IN FIELD, MEETING MINIMUM THICKNESS AND KEY DEPTH REQUIREMENTS.
4. TRENCH DAM SHALL BE PLACED AT LEAST 5 FT AWAY FROM ANY PIPELINE STRUCTURE. SEE SPECS FOR OTHER REQUIREMENTS.
5. PLACE TRENCH DAMS IN CLASS I EMBEDMENTS AT THE MIDPOINT OF LINE SEGMENTS LONGER THAN 100 FEET BETWEEN MANHOLES.

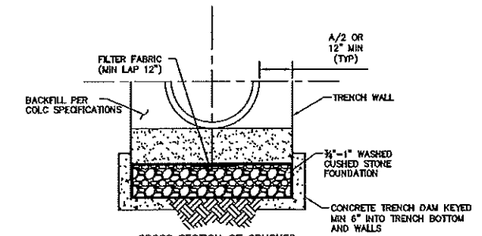
TYPICAL CROSS SECTION



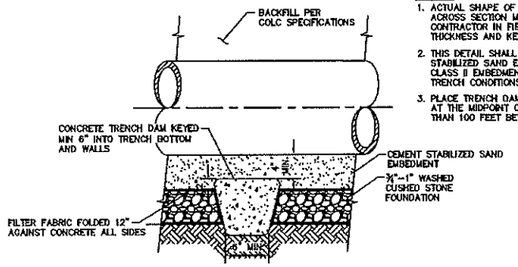
LONGITUDINAL SECTION ALONG PIPE CENTERLINE

EMBEDMENT TRENCH DAM DETAIL

NTS 4-2012



CROSS SECTION OF CRUSHED STONE FOUNDATION



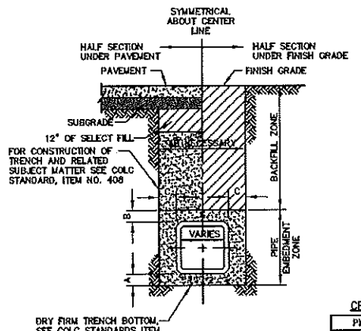
LONGITUDINAL SECTION ALONG PIPE CENTERLINE

FOUNDATION TRENCH DAM DETAIL

NTS 4-2012

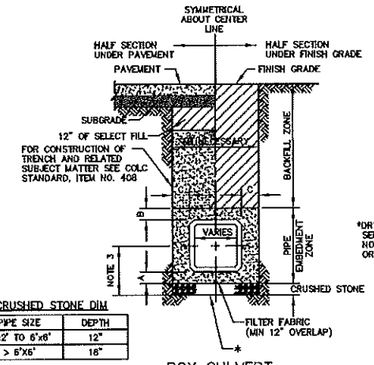
NOTES:

1. ACTUAL SHAPE OF CONCRETE TRENCH DAM ACROSS SECTION MAY BE DETERMINED BY CONTRACTOR IN FIELD, MEETING MINIMUM THICKNESS AND KEY DEPTH REQUIREMENTS.
2. THIS DETAIL SHALL BE USED WITH CEMENT STABILIZED SAND EMBEDMENT, OR OTHER CLASS II EMBEDMENT, IN WET STABLE TRENCH CONDITIONS.
3. PLACE TRENCH DAMS IN CLASS I EMBEDMENTS AT THE MIDPOINT OF LINE SEGMENTS LONGER THAN 100 FEET BETWEEN MANHOLES.



BOX CULVERT BEDDING AND BACKFILL FOR DRY STABLE TRENCH

NTS

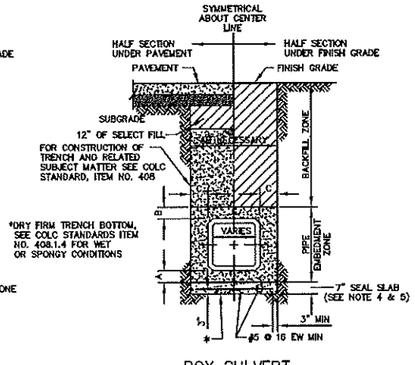


CRUSHED STONE DIM

PIPE SIZE	DEPTH
3'x2' TO 6'x6'	12"
> 8'X6'	18"

BOX CULVERT BEDDING AND BACKFILL FOR WET STABLE TRENCH

NTS



BOX CULVERT BEDDING AND BACKFILL WITH SEAL SLAB

NTS 4-2012

DIMENSIONAL REQUIREMENTS

PIPE SIZE	A	B	C
3'x2' AND LARGER	6"	6"	12"

MATERIAL REQUIREMENTS

BACKFILL ZONE

1. IN PAVED AREAS, USE CEMENT STABILIZED SAND, PLACE IN 8" LIFTS AND COMPACT TO 95% STANDARD PROCTOR DENSITY, TO WITHIN 12" OF SUBGRADE.
2. IN UNPAVED AREAS, USE SOIL EXCAVATED FROM TRENCH, PLACE IN 6" LIFTS AND COMPACT TO 95% STANDARD PROCTOR DENSITY.

PIPE EMBEDMENT ZONE

1. USE CEMENT STABILIZED SAND, PLACE IN 8" LIFTS AND COMPACT TO 95% STANDARD PROCTOR DENSITY.
2. 2' WIDE FILTER FABRIC PLACED AT EACH JOINT ALL AROUND WITH 1' OVERLAP. FABRIC TO BE AMOCO TREVIRA 51115 OR APPROVED EQUAL.

NOTES:

1. ANY EXCAVATION WITHIN 3' OR LESS OF HIGHWAY PAVEMENT EDGE OR CITY STREET SHALL REQUIRE 1-1/2 SACK CEMENT STABILIZED BACKFILL UP TO ROAD BASE. COMPACTED IN 8" LIFTS WITH VIBRATORY PLATE.
2. WHERE MULTIBLE BOX SEWERS ARE USED IN THE SAME TRENCH, MIN OUTSIDE TO OUTSIDE BOX SEWER SEPERATION SHALL BE 6".
3. ALTERNATE TRENCH BOTTOM TREATMENT MAY BE USED AS APPROVED BY THE CITY ENGINEER AND AS PAID FOR IN THE PROPOSAL.
4. CONCRETE IN SLAB TO REACH MIN COMPRESSIVE STRENGTH OF 1000 PSI BASED ON MAX DESIGN BEFORE PIPE IS LAID.
5. PRECAST SEAL SLAB MAY BE USED AS APPROVED BY CITY ENGINEER.

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BEDDING AND BACKFILL
DETAILS 2 OF 2

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GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

BEDDING AND BACKFILL DETAILS

BB-02

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7/20/17

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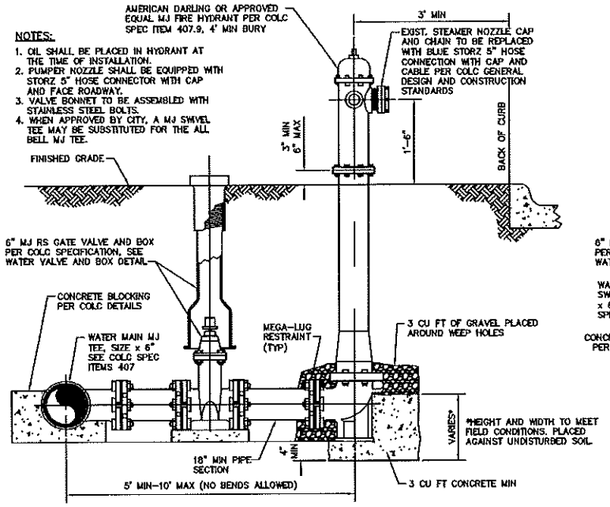
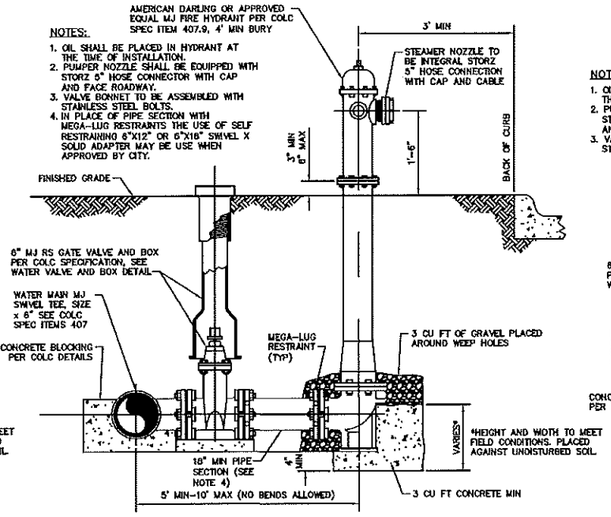
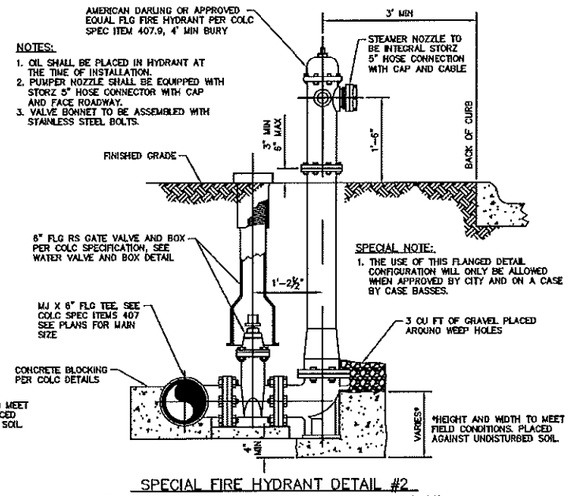


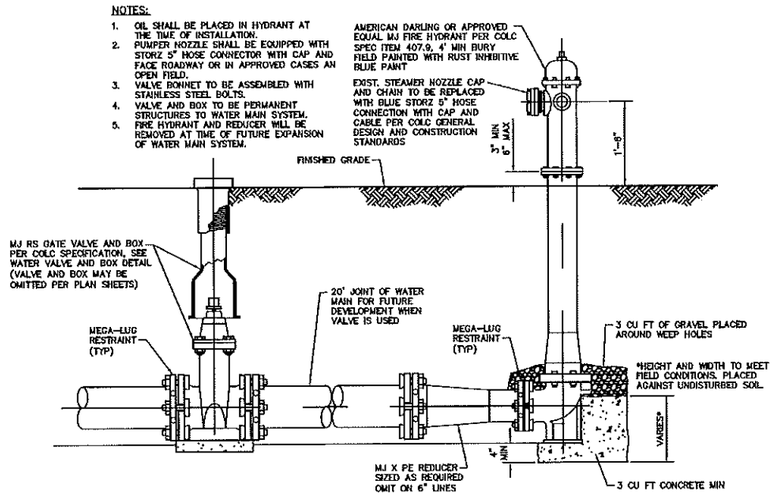
FIRE HYDRANT AND VALVE DETAIL
NTS 10-2013



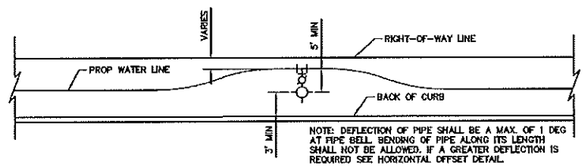
SPECIAL FIRE HYDRANT DETAIL #1
SWIVEL TEE FIRE HYDRANT AND VALVE DETAIL
NTS 10-2013



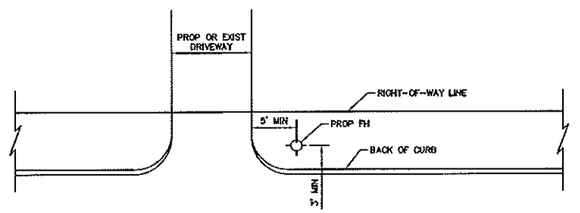
SPECIAL FIRE HYDRANT DETAIL #2
FLANGED FIRE HYDRANT AND VALVE DETAIL
NTS 10-2013



END OF LINE FIRE HYDRANT AND VALVE FOR FUTURE LINE EXTENSION
NTS 10-2013



WATER LINE DEFLECTION DETAIL
NTS 4-2012



FIRE HYDRANT TO PAVEMENT CLEARANCE DETAIL
NTS 4-2012

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WATER DETAILS
SHEET 1 OF 7

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GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

WATER DETAILS

SHEET 1 OF 7

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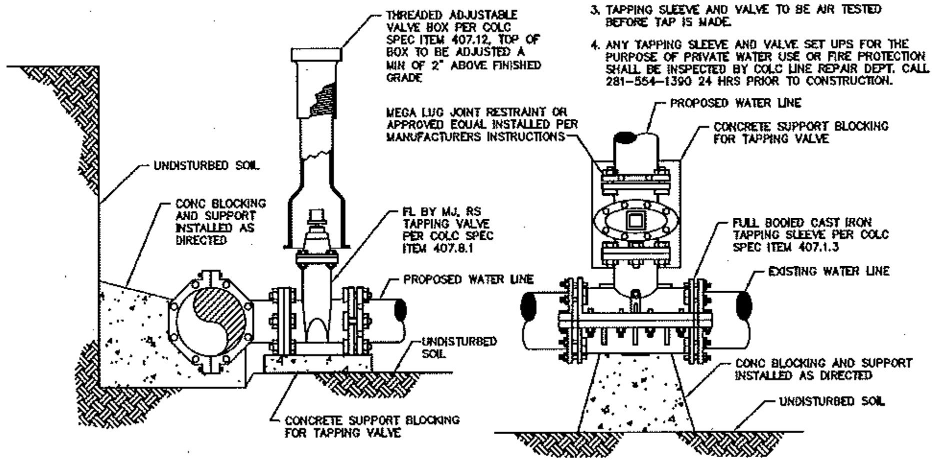
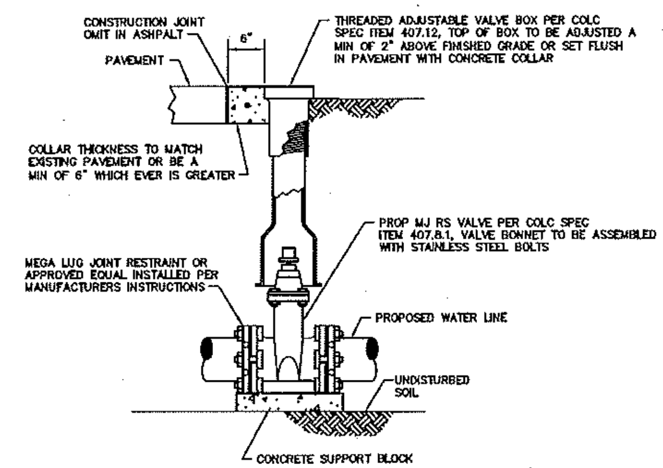
WATER DETAILS
SHEET 2 OF 7

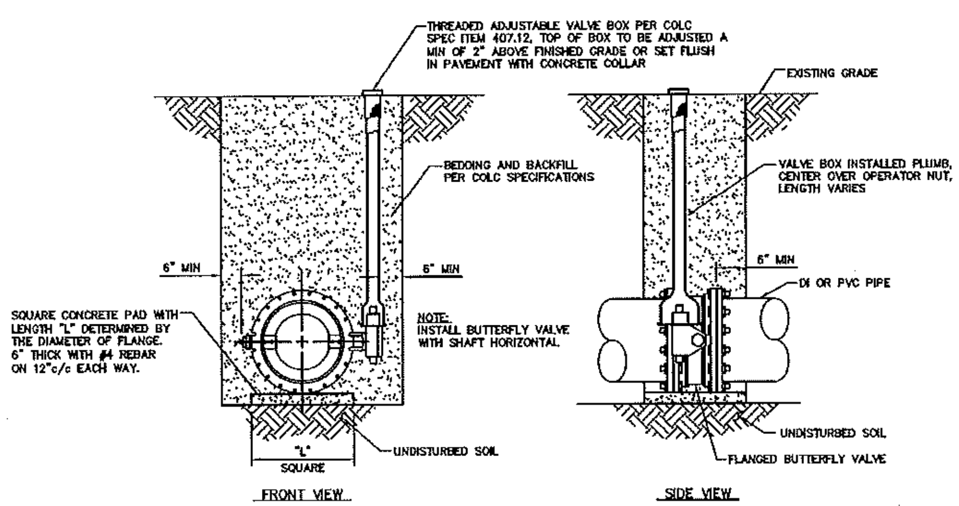
NOTES:
1. VALVE AND TAPPING SLEEVE TO BE INSTALLED PER COLC SPECIFICATION WITH POLLY WRAP BEFORE ANY CONCRETE IS POURED.
2. VALVE BONNET TO BE ASSEMBLED WITH STAINLESS STEEL BOLTS.
3. TAPPING SLEEVE AND VALVE TO BE AIR TESTED BEFORE TAP IS MADE.
4. ANY TAPPING SLEEVE AND VALVE SET UPS FOR THE PURPOSE OF PRIVATE WATER USE OR FIRE PROTECTION SHALL BE INSPECTED BY COLC LINE REPAIR DEPT. CALL 281-554-1390 24 HRS PRIOR TO CONSTRUCTION.



TAPPING SLEEVE AND VALVE DETAIL
NTS 4-2012

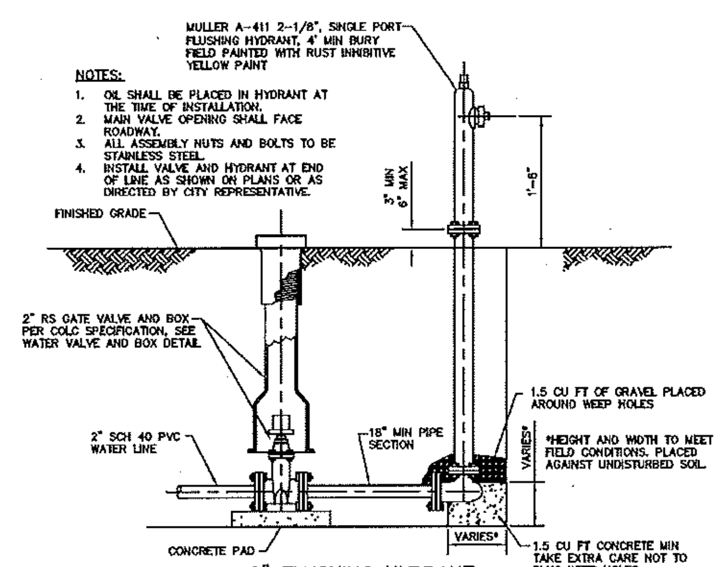


WATER VALVE AND BOX DETAIL
NTS 4-2012



BUTTERFLY VALVE INSTALLATION
NTS 4-2012
(USE OF BUTTERFLY VALVE ONLY WHEN APPROVED BY CITY ENGINEERING DEPT.)

NOTES:
1. OIL SHALL BE PLACED IN HYDRANT AT THE TIME OF INSTALLATION.
2. MAIN VALVE OPENING SHALL FACE ROADWAY.
3. ALL ASSEMBLY NUTS AND BOLTS TO BE STAINLESS STEEL.
4. INSTALL VALVE AND HYDRANT AT END OF LINE AS SHOWN ON PLANS OR AS DIRECTED BY CITY REPRESENTATIVE.



2" FLUSHING HYDRANT
NTS 4-2012
(USE OF 2" FLUSHING HYDRANT ONLY WHEN APPROVED BY CITY ENGINEERING DEPT.)

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WATER DETAILS

SHEET 2 OF 7

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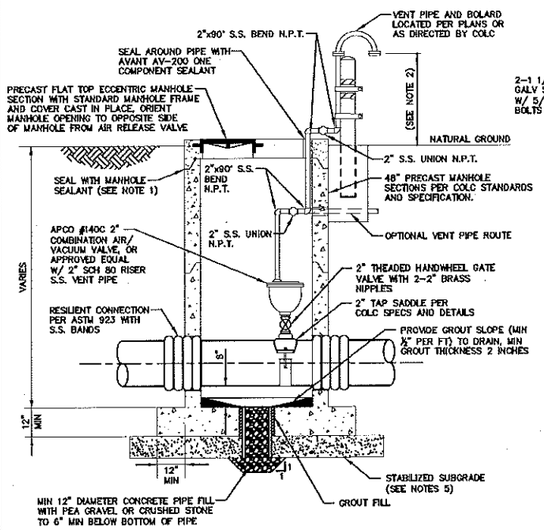
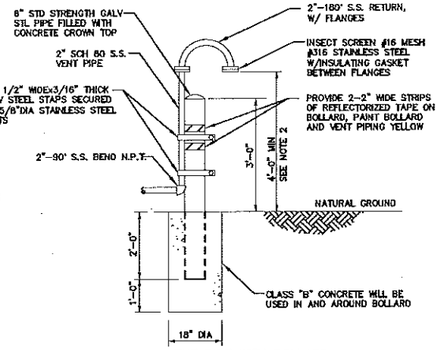


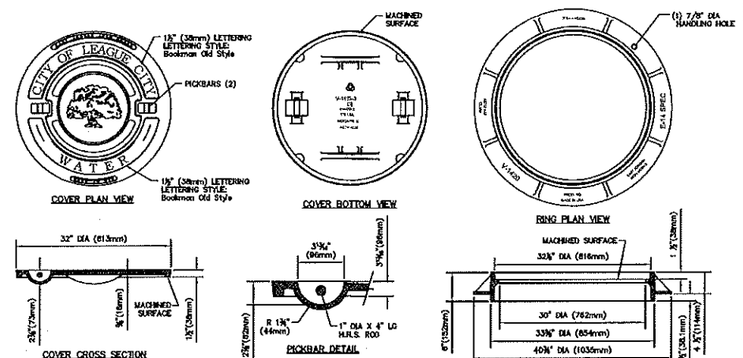
COMBINATION AIR RELEASE/AIR VACUUM VALVE ASSEMBLY DETAIL
NTS 4-2012



VENT PIPE WITH BOLLARD

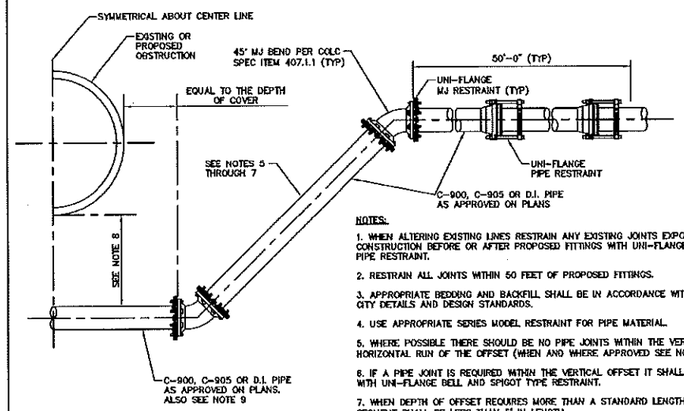
NOTES

1. PROVIDE RAM-NEK OR APPROVAL EQUAL BETWEEN PRECAST SEGMENTS OF THE MANHOLE.
2. VERIFY THAT LOCATION OF SCREEN IS 1 FOOT ABOVE 100-YEAR FLOOD PLAIN ELEVATION OR 4 FEET ABOVE NATURAL GROUND WHICHEVER IS HIGHER.
3. REFER TO PLAN AND PROFILE SHEETS FOR LOCATIONS OF AIR RELEASE VALVE AND MANHOLES.
4. MANHOLE BASE SHALL BE A PRECAST SECTION WITH PROPER SIZED WATER TIGHT CONNECTION FOR PROPOSED WATER LINE. CENTER ONE FULL JOINT OF WATER PIPE AT MANHOLE.
5. MANHOLE SHALL BE SET ON A MIN OF 12" COMPACTED CEMENT STABILIZED SAND BEDDING FOR DRY STABLE TRENCH, SEE CRUSHED STONE MANHOLE SUPPORT OR MANHOLE PILE SUPPORT FOR WET AND UNSTABLE CONDITIONS.



NOTES:
1. Cover Material Specs: Ductile Iron ASTM A 536, Shall Meet All AASHTO M 306 Proof-load Specifications and Requirments.
2. Ring Material Specs: Gray Iron ASTM A 48 CL35B, Shall Meet All AASHTO M 306 Proof-load Specifications and Requirments.
3. For Use On Public Water Mains Only. For Private Mains Use Generic Lids That Meet Above Specifications.
4. Refer To City of League City General Design and Construction Standards Book Item 807.7.3 Paragraphs 1 and 2 For More Information.

HEAVY DUTY
WATER 32"
MANHOLE RING AND COVER DETAIL
NTS 4-2012



NOTES:

1. WHEN ALTERING EXISTING LINES RESTRAIN ANY EXISTING JOINTS EXPOSED BY CONSTRUCTION BEFORE OR AFTER PROPOSED FITTINGS WITH UNI-FLANGE BELL AND SPIGOT PIPE RESTRAINT.
2. RESTRAIN ALL JOINTS WITHIN 50 FEET OF PROPOSED FITTINGS.
3. APPROPRIATE BEDDING AND BACKFILL SHALL BE IN ACCORDANCE WITH CITY OF LEAGUE CITY DETAILS AND DESIGN STANDARDS.
4. USE APPROPRIATE SERIES MODEL RESTRAINT FOR PIPE MATERIAL.
5. WHERE POSSIBLE THERE SHOULD BE NO PIPE JOINTS WITHIN THE VERTICAL OR HORIZONTAL RUN OF THE OFFSET (WHEN AND WHERE APPROVED SEE NOTE 8 AND 7).
6. IF A PIPE JOINT IS REQUIRED WITHIN THE VERTICAL OFFSET IT SHALL BE RESTRAINED WITH UNI-FLANGE BELL AND SPIGOT TYPE RESTRAINT.
7. WHEN DEPTH OF OFFSET REQUIRES MORE THAN A STANDARD LENGTH OF PIPE NO SEGMENT SHALL BE LESS THAN 5' IN LENGTH.
8. THE MINIMUM CLEARANCE SHALL BE DETERMINED BY THE AMOUNT OF BEDDING AND BACKFILL REQUIRED BY THE PROSPECTIVE PIPE AND THEIR USAGE. SEE THE BEDDING AND BACKFILL DETAILS FOR DIMENSIONS.
9. A SOLID CONTINUOUS JOINT OF PIPE SHALL BE USED AT ALL TIMES FOR THE HORIZONTAL SECTION OF THE OFFSET. IF THE MINIMUM SIDE CLEARANCE DISTANCES PLUS THE DIMENSION OF THE OBSTRUCTION IS GREATER THAN A STANDARD JOINT OF PIPE AN APPROPRIATELY SIZED AND CONTINUOUS LENGTH OF HDPE SHALL BE USED WITH TRANSITION FITTING OR GASKETS AS SPECIFIED BY THE MANUFACTURER IF NEEDED.

RESTRAINED MECHANICAL JOINT VERTICAL OFFSET
NTS 4-2012

90° BEND	
PIPE SIZE	BEARING AREA
4"	2 S.F.
6"	4 S.F.
8"	8 S.F.
10"	12 S.F.
12"	16 S.F.
14"	22 S.F.
16"	29 S.F.
18"	36 S.F.
20"	44 S.F.
24"	64 S.F.
30"	100 S.F.
36"	103 S.F.

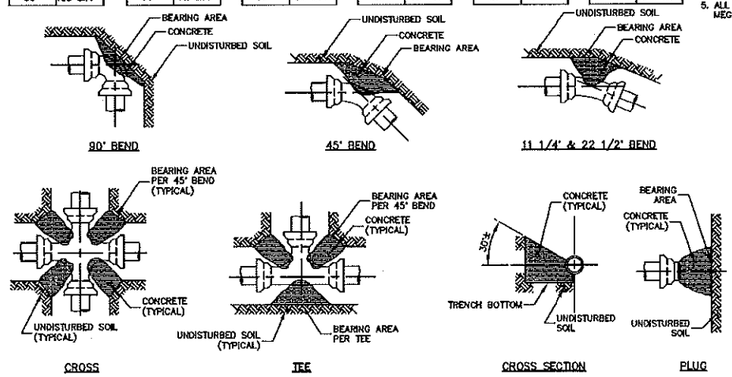
45° BEND	
PIPE SIZE	BEARING AREA
4"	1 S.F.
6"	1 S.F.
8"	4 S.F.
10"	6 S.F.
12"	9 S.F.
14"	12 S.F.
16"	16 S.F.
18"	20 S.F.
20"	24 S.F.
24"	36 S.F.
30"	54 S.F.
36"	72 S.F.

22 1/2° BEND	
PIPE SIZE	BEARING AREA
4"	1 S.F.
6"	1 S.F.
8"	2 S.F.
10"	3 S.F.
12"	5 S.F.
14"	6 S.F.
16"	8 S.F.
18"	10 S.F.
20"	12 S.F.
24"	18 S.F.
30"	28 S.F.
36"	38 S.F.

11 1/4° BEND	
PIPE SIZE	BEARING AREA
4"	1 S.F.
6"	1 S.F.
8"	1 S.F.
10"	2 S.F.
12"	2 S.F.
14"	3 S.F.
16"	4 S.F.
18"	5 S.F.
20"	6 S.F.
24"	9 S.F.
30"	12 S.F.
36"	15 S.F.

TEE	
PIPE SIZE	BEARING AREA
4"	2 S.F.
6"	3 S.F.
8"	5 S.F.
10"	8 S.F.
12"	12 S.F.
14"	15 S.F.
16"	20 S.F.
18"	25 S.F.
20"	32 S.F.
24"	45 S.F.
30"	71 S.F.
36"	77 S.F.

PLUG	
PIPE SIZE	BEARING AREA
4"	2 S.F.
6"	3 S.F.
8"	5 S.F.
10"	8 S.F.
12"	12 S.F.
14"	15 S.F.
16"	20 S.F.
18"	25 S.F.
20"	32 S.F.
24"	45 S.F.
30"	71 S.F.
36"	77 S.F.



HORIZONTAL THRUST BLOCKING DETAILS
NTS 4-2012

THRUST BLOCKING NOTES:

1. SEE COLC SPECIFICATION ITEM 407.15 FOR CONCRETE.
2. PLACE CONCRETE AGAINST UNDISTURBED SOIL AND FITTING ONLY, CLEAR OF THE JOINT.
3. ALL IRON FITTINGS SHALL BE WRAPPED WITH POLYETHYLENE FILM 8 MILS MIN THICKNESS MEETING ANSI 21.5 (AWWA C105) WITH ALL EDGES AND LAPS TAPED SECURELY TO PROVIDE A CONTINUOUS AND WATERTIGHT WRAP.
4. DIMENSIONS ARE BASED ON 150 PSI TEST PRESSURE AND SAFE SOIL BEARING LOAD OF 1100 PSI.
5. ALL FITTINGS TO BE MECHANICAL JOINT WITH MEGA-LUG RESTRAINTS OR APPROVED EQUAL.

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NORTH KANSAS AVENUE RECONSTRUCTION

WATER DETAILS

SHEET 3 OF 7

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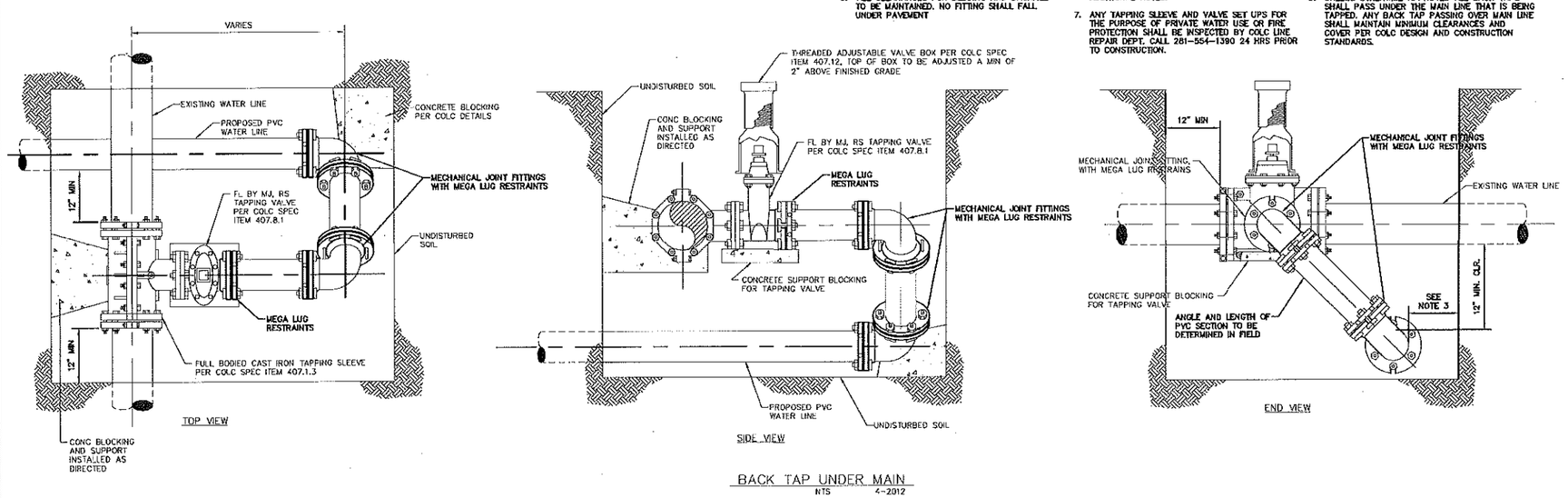
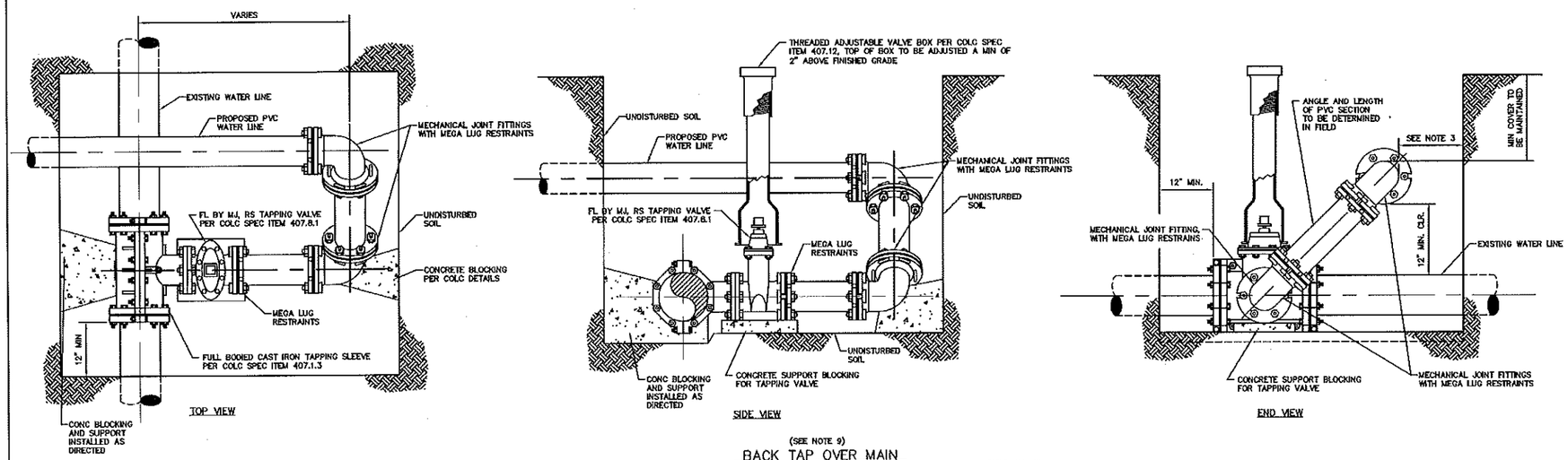
7/20/17

NOTES:

1. VALVE AND TAPPING SLEEVE TO BE INSTALLED PER COLC SPECIFICATION WITH POLY WRAP.
2. ALL MATERIALS AND COATINGS TO BE IN ACCORDANCE WITH SPECIFICATIONS FOR WATER MAIN CONSTRUCTION UNDER ITEM 407.
3. ALL CLEARANCES FOR BEDDING AND BACKFILL TO BE MAINTAINED. NO FITTING SHALL FALL UNDER PAVEMENT
4. SIZE OF TAP SADDLE, VALVE AND PIPING TO BE SHOWN ON PLANS.
5. VALVE BONNET TO BE ASSEMBLED WITH STAINLESS STEEL BOLTS.
6. SEE TAPPING SLEEVE AND VALVE DETAIL FOR ADDITIONAL NOTES.
7. ANY TAPPING SLEEVE AND VALVE SET UPS FOR THE PURPOSE OF PRIVATE WATER USE OR FIRE PROTECTION SHALL BE INSPECTED BY COLC LINE REPAIR DEPT. CALL 281-554-1390 24 HRS PRIOR TO CONSTRUCTION.
8. MINIMUM CLEARANCES NEAR OBSTRUCTIONS SUCH AS STORM SEWERS AND OTHER DRY UTILITIES SHALL BE 5' HORIZONTAL DISTANCE. OTHER OBSTRUCTION MAY REQUIRE ADDITIONAL FOOTAGE DETERMINED ON THE SIZE OF THE OBSTRUCTION AND ON A CASE BY CASE SITUATION.
9. UNLESS OTHERWISE APPROVED ALL BACK TAPS SHALL PASS UNDER THE MAIN LINE THAT IS BEING TAPPED. ANY BACK TAP PASSING OVER MAIN LINE SHALL MAINTAIN MINIMUM CLEARANCES AND COVER PER COLC DESIGN AND CONSTRUCTION STANDARDS.



BACK TAP UNDER MAIN
NTS 4-2012



(SEE NOTE 9)
BACK TAP OVER MAIN
NTS 4-2012

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W-04

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League City TEXAS

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CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

WATER DETAILS

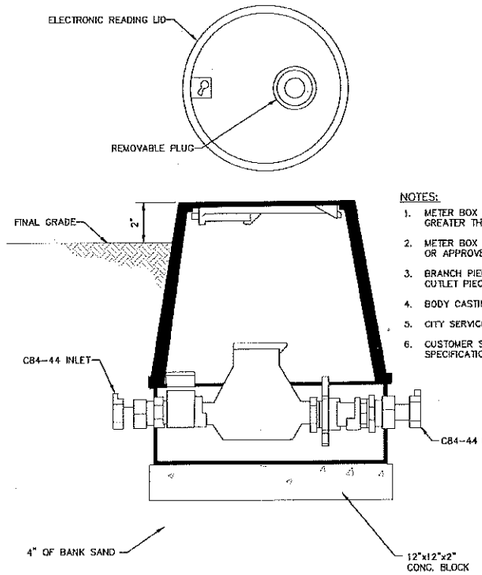
SHEET 4 OF 7

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SCALE: _____ DGN. BY: _____
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
SUBMITTED: SURV. BY: _____
F.B. NO. _____

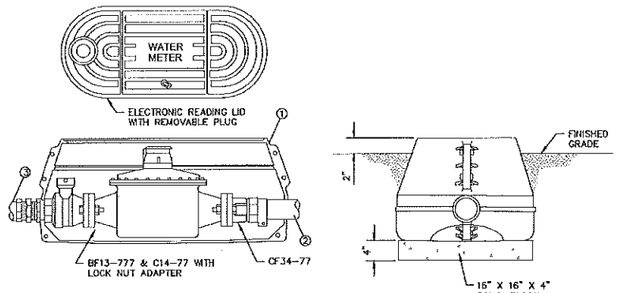
STATE OF TEXAS
BELL ANDREA CHONG RANFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\Standards\Roadway\W-04.dgn 7/20/2017 8:28:02 PM CCL



NOTES:

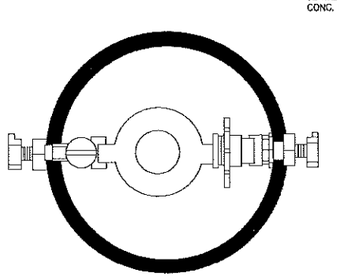
1. METER BOX DESIGN FOR SERVICE TO HOMES WITH GREATER THAN 2000 SQ. FT.
2. METER BOX TO BE FORD YL111-444-TP YOKE BOX OR APPROVED EQUAL.
3. BRANCH PIECE, VALVES EXPANSION CONNECTIONS, AND OUTLET PIECES TO BE WATER WORKS BRASS.
4. BODY CASTING AND LID TO BE CAST IRON LOCKING.
5. CITY SERVICE LEAD MATERIAL TO BE POLYETHYLENE.
6. CUSTOMER SERVICE LINE TO BE PER BUILDING CODE SPECIFICATION AND HAVE A MIN. ONE FOOT COVER.



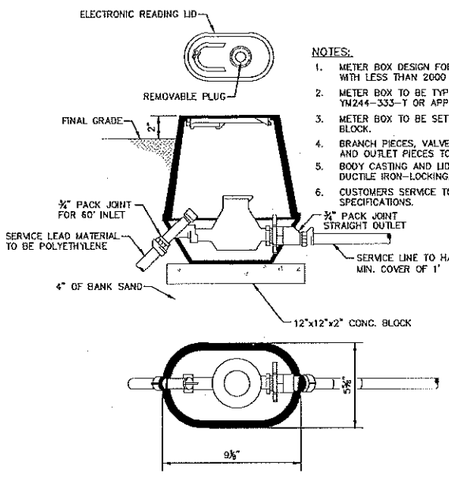
NOTES:

1. FORD 2" METER BOX WITH CAST IRON BODY, ASTM A48-CLASS 25, EPOXY COATED, FUSION BONDED, #FPMB-7EP-TP OR APPROVED EQUAL.
2. CUSTOMER SERVICE LINE MATERIAL TO BE PER CITY SPECIFICATIONS AND HAVE A MIN COVER OF 12 INCHES.
3. CITY SERVICE LEAD MATERIAL TO BE POLYETHYLENE.

1-1/2" & 2" METER BOX DETAIL
NTS 4-2012



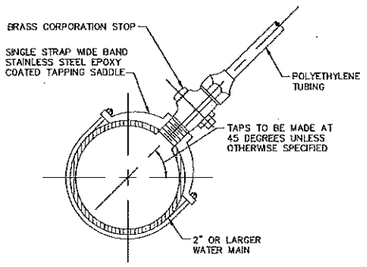
1" METER BOX DETAIL
NTS 4-2012



NOTES:

1. METER BOX DESIGN FOR SERVICES TO HOMES WITH LESS THAN 2000 SQ.FT.
2. METER BOX TO BE TYPE FORD YOKE BOX YM244-333-T OR APPROVED EQUAL.
3. METER BOX TO BE SET ON 16" x 16" x 4" CONC. BLOCK.
4. BRANCH PIECES, VALVES, EXPANSIOIN CONNECTIONS AND OUTLET PIECES TO BE WATERWORKS BRASS.
5. BODY CASTING AND LID TO BE CAST IRON OR DUCTILE IRON-LOCKING.
6. CUSTOMERS SERVICE TO BE PER BUILDING CODE SPECIFICATIONS.

3/4" x 3/4"
SINGLE SERVICE METER BOX DETAIL
NTS 4-2012



3/4" TO 2" SERVICE TAP DETAIL
NTS 4-2012

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CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

WATER DETAILS

SHEET 5 OF 7

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
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W-05

Project No.	00000		
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Scale	NTS	Date	OCT 2011
Sheet	0	Of	00

SCALE: DGN. BY:
DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO.
SUBMITTED: SURV. BY:
F.B. NO.

STATE OF TEXAS
BELL ANDREA CHENG RANFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

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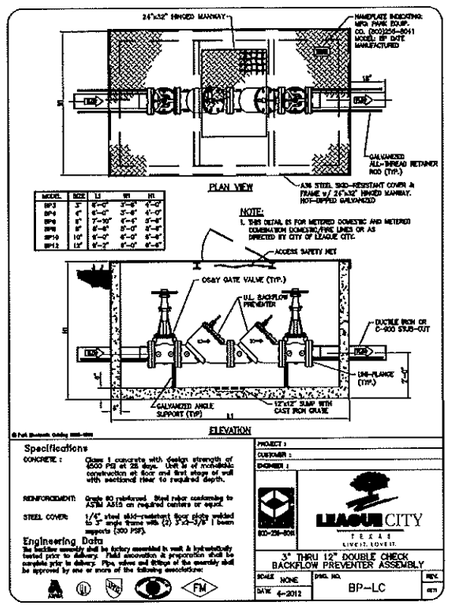

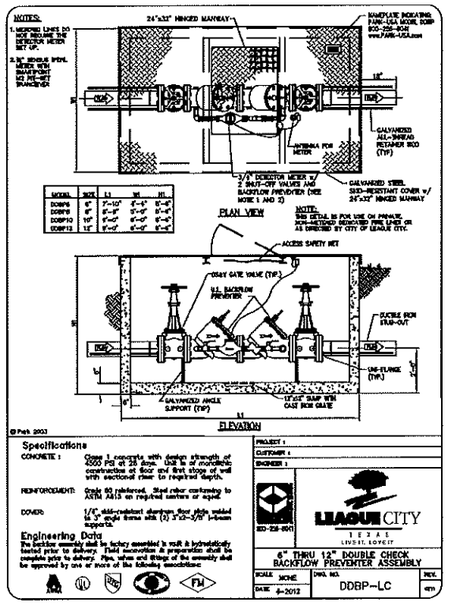

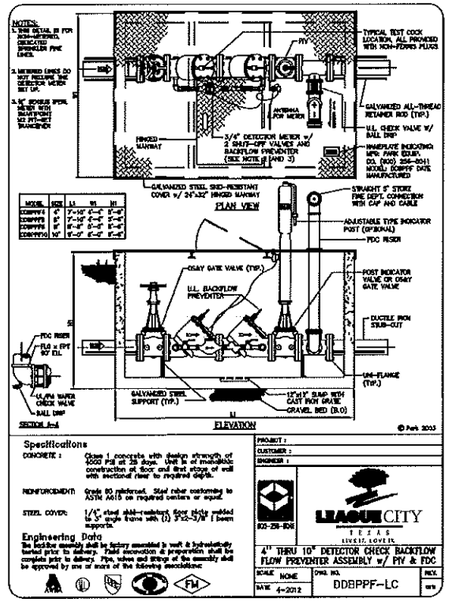

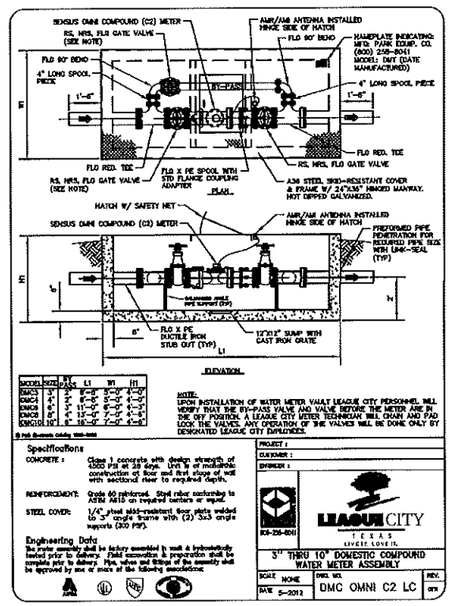

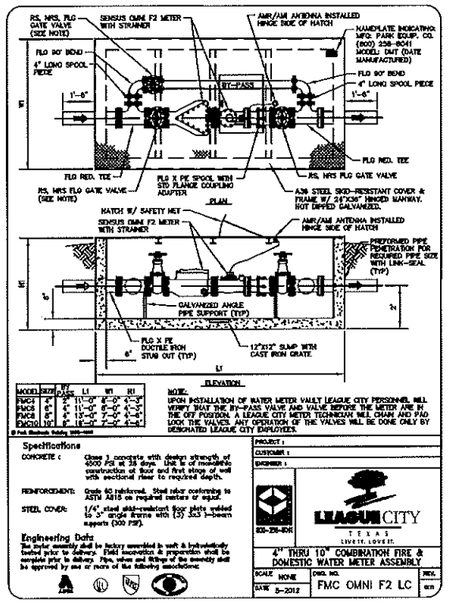

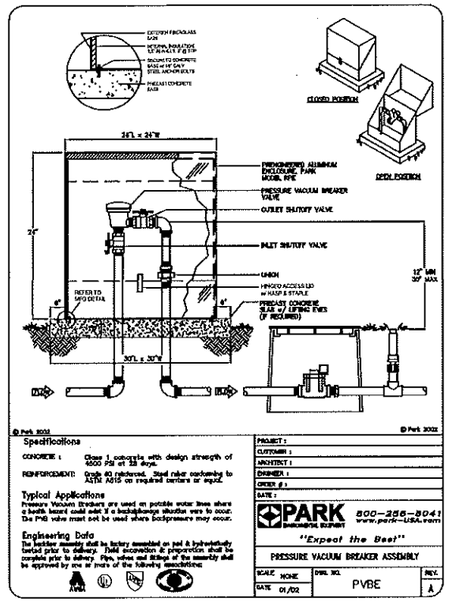

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GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

WATER DETAILS

SHEET 6 OF 7

W-06

Project No.	00000		
Drawn	ARN	Checked	XXX
Scale	NTS	Date	OCT 2011
Sheet	0	Of	00

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Texas Board of Professional Engineers Registration No. F-439
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DATE: 7/20/2017 DWN. BY: CCL
JOB NO. 05523-0005-00 DWG. NO. _____
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BELL ANDREA CHENG RANFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

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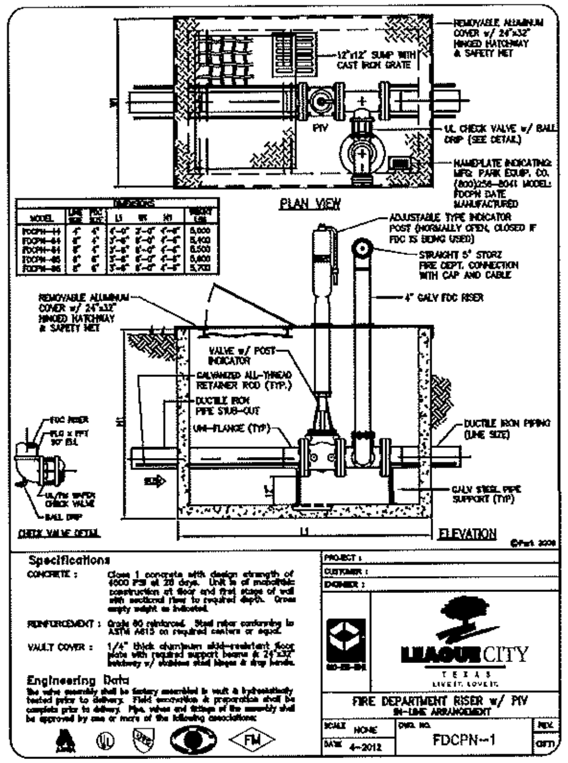
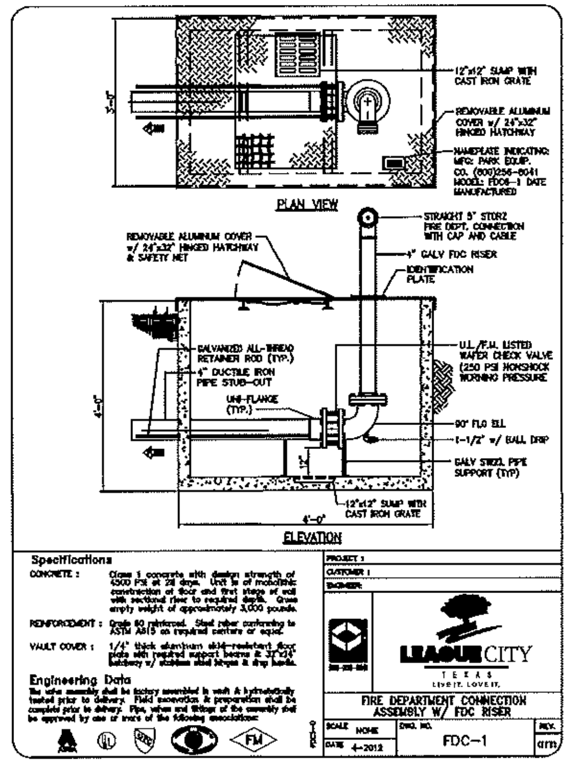
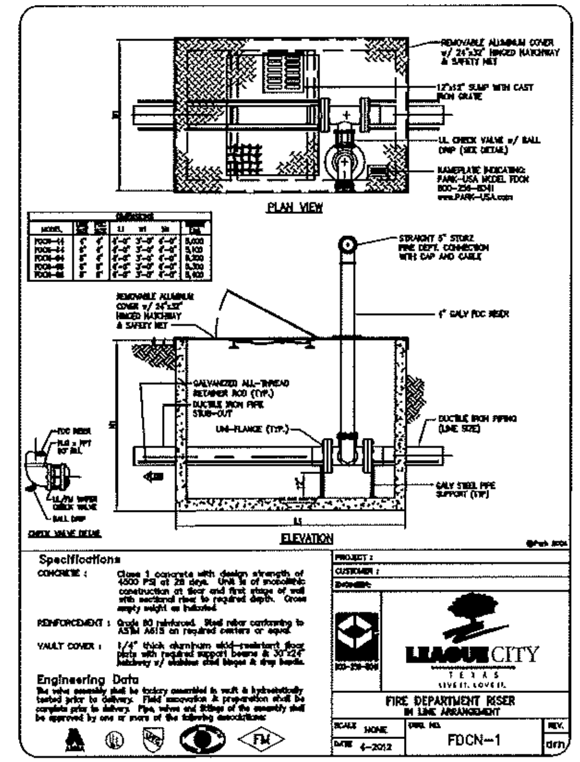
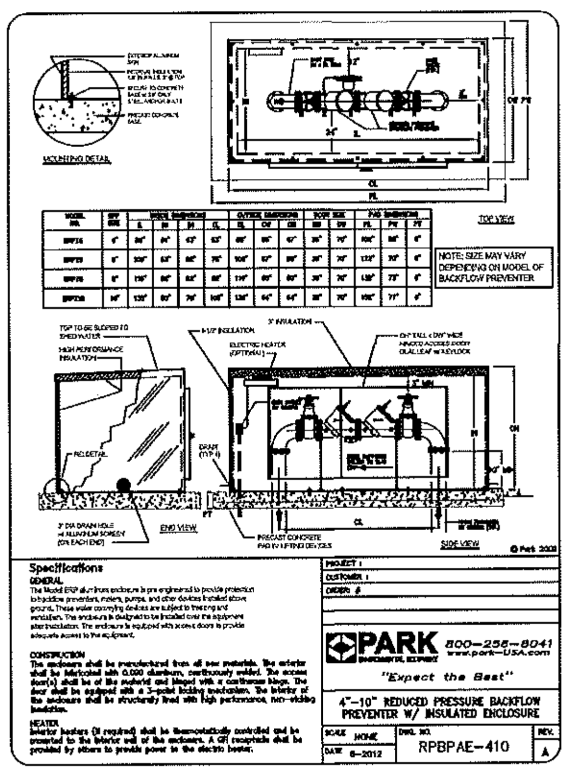
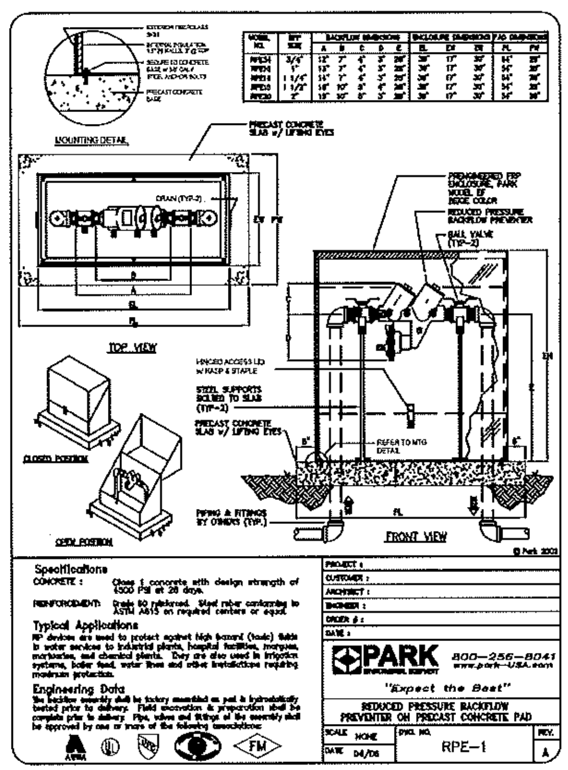
WATER DETAILS
SHEET 7 OF 7











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W-07

Project No.	00000		
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Scale	NTS	Date	OCT 2011
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NO.	DATE	REVISIONS	APP.

CITY OF LEAGUE CITY
GALVESTON COUNTY, TEXAS

NORTH KANSAS AVENUE RECONSTRUCTION

WATER DETAILS

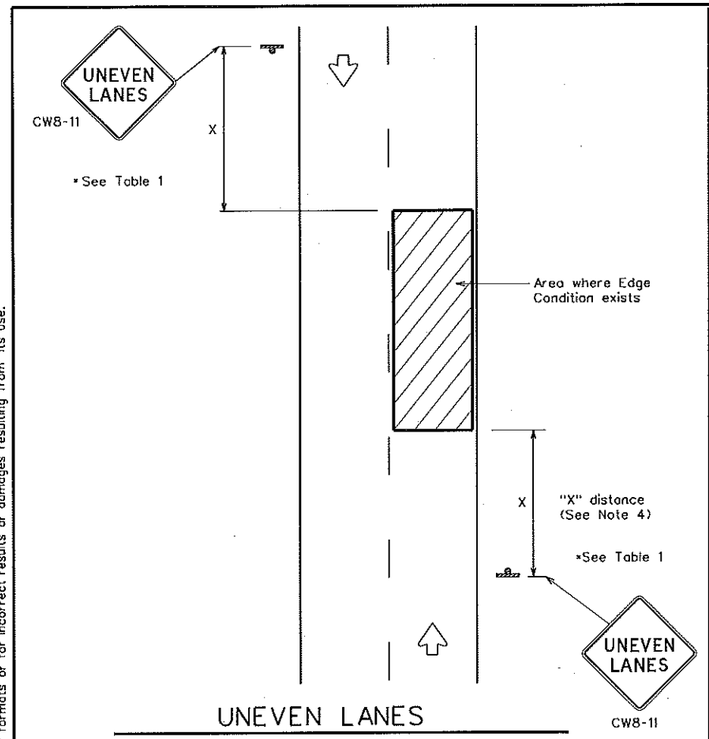
SHEET 7 OF 7

JONES | CARTER
Texas Board of Professional Engineers Registration No. F-439
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

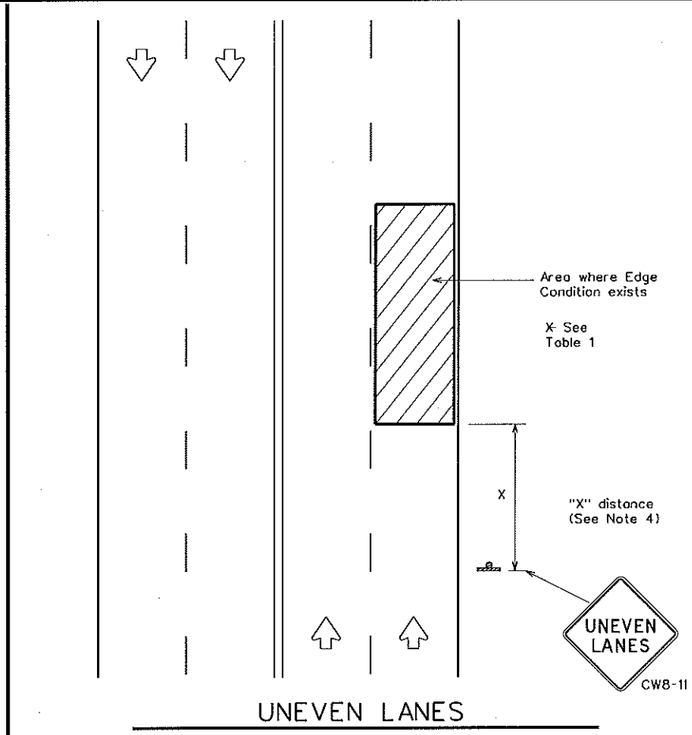
SCALE:
DGN. BY:
DATE: 7/20/2017
DWN. BY: CCL
JOB NO. 05523-0005-00
DWG. NO.
SUBMITTED:
SURV. BY:
F.B. NO.

STATE OF TEXAS
BELL ANDREA CHENG RANFT
86219
LICENSED PROFESSIONAL ENGINEER
7/20/17

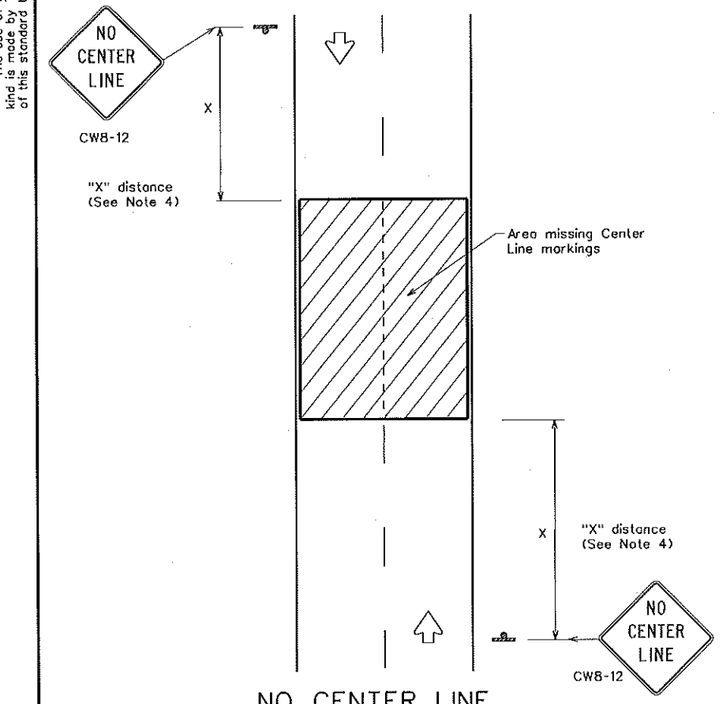
DATE:
FILE:



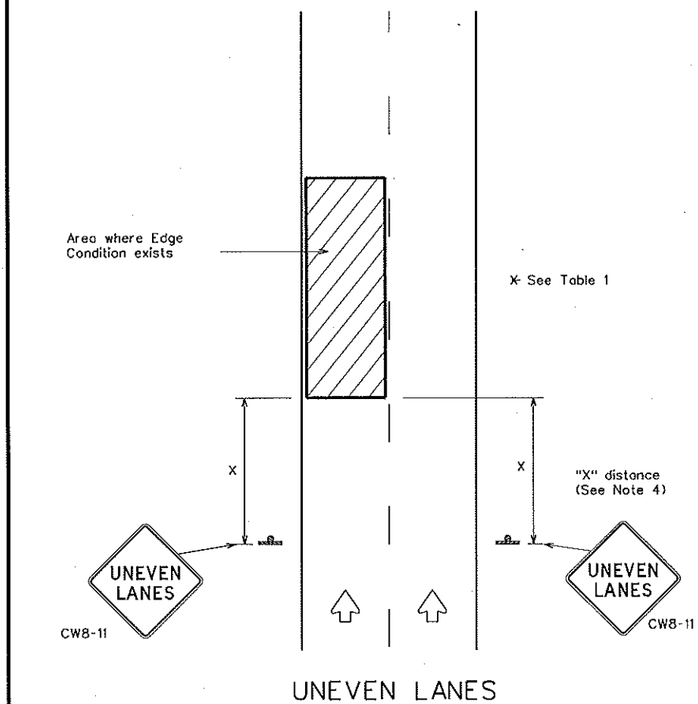
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

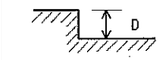
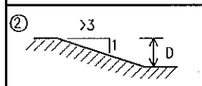
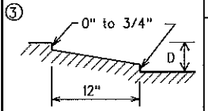
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL} SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

GENERAL NOTES

1. If spalling or holes occur, ROUGH ROAD (CW8-8) signs should be placed in advance of the condition and be repeated every two miles where the condition persists.
2. UNEVEN LANES (CW8-11) signs shall be installed in advance of the condition and repeated every mile. Signs installed along the uneven lane condition may be supplemented with the NEXT XX MILES (CW7-3aP) plaque or Advisory Speed (CW13-1P) plaque.
3. NO CENTER LINE (CW8-12) signs and temporary pavement markings as per the WZ(STPM) standard shall be installed if yellow centerlines separating two way traffic are obscured or obliterated. Repeat NO CENTER LINE signs every two miles where the center line markings are not in place. The signs and markings shall remain in place until permanent pavement markings are installed.
4. Signs shall be spaced at the distances recommended as per BC standards.
5. Additional signs may be required as directed by the Engineer. Signs shall remain in place until final surface is applied. Signs shall be considered subsidiary to Item 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING."
6. Signs shall be fabricated and mounted on supports as shown on the BC standards and/or listed on the "Compliant Work Zone Traffic Control Devices" list.
7. Short term markings shall not be used to simulate edge lines.
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition.

TABLE 1

Edge Condition	Edge Height (D)	* Warning Devices
① 	Less than or equal to: 1/4" (maximum-planing) 1/2" (typical-overlay)	Sign: CW8-11
	Distance "D" may be a maximum of 1 1/4 " for planing operations and 2" for overlay operations if uneven lanes with edge condition 1 are open to traffic after work operations cease.	
② 	Less than or equal to 3"	Sign: CW8-11
③  Notched Wedge Joint	Distance "D" may be a maximum of 3" if uneven lanes with edge condition 2 or 3 are open to traffic after work operations cease. Uneven lanes should not be open to traffic when "D" is greater than 3".	

TRAFFIC CONTROL DURING PLANING, OVERLAY AND LEVELING OPERATIONS ARE SHOWN ELSEWHERE IN THE PLANS.

MINIMUM WARNING SIGN SIZE	
Conventional roads	36" x 36"
Freeways/expressways, divided roadways	48" x 48"

Texas Department of Transportation

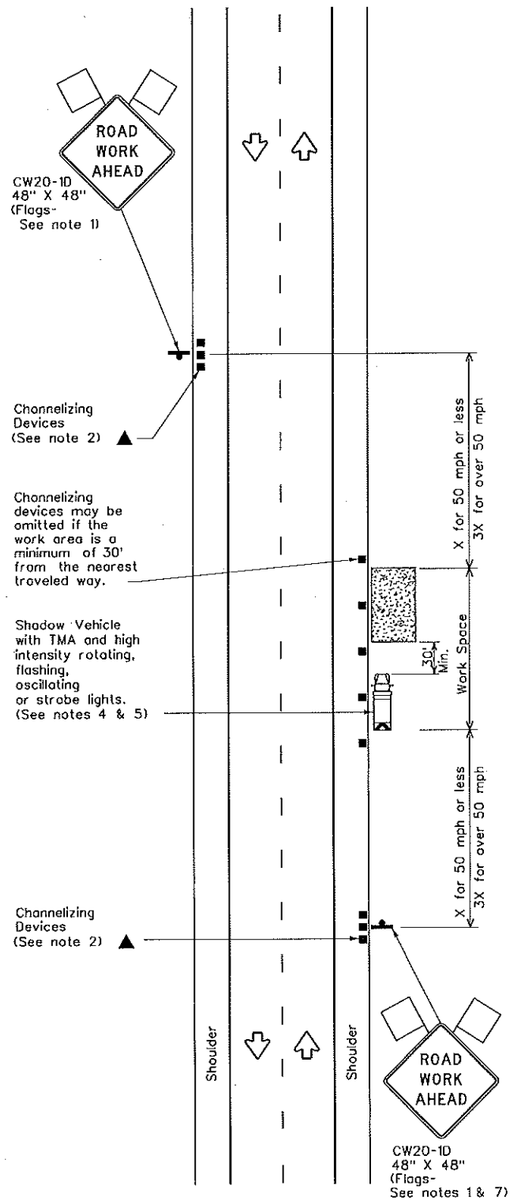
Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

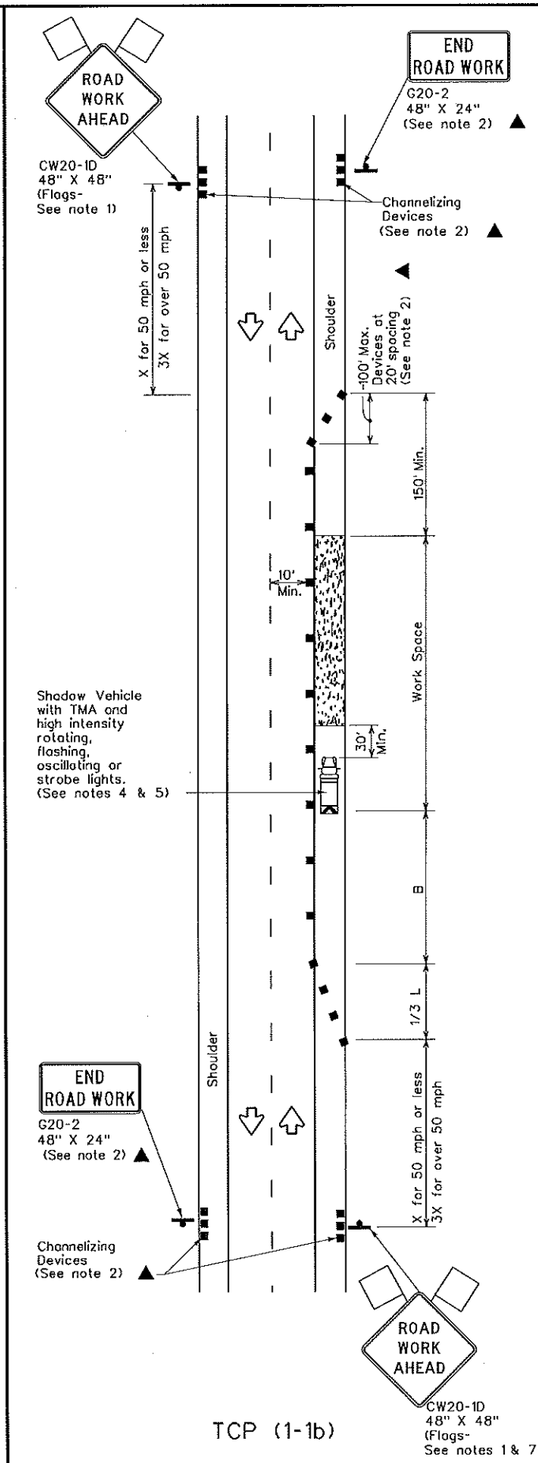
FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS				
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03				61

112



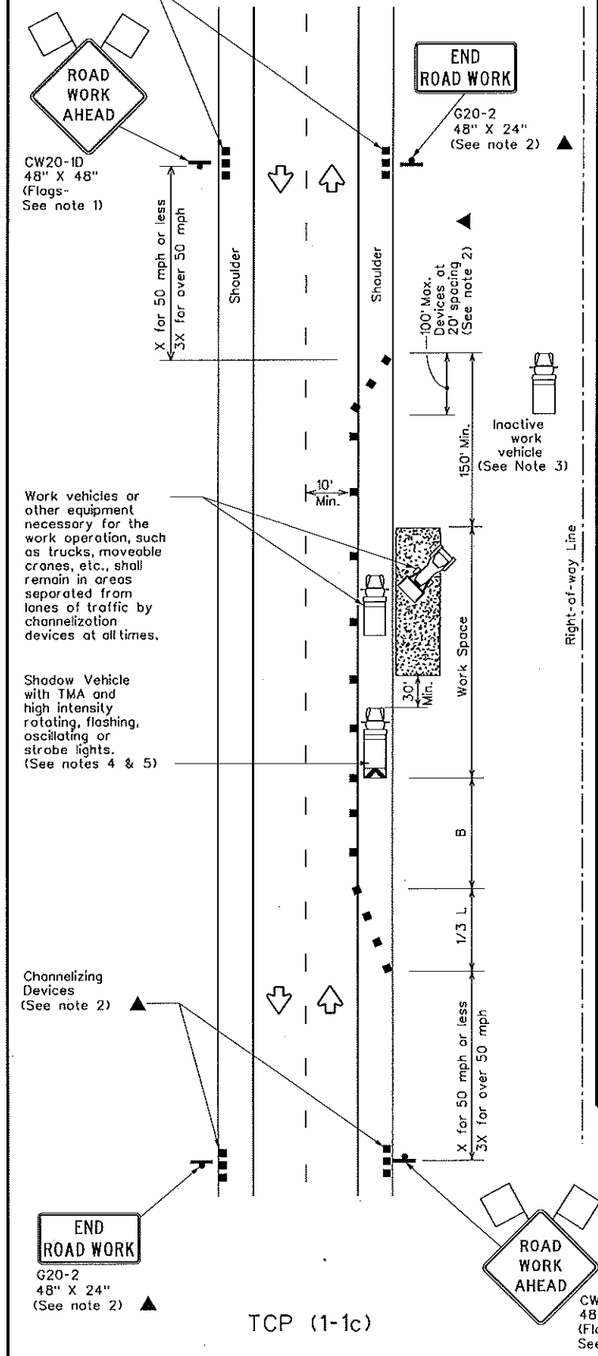
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
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 elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
4. 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 wider work spaces.
6. See TCP(5-1)for shoulder work on divided highways, expressways and freeways.
7. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "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(1-1)-12

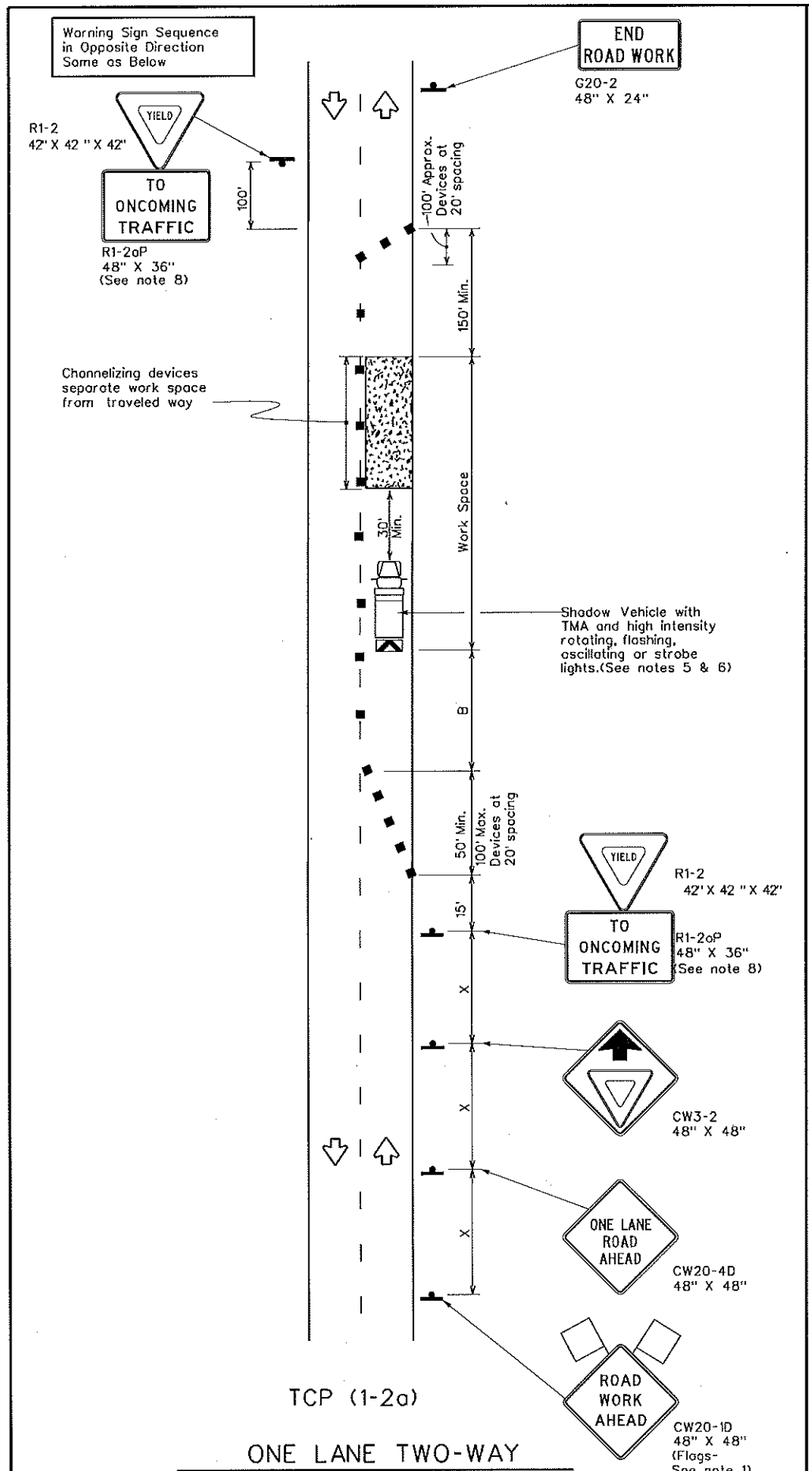
DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
CONT	SECT	JOB	HIGHWAY
DIST	COUNTY		SHEET NO.
			62

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

DATE:
FILE:

151

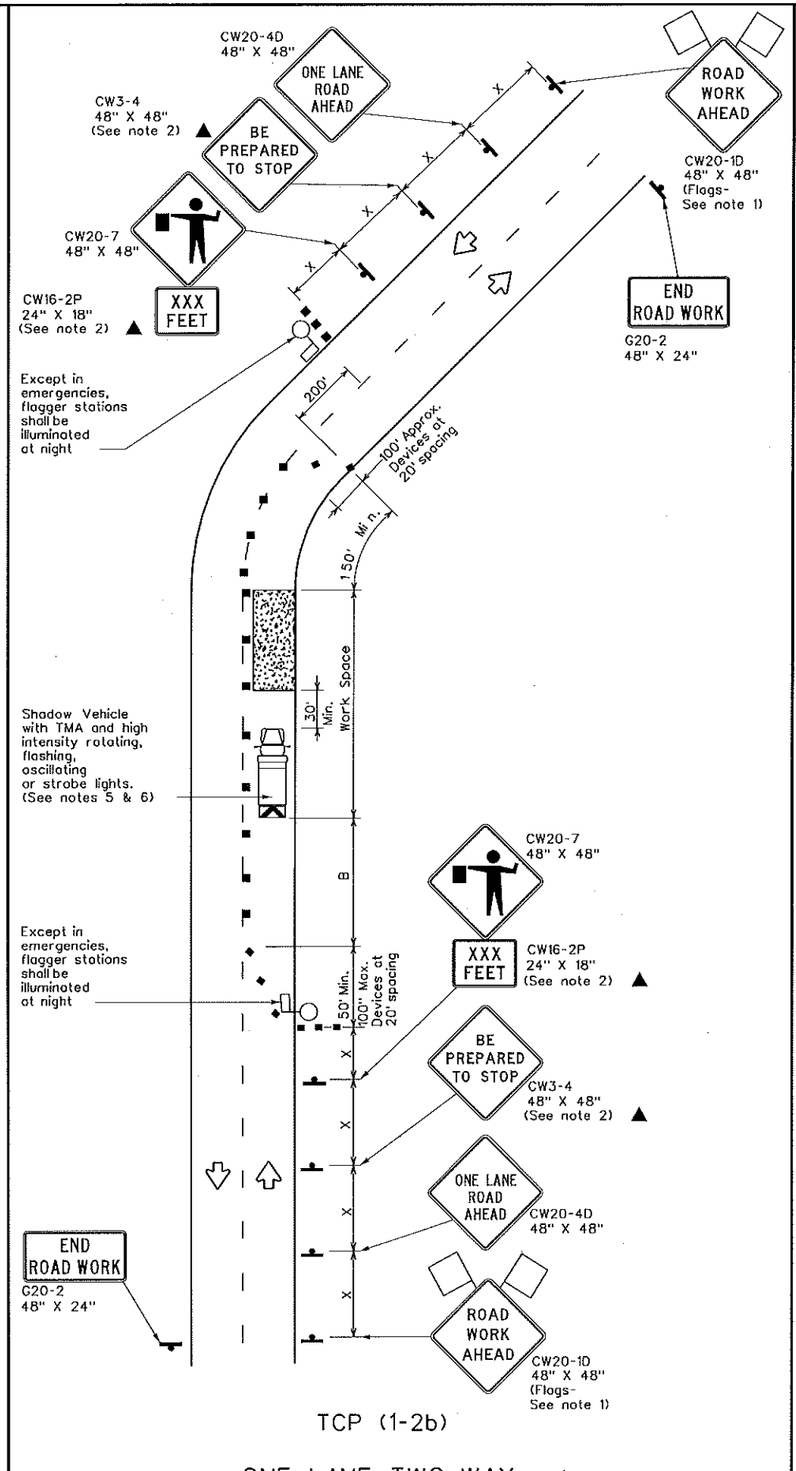
DATE:
FILE:



TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY CONTROL WITH FLAGGERS

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* 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 elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. 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.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

7. R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work spaces should be no longer than one half city block. In rural areas on roadways with less than 2000 ADT, work spaces should be no longer than 400 feet.
8. R1-2 "YIELD" sign with R1-2aP "TO ONCOMING TRAFFIC" plaque shall be placed on a support at a 7 foot minimum mounting height.

TCP (1-2b)

9. Flaggers should use two-way radios or other methods of communication to control traffic.
10. Length of work space should be based on the ability of flaggers to communicate.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

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.

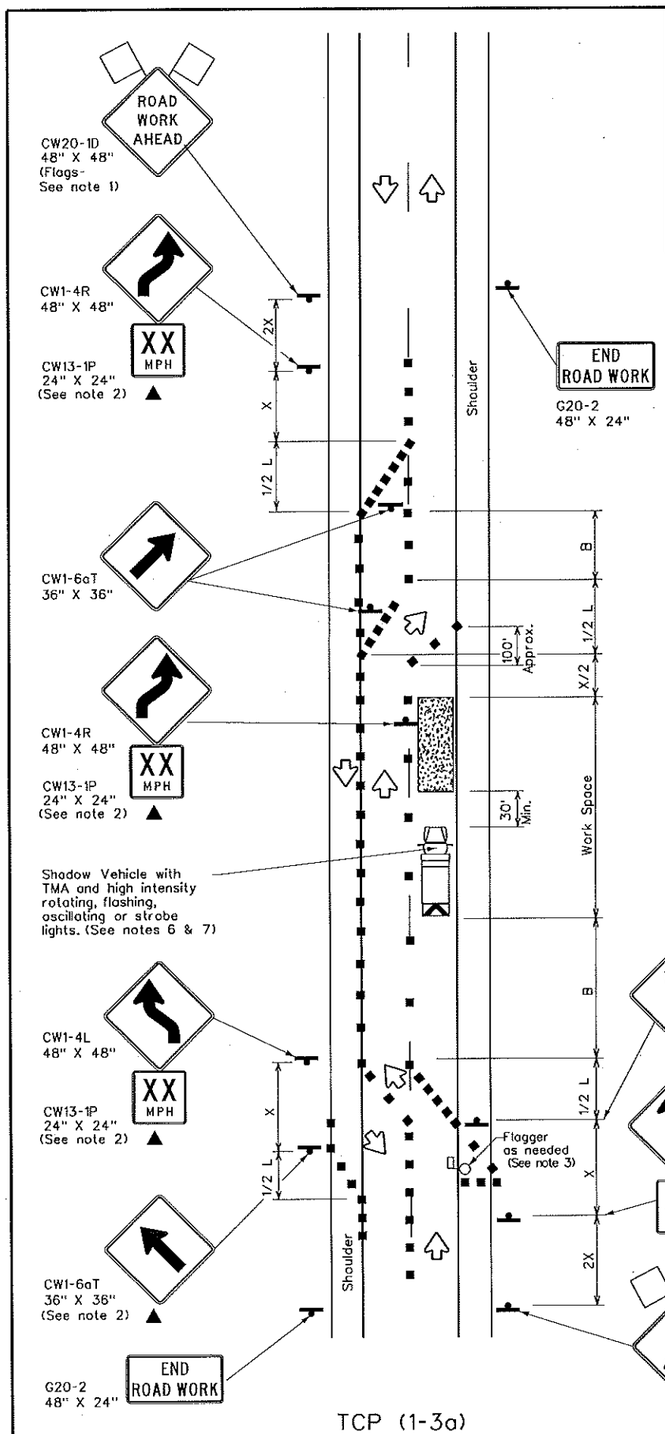
Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-12

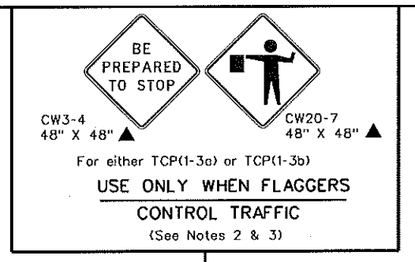
REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
4-90 2-12	CONT	SECT	JOB	HIGHWAY
2-94				
1-97	DIST	COUNTY		SHEET NO.
4-98				63

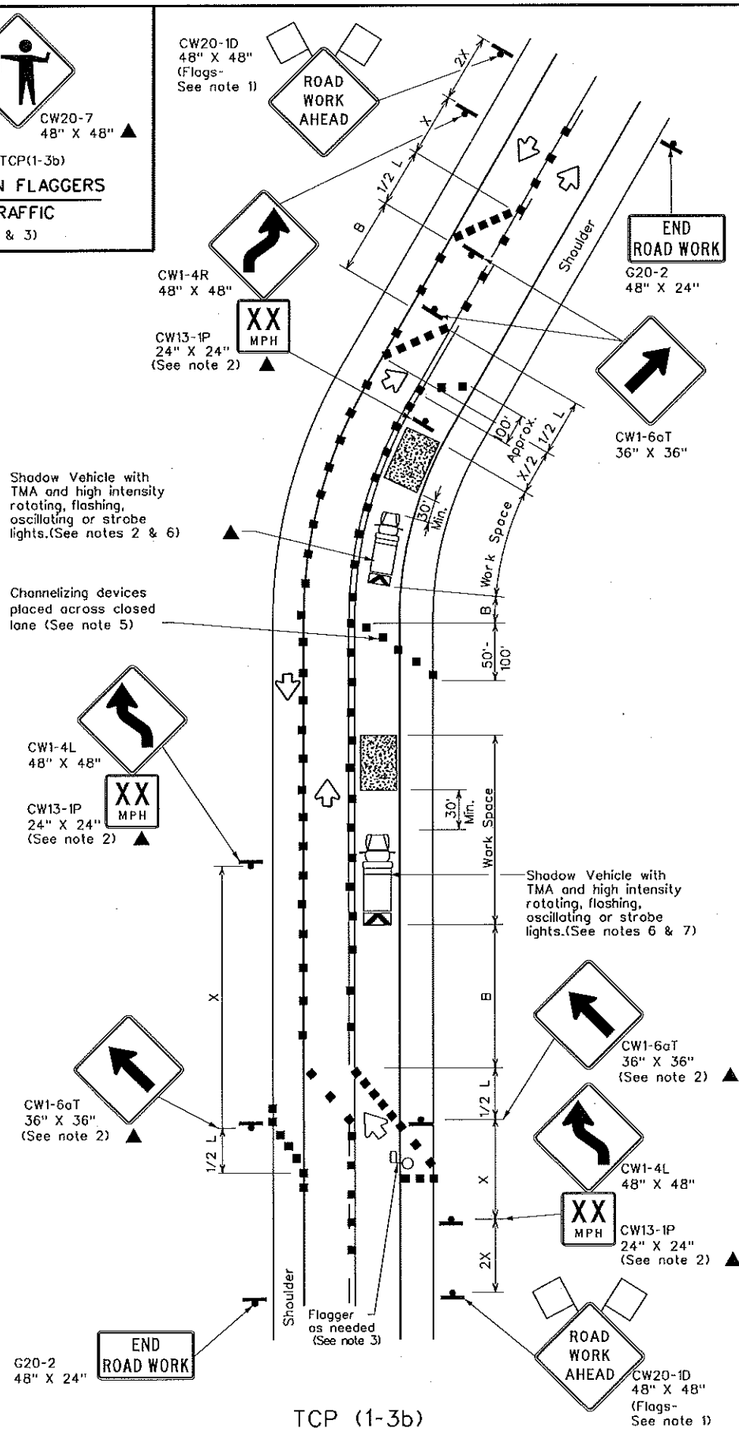
DATE:
FILE:



TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW





TCP (1-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
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 elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
4. DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
5. When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.
6. 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.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
8. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20', or 15' if posted speed are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the area of conflicting markings not the entire work zone.

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
TRAFFIC SHIFTS ON TWO LANE ROADS

TCP(1-3)-12

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
2-94 2-12	CONT	SECT	JOB	HIGHWAY
8-95				
1-97	DIST	COUNTY		SHEET NO.
4-98				64

153

DATE:
FILE:

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

2. The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.

3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.

4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.

5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.

8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.

10. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.

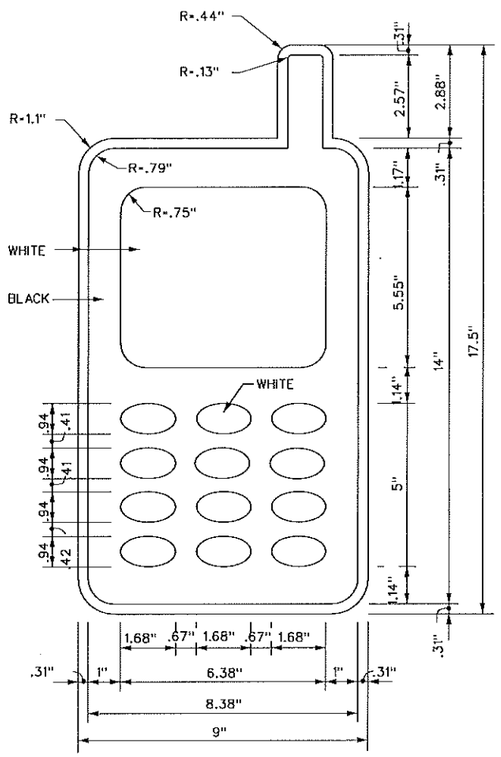
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

12. The Engineer has the final decision on the location of all traffic control devices.

13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY APPAREL NOTES:

1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.



3.0" Radius, 1.25" Border, 0.75" Indent, Black on Yellow:
[STAY ALERT] Font: D
3.0" Radius, 1.25" Border, 0.75" Indent, Black on Orange:
[TALK OR TEXT LATER] Font: C specified length:

SIGN DETAIL (G20-10T)

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation
Traffic Operations Division - TE
Phone (512) 416-3118

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				
4-03 5-10 8-14	DIST	COUNTY		SHEET NO.
9-07 7-13				65

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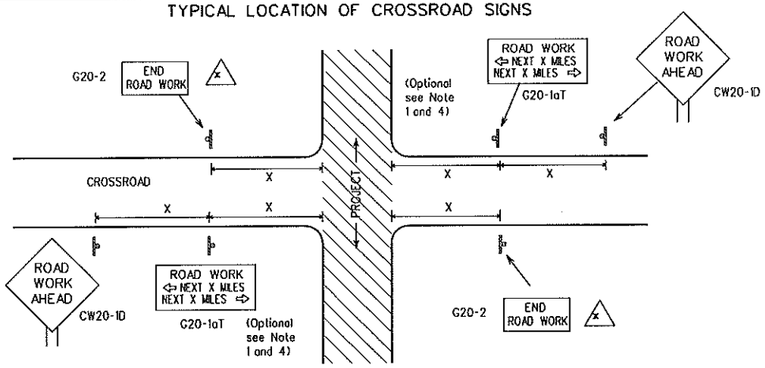
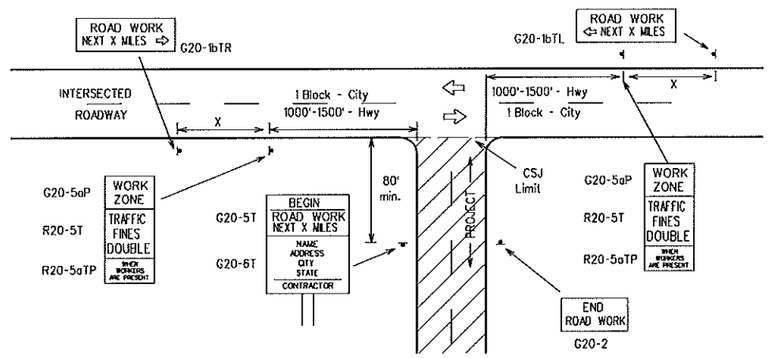
TYPICAL LOCATION OF CROSSROAD SIGNS



(x) May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of Engineer. (See note 2 below)

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume. This information shall be shown in the plans.
3. Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
4. The "ROAD WORK NEXT X MILES"(G20-1aT)sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
2. If construction closes the road at a T-intersection the Contractor shall place the "CONTRACTOR NAME"(G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING [1,5,6]

SIZE

Sign Number or Series	Conventional Road	Expressway/ Freeway
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"

SPACING

Posted Speed	Sign Spacing "X" Δ
MPH	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500 [2]
60	600 [2]
65	700 [2]
70	800 [2]
75	900 [2]
80	1000 [2]
*	* [3]

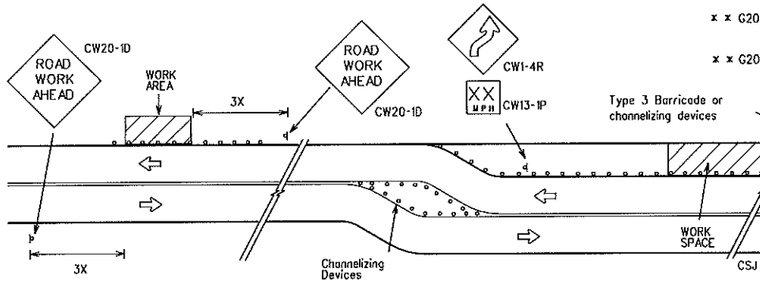
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

Δ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

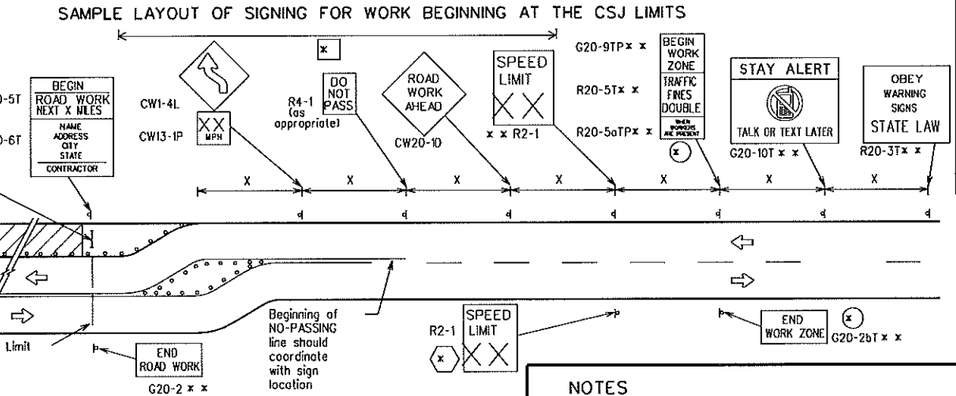
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

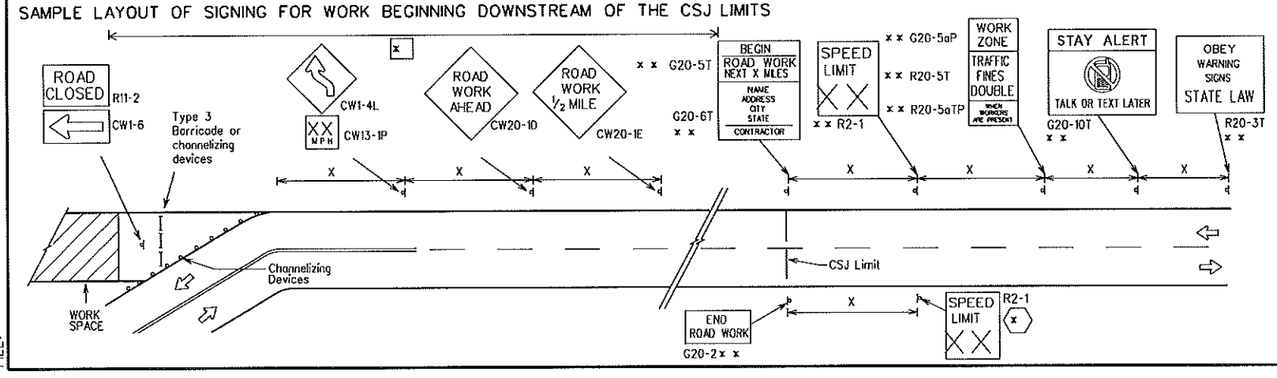


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizing devices.

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS



NOTES

The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES"(G20-5T)sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.

(x) The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.

x x Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.

[x] Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic Control Plan.

(x) Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND	
⊢⊣	Type 3 Barricade
○○○	Channelizing Devices
▬	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

SHEET 2 OF 12

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13				66

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DATE:
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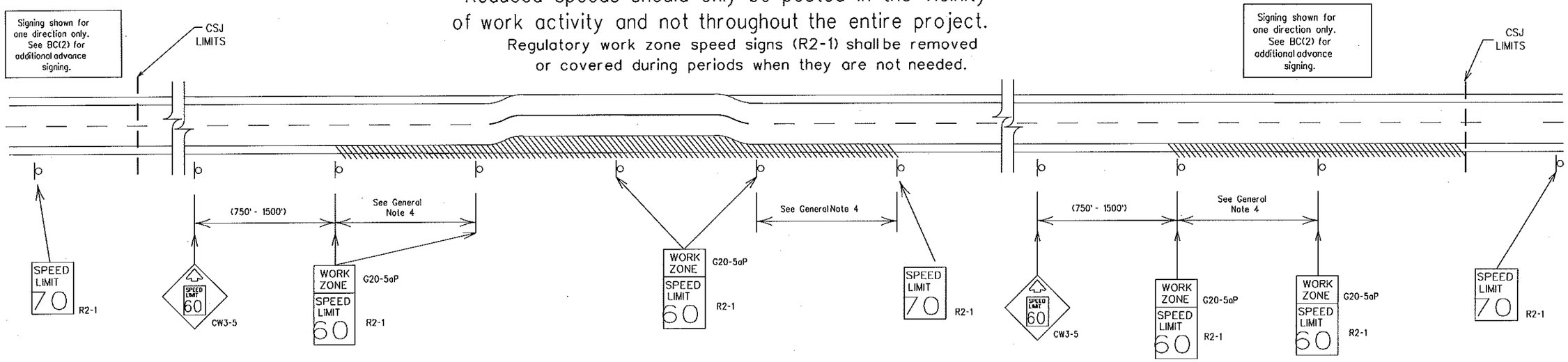
DATE:
FILE:

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the travelled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered.
(See Removing or Covering on BC(4)).

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater 0.2 to 2 miles
   35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the "ADVANCE SPEED LIMIT" (CW3-5) sign, "WORK ZONE" (G20-5aP) plaque and the "SPEED LIMIT" (R2-1) signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form •1204 in the TxDOT e-form system.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	DIST	COUNTY		SHEET NO. 67

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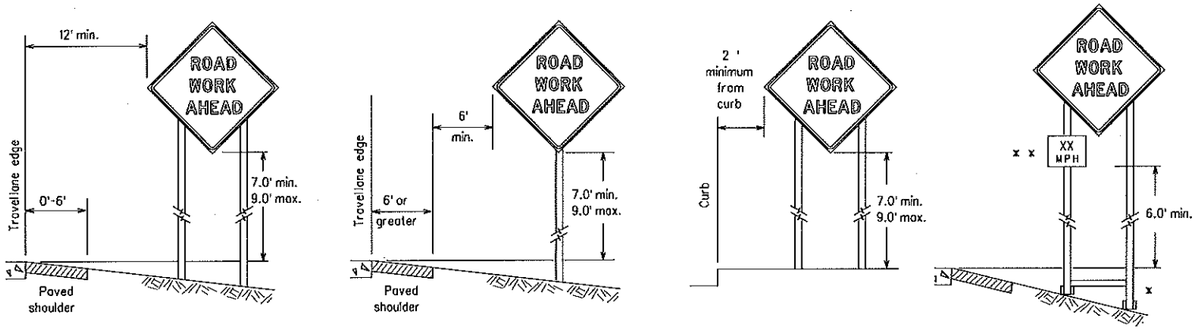
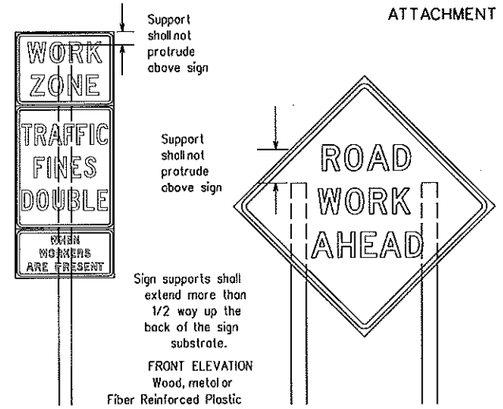
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



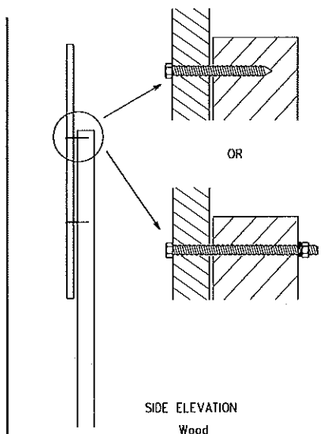
x When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

x x When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travellane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS



Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the spice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

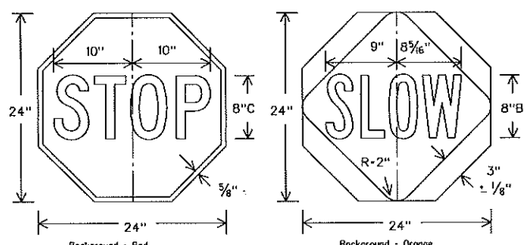


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24" as detailed below.
2. When used at night, the STOP/SLOW paddle shall be retroreflectorized.
3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
4. Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
6. Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD). The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)

1. The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
   a. Long-term stationary - work that occupies a location more than 3 days.
   b. Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
   c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
   d. Short, duration - work that occupies a location up to 1 hour.
   e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

1. The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
2. The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
5. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

SIZE OF SIGNS

1. The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

SIGN SUBSTRATES

1. The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
3. All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type B or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
4. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
7. Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

1. Flags may be used to draw attention to warning signs. When used the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

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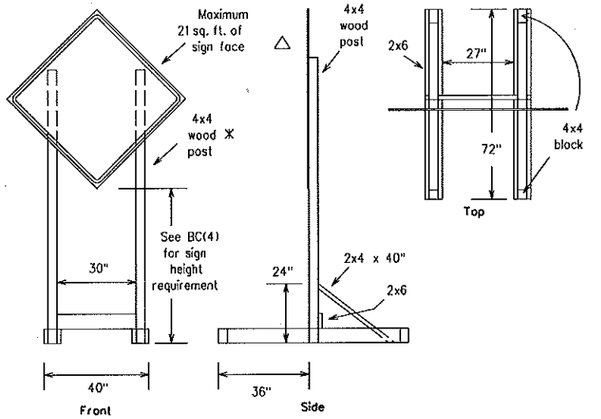
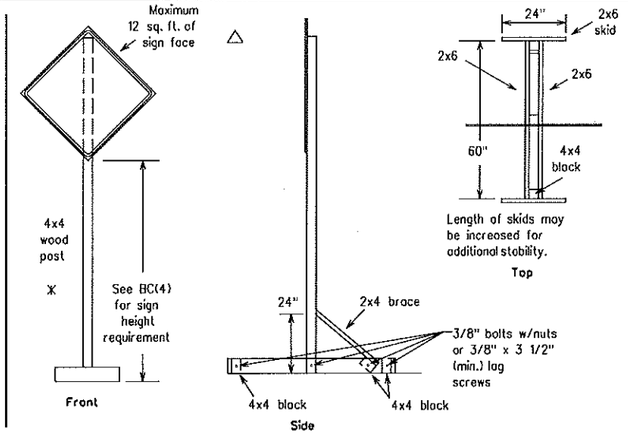
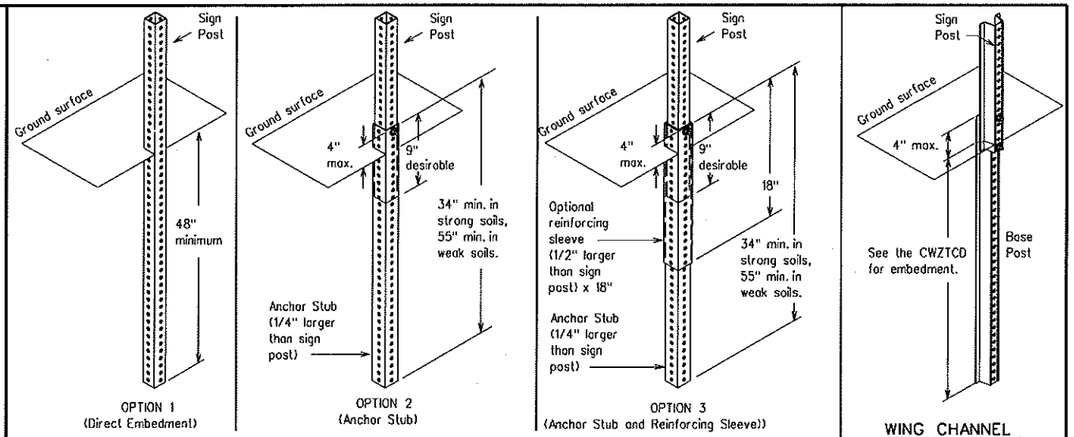




SKID MOUNTED WOOD SIGN SUPPORTS

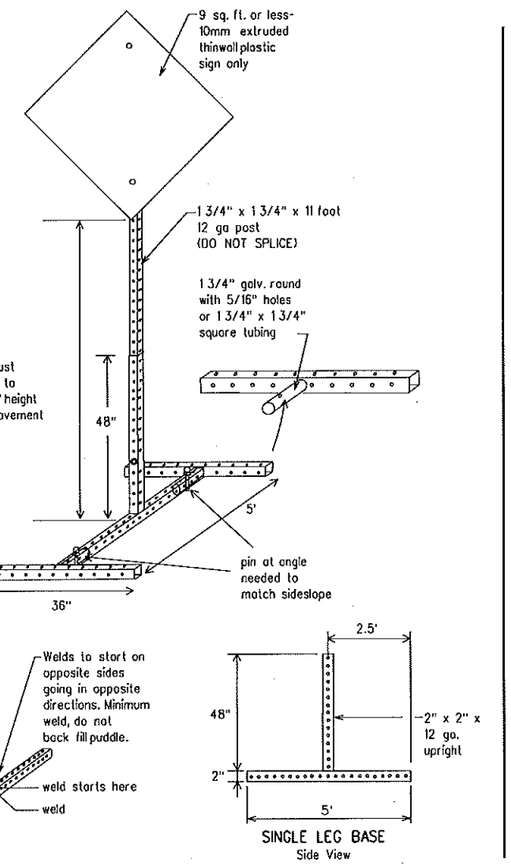
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □

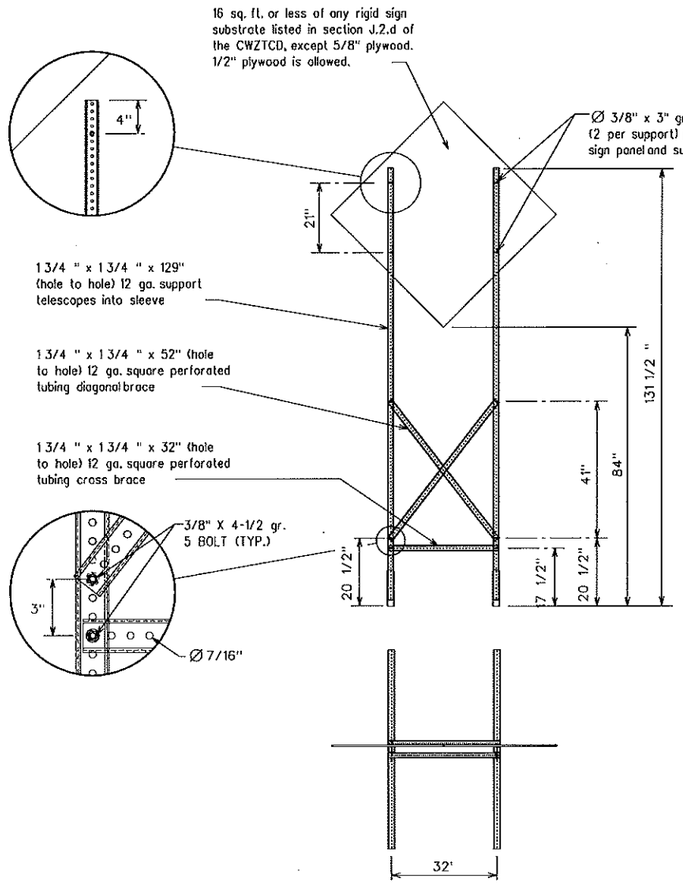


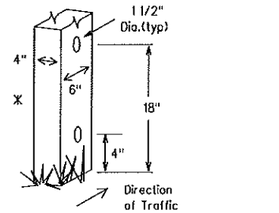
PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.
The maximum sign square footage shall adhere to the manufacturer's recommendation.
Two post installations can be used for larger signs.

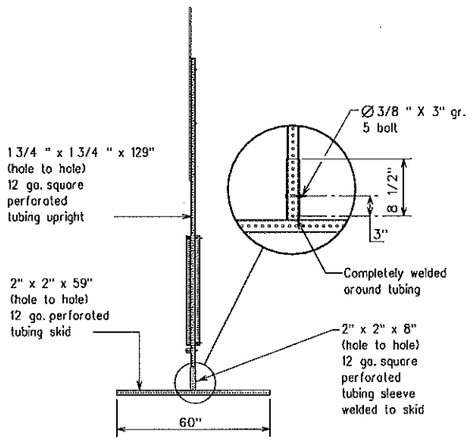






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

WEDGE ANCHORS

Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

OTHER DESIGNS

MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

GENERAL NOTES

1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

□ See BC(4) for definition of "Work Duration."

* Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.

△ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
2. Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
4. Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
6. When in use the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
8. The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
11. Do not use the word "Danger" in message.
12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
15. PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
16. Each line of text should be centered on the message board rather than left or right justified.
17. If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

Roadway designation • IH-number, US-number, SH-number, FM-number

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT
RIGHT X LANES CLOSED	RIGHT X LANES OPEN
CENTER LANE CLOSED	DAYTIME LANE CLOSURES
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE
EXIT CLOSED	RIGHT LN TO BE CLOSED
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI
XXXXXXXX BLVD CLOSED	

Other Condition List

ROADWORK XXX FT	ROAD REPAIRS XXXX FT
FLAGGER XXXX FT	LANE NARROWS XXXX FT
RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
DETOUR X MILE	ROUGH ROAD XXXX FT
ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
BUMP XXXX FT	US XXX EXIT X MILES
TRAFFIC SIGNAL XXXX FT	LANES SHIFT x

x LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

MERGE RIGHT	FORM X LINES RIGHT
DETOUR NEXT X EXITS	USE XXXXX RD EXIT
USE EXIT XXX	USE EXIT I-XX NORTH
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N
TRUCKS USE US XXX N	WATCH FOR TRUCKS
WATCH FOR TRUCKS	EXPECT DELAYS
EXPECT DELAYS	PREPARE TO STOP
REDUCE SPEED XXX FT	END SHOULDER USE
USE OTHER ROUTES	WATCH FOR WORKERS
STAY IN LANE x	

Location List

AT FM XXXX
BEFORE RAILROAD CROSSING
NEXT X MILES
PAST US XXX EXIT
XXXXXXX TO XXXXXXX
US XXX TO FM XXXX

Warning List

SPEED LIMIT XX MPH
MAXIMUM SPEED XX MPH
MINIMUM SPEED XX MPH
ADVISORY SPEED XX MPH
RIGHT LANE EXIT
USE CAUTION
DRIVE SAFELY
DRIVE WITH CARE

** Advance Notice List

TUE-FRI XX AM- X PM
APR XX-XX X PM-X AM
BEGINS MONDAY
BEGINS MAY XX
MAY X-X XX PM - XX AM
NEXT FRI-SUN
XX AM TO XX PM
NEXT TUE AUG XX
TONIGHT XX PM- XX AM

x x See Application Guidelines Note 6.

APPLICATION GUIDELINES

1. Only 1 or 2 phases are to be used on a PCMS.
2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AHEAD may be used instead of distances if necessary.
7. FT and MI, MILE and MILES interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
2. When symbol signs, such as the "Flagger Symbol"(CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

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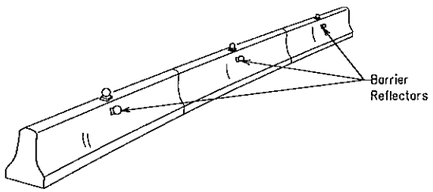
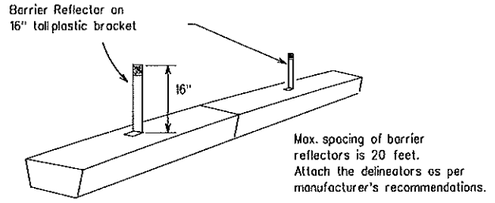
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.

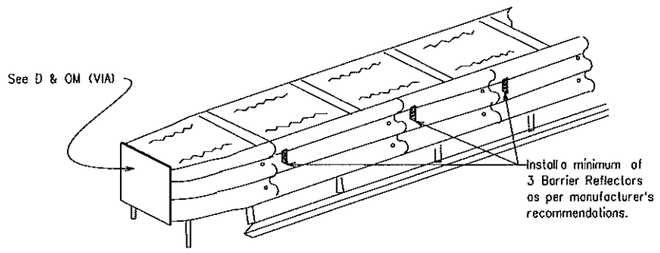


CONCRETE TRAFFIC BARRIER (CTB)

3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
4. Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional) while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
11. Single slope barriers shall be delineated as shown on the above detail.



LOW PROFILE CONCRETE BARRIER (LPCB)

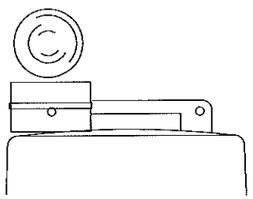


DELINEATION OF END TREATMENTS

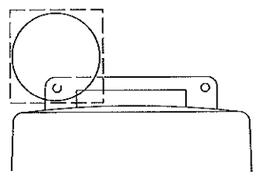
END TREATMENTS FOR
CTB'S USED
IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



Type C Warning Light or approved substitute mounted on a drum adjacent to the travelway.



Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

WARNING LIGHTS

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B or C Sheeting, meeting the requirements of Departmental Material Specification DMS-8300.
4. Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
7. When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

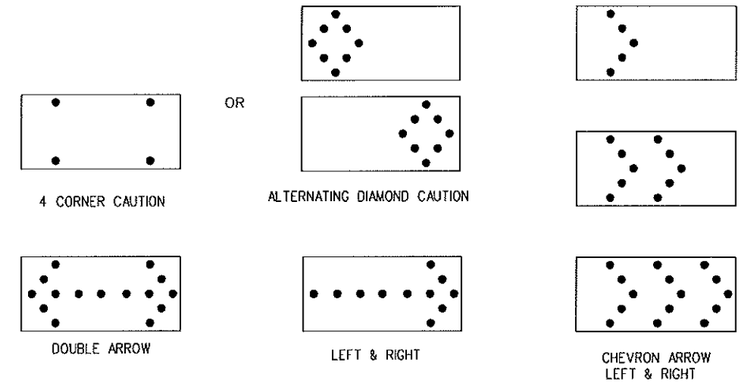
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
4. Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travellane on detours, on lane changes, on lane closures, and on other similar conditions.
5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
7. The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS

1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the CWZTCD.
3. The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
5. Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
6. The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

1. The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travellanes.
2. Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
3. The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
4. The Flashing Arrow Board should be able to display the following symbols:



5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
6. The straight line caution display is NOT ALLOWED.
7. The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
8. Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
9. The sequential arrow display is NOT ALLOWED.
10. The flashing arrow display is the TxDOT standard: however, the sequential Chevron display may be used during daylight operations.
11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

REQUIREMENTS			
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

ATTENTION
Flashing Arrow Boards shall be equipped with automatic dimming devices.

WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL.

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation

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BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR

BC(7)-14

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GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
4. Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
6. The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

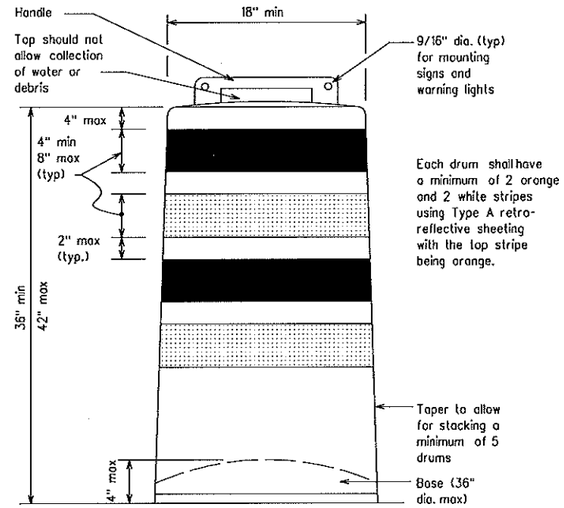
1. Plastic drums shall be a two-piece design: the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
9. Drum body shall have a maximum unballasted weight of 11 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

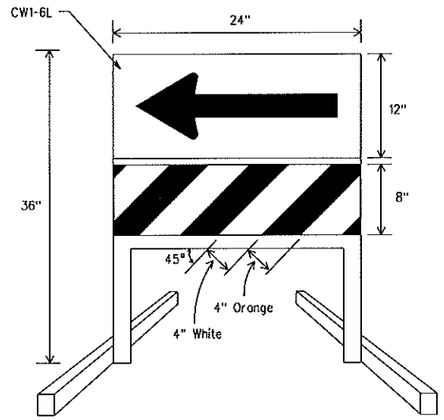
RETROREFLECTIVE SHEETING

1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

BALLAST

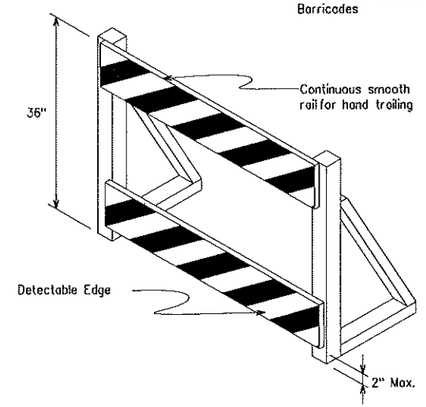
1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
2. Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
5. When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.





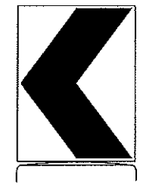
DIRECTION INDICATOR BARRICADE

1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3. The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B or Type C Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
4. Double arrows on the Direction Indicator Barricade will not be allowed.
5. Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.

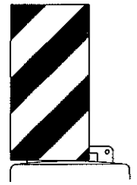


DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" and should not be used as a control for pedestrian movements.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades may use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



18" x 24" Sign
(Maximum Sign Dimension)
Chevron CW1-8, Opposing Traffic Lane Divider, Driveway sign D70a, Keep Right R4 series or other signs as approved by Engineer



12" x 24"
Vertical Panel
mount with diagonals sloping down towards travel way

Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B or Type C Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
8. R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

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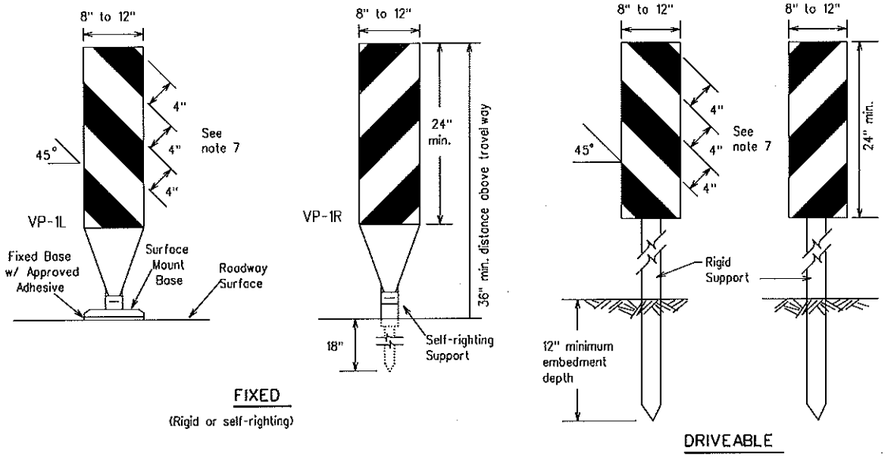
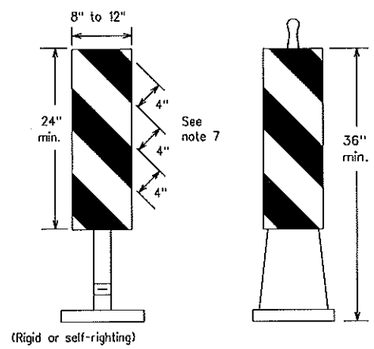


FIXED
(Rigid or self-righting)

DRIVEABLE

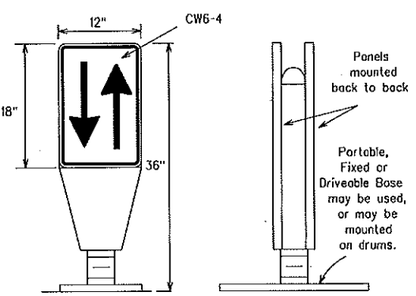


(Rigid or self-righting)

PORTABLE

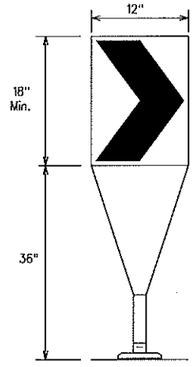
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of VP's for drop-offs.
3. VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
6. Sheeting for the VP's shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

VERTICAL PANELS (VPs)



1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
2. The OTLD may be used in combination with 42" cones or VPs.
3. Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
4. The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B or Type C conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



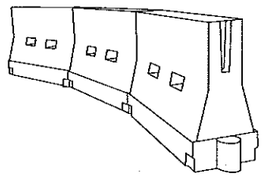
Fixed Base w/ Approved Adhesive
(Driveable Base, or Flexible Support can be used)

1. The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
2. Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
3. Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
4. To be effective, the chevron should be visible for at least 500 feet.
5. Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B or Type C conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
6. For Long Term Stationary use on tapers or transitions on freeways and divided highways self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

CHEVRONS

GENERAL NOTES

1. Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
3. Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
4. The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
5. Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
6. Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
7. The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10) placed near the top of the LCD along the full length of the device.

WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS

Posted Speed x	Formula	Minimum Desirable Taper Lengths x x 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45	L=WS	450'	495'	540'	45'	90'
50		500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60		600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70		700'	770'	840'	70'	140'
75		750'	825'	900'	75'	150'
80		800'	880'	960'	80'	160'

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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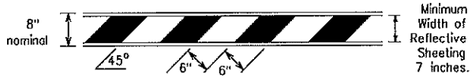
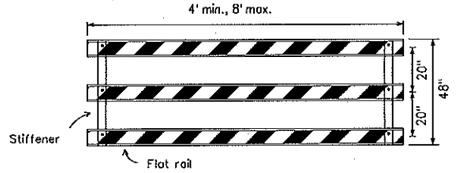
TYPE 3 BARRICADES

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road striping should slope downward in both directions toward the center of roadway.
4. Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
7. Warning lights shall NOT be installed on barricades.
8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
9. Sheeting for barricades shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



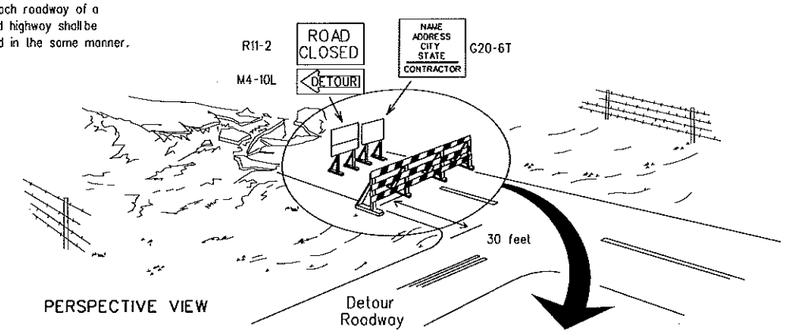
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

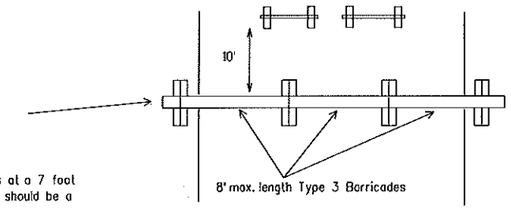
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

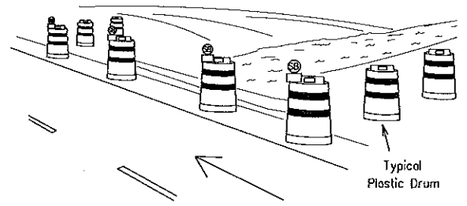
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

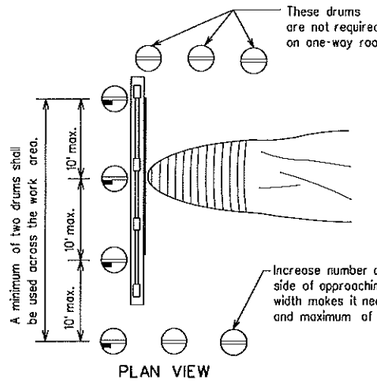
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

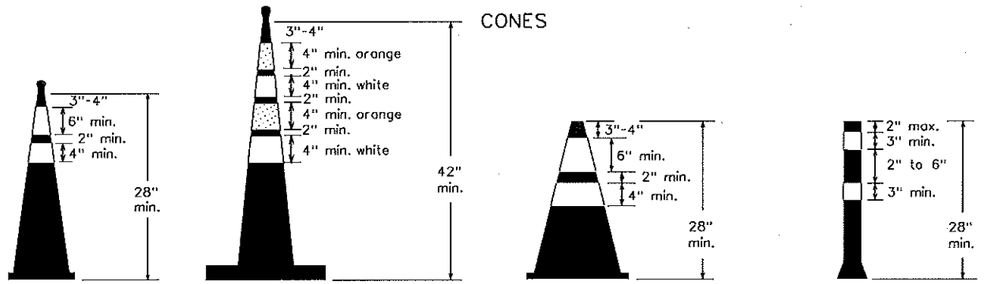
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.



PLAN VIEW

LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

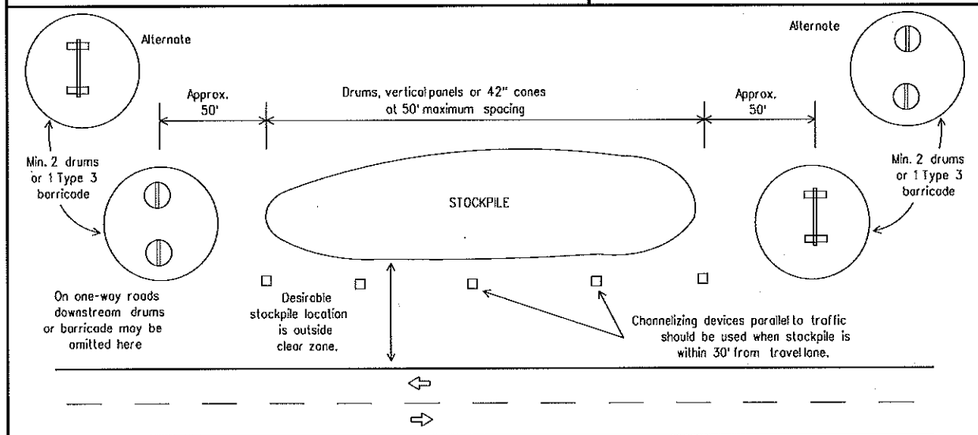


Two-Piece cones | One-Piece cones | Tubular Marker

28" Cones shall have a minimum weight of 9 1/2 lbs.

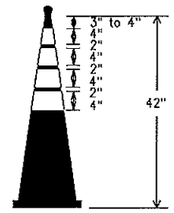
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers used at night shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



EDGELINE CHANNELIZER

1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

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WORK ZONE PAVEMENT MARKINGS

GENERAL

1. The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(12).
2. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

1. Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
2. Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

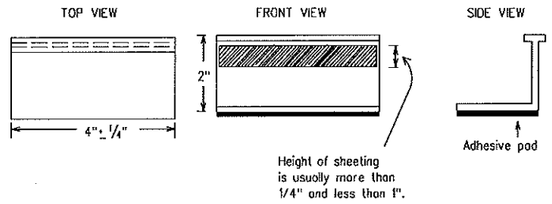
MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
4. Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

1. Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
2. The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
3. Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
   A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
   B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
3. Small design variances may be noted between tab manufacturers.
4. See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
YELLOW - (two amber reflective surfaces with yellow body).
WHITE - (one silver reflective surface with white body).

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

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BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

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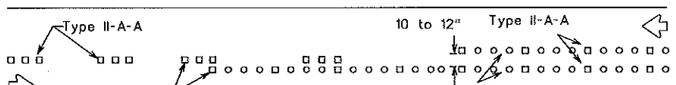
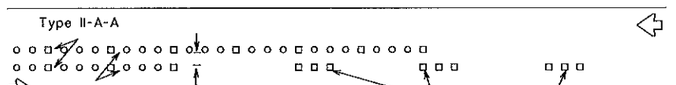
PAVEMENT MARKING PATTERNS

REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A

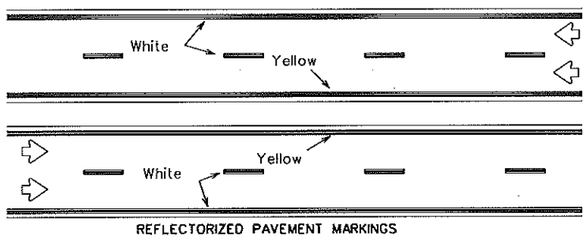
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



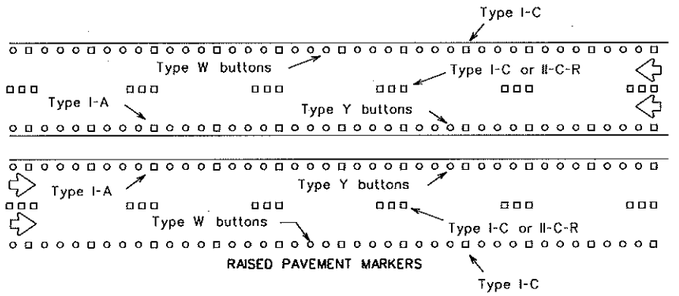
RAISED PAVEMENT MARKERS - PATTERN B

Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer. Prefabricated markings may be substituted for reflectorized pavement markings.

CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



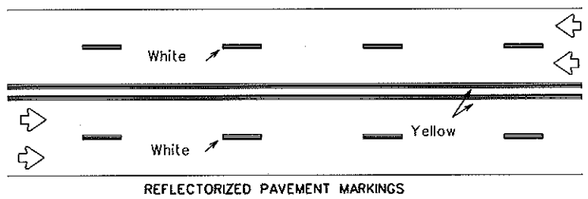
REFLECTORIZED PAVEMENT MARKINGS



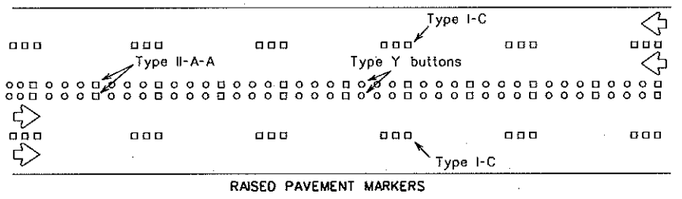
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



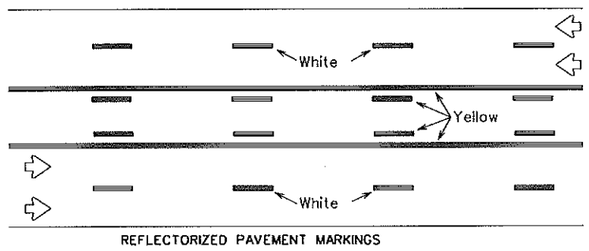
REFLECTORIZED PAVEMENT MARKINGS



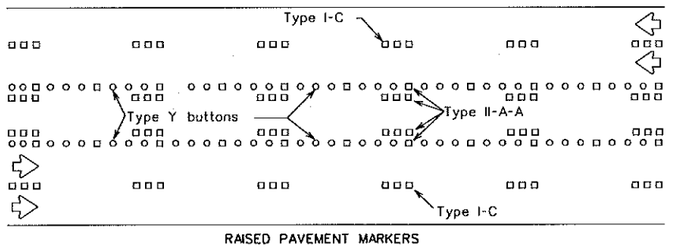
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

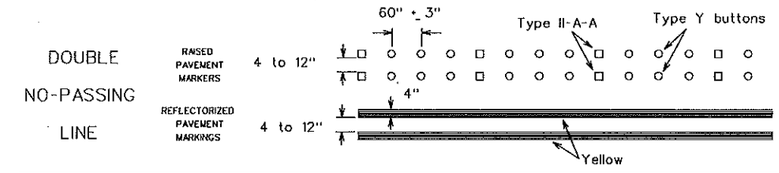
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

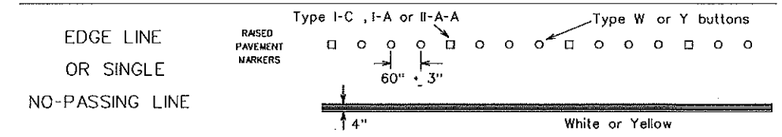
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

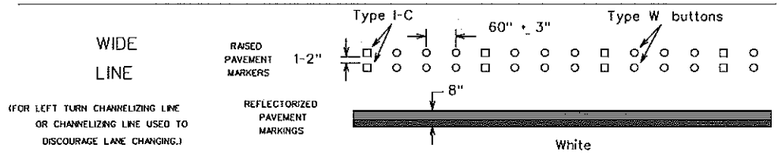


EDGE LINE OR SINGLE NO-PASSING LINE



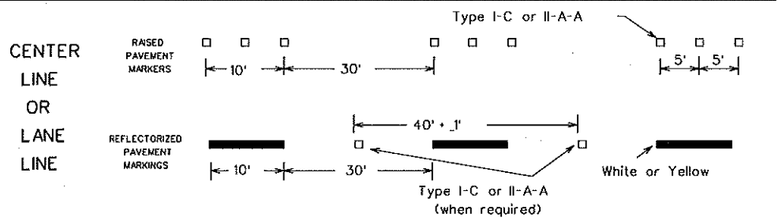
WIDE LINE

(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

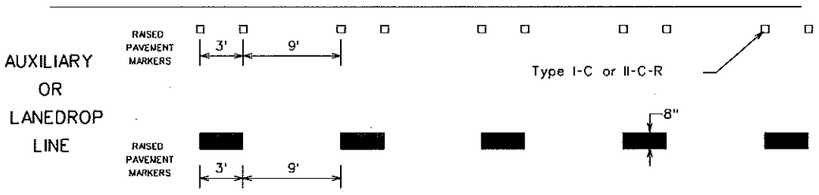


BROKEN LINES

CENTER LINE OR LANE LINE

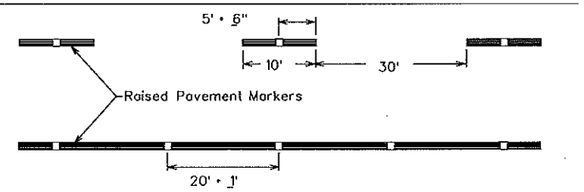


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

If raised pavement markers are used to supplement REMOVABLE markings, the markers shallbe applied to the top of the tape at the approximate mid length of tape used for broken lines or at 20 foot spacing for solid lines. This allows on easier removal of raised pavement markers and tape.



Centerline only - not to be used on edge lines

Raised pavement markers used as standard pavement markings shallbe from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

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Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

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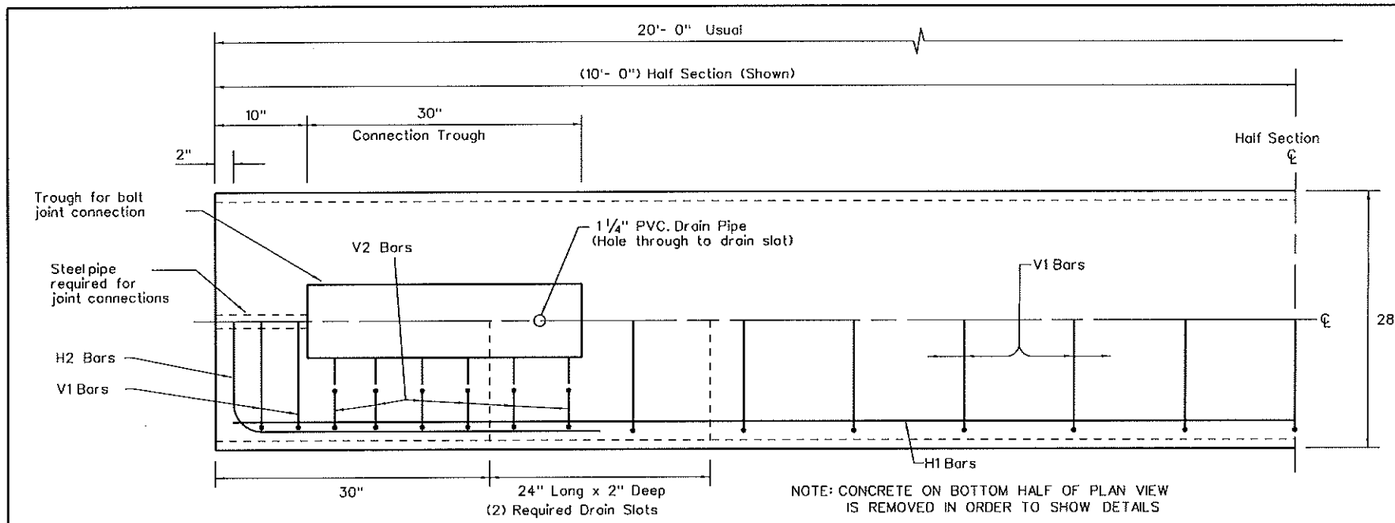
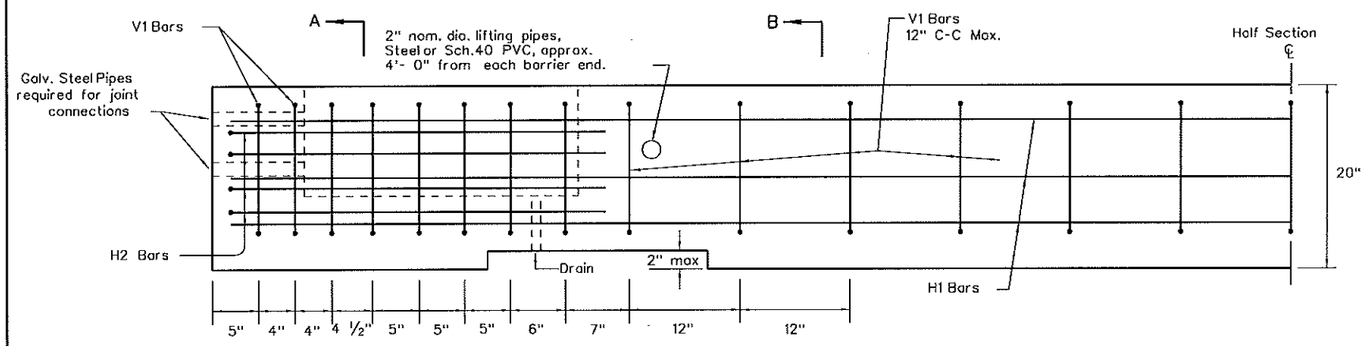
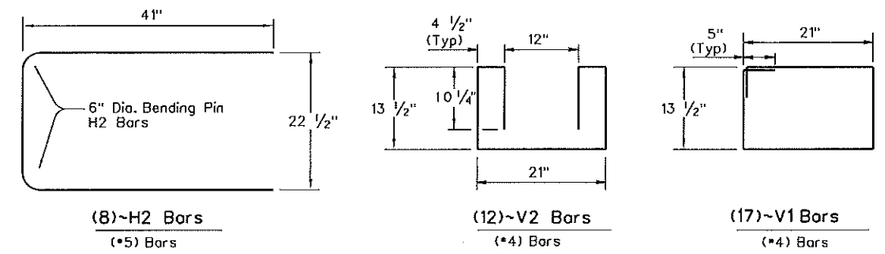


PLAN
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)



ELEVATION
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)



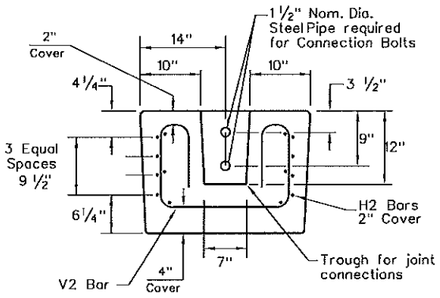
(8)~H2 Bars
(#5) Bars

(12)~V2 Bars
(#4) Bars

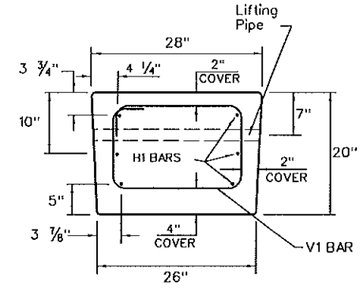
(17)~V1 Bars
(#4) Bars

REINFORCING STEEL DETAILS
TYPE 1 - BARRIER SEGMENT

Note: Use 2" Dia. Bending Pin, unless otherwise shown



SECTION A-A



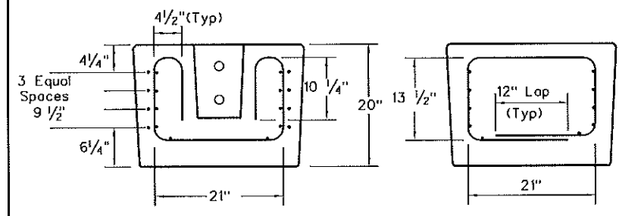
SECTION B-B

GENERAL NOTES

1. Low Profile Concrete Barrier (LPCB), is approved for use in temporary work zone locations, where the posted speed is 45 mph, or less.
2. Concrete shall be Class H for precast barrier with a minimum compressive strength of 3,600 psi.
3. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
4. Precast LPCB barrier length shall be 20 ft.
5. All barrier edges shall have 3/4" chamfer or a tooled radius.
6. Joint connection hardware shall be in accordance with Item 449, "Anchor Bolts." and is considered subsidiary.
7. Steel pipe required for joint connection bolts shall be galvanized in accordance with Item 445,"Galvanizing."
8. Welded wire reinforcement (WWR) may be used in lieu of conventional reinforcement for Type 1 barrier, and shall meet the requirements shown.

FOR CONTRACTORS INFORMATION ONLY

(TYPE 1) APPROX. QUANTITIES 20 FT. SECTION		
CONCRETE	CY	2.6
REINFORCING STEEL	LBS	330
TOTAL BARRIER WT.	LBS	11000



SECTION A-A

SECTION B-B

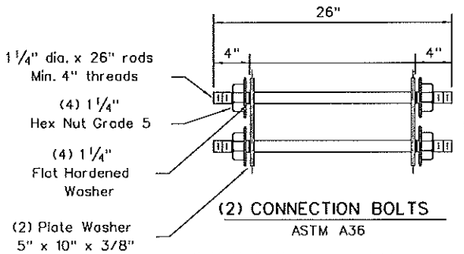
(WWR) GENERAL NOTES

1. Deformed Welded Wire Reinforcement shall conform to ASTM A497.
2. Welded wire cage may be cut or bent, if necessary, but must be approved by the Engineer.
3. Combinations of reinforcing steel and WWR are permitted, as directed by the Engineer. The dimensions from the end of the barrier section to the first wire shall not exceed 3".

REQUIRED (WWR) WIRE DESIGN

8 ~ (D31) Horizontal Wires (Equally spaced)
10 ~ (D20) Horizontal Wires (Equally spaced)
29 ~ (D20) Vertical Wires (Spaced as shown in Elevation View)

WELDED WIRE REINFORCEMENT (WWR)- OPTIONAL REINFORCING



(2) CONNECTION BOLTS
ASTM A36

Note: Rods, Hex nuts and Washers shall be Galvanized.

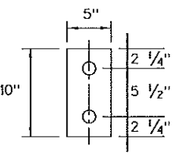


PLATE WASHER
5" x 10" x 3/8"

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

LOW PROFILE CONCRETE BARRIER
PRECAST BARRIER (TYPE 1)
LPCB-13

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
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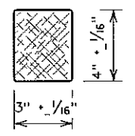
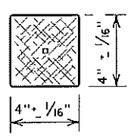
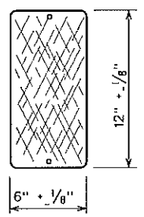
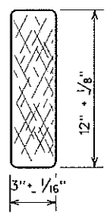
REVISIONS				
	DIST	COUNTY		SHEET NO.
				77

DATE:
FILE:

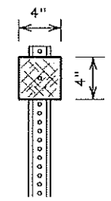
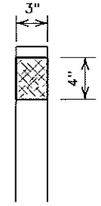
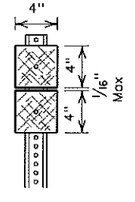
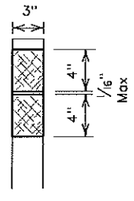
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

NOTE

1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx).
2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	FLX	WC	FLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXX)XXX(XX)

NUMBER OF REFLECTORS
- S = Single
- D = Double

COLOR OF REFLECTORS
- W = White
- Y = Yellow
- R = Red

REFLECTOR UNIT SIZE
- 1 or 2

TYPE OF POST OR DELINEATOR
- WC = Wing Channel Post
- FLX = Flexible Post
- BRF = Barrier Reflector

TYPE OF MOUNT
- GND = Embedded (drivable or set in concrete)
- CTB = Concrete Barrier Mount
- GF1 or GF2 = Guard Fence Attachment
- SRF = Surface Mount

DIRECTION
- If Required
- BI = Bi-Directional
- BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXX)XXX(XX)

TYPE OF OBJECT MARKER
- 1, 2, 3, or 4

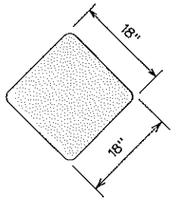
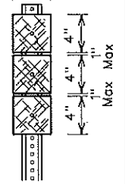
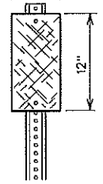
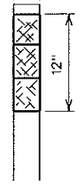
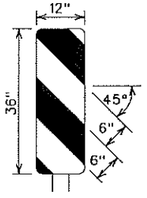
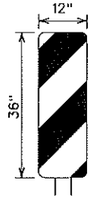
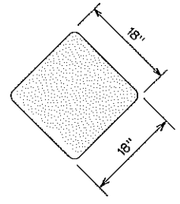
NUMBER OF REFLECTORS OR DIRECTION
- X = 3-Size 2 reflector units (Type 2 only)
- Y = 1-Size 3 reflector unit (Type 2 only)
- Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
- L = Left Side (Type 3 Object Marker only)
- R = Right Side (Type 3 Object Marker only)
- C = Center (Type 3 Object Marker only)

TYPE OF POST
- WC = Wing Channel Post
- FLX = Flexible Post
- TWT = Thin Walled Tubing

TYPE OF MOUNT
- GND = Embedded (drivable)
- SRF = Surface Mount
- WAS = Wedge Anchor Steel
- WAP = Wedge Anchor Plastic

DIRECTION
- If Required
- BI = Bi-Directional

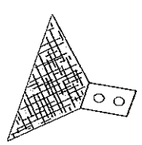
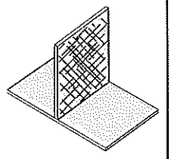
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B or C Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B or C Sheeting			Red -Type B or C Sheeting
POST TYPE	TWT	WC	WC	FLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

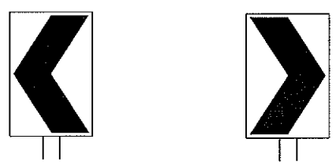
	GF1	GF2	CTB
DEVICE			

1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

SHEETING: Yellow, White, Red

NOTE
1. Minimum 9 square inches of reflective sheeting surface area.

CHEVRONS

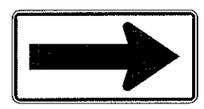
DEVICE: 

W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. The Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTIONAL LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE: 

W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:
Delineator and object marker backplates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Operations Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-15

FILE: dom1-15.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS				
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10				78

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DATE:
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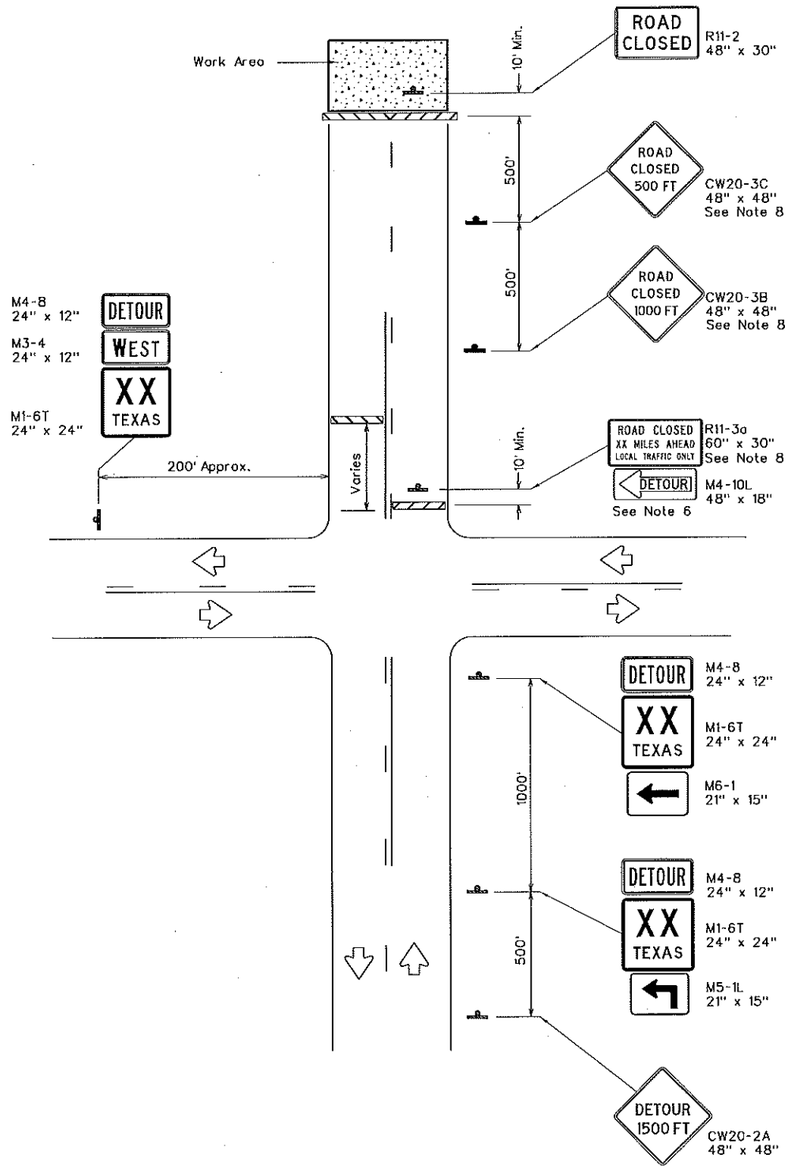
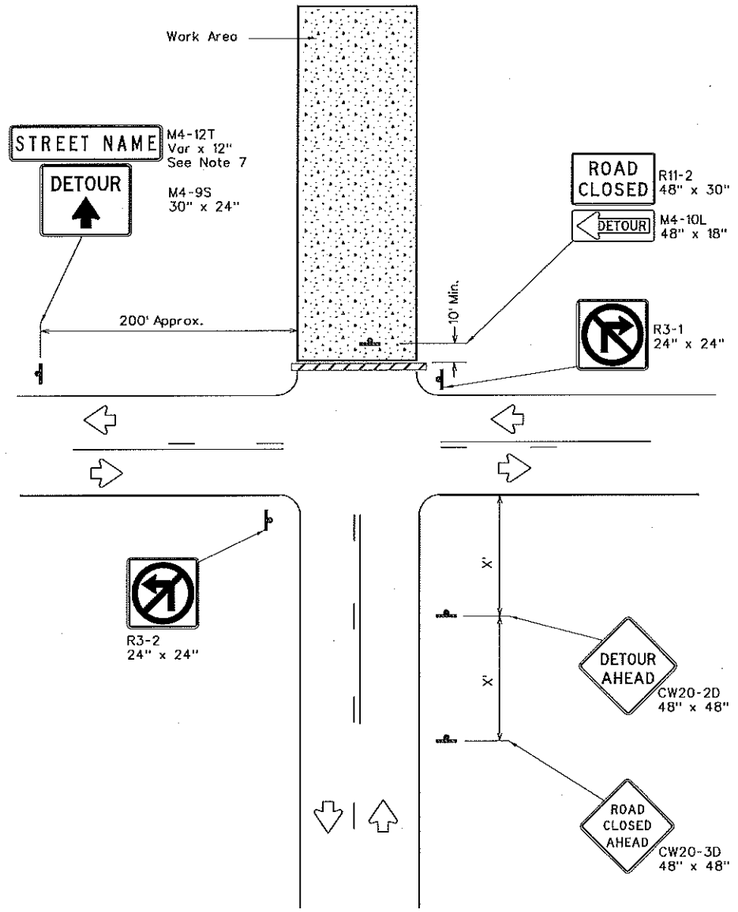


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

Signing for an Un-numbered Route with an Off-Site Detour

LEGEND	
	Type 3 Barricade
	Sign

Posted Speed x	Minimum Sign Spacing "X" Distance
30	120'
35	160'
40	240'
45	320'
50	400'
55	500'
60	600'
65	700'
70	800'
75	900'

x Conventional Roads Only

GENERAL NOTES

1. This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
2. Barricades used shall meet the requirements shown on Barricade and Construction Standard BC(10) and listed on the Compliant Work Zone Traffic Control Devices list (CWZTCD).
3. Stockpiled materials shall not be placed on the traffic side of barricades.
4. Barricades at the road closure should extend from pavement edge to pavement edge.
5. Detour signing shown is intended to illustrate the type of signing that is appropriate for numbered routes or un-numbered routes as labeled. It does not indicate the full extent of detour signing required. Detour routes should be signed as shown elsewhere in the plans.
6. If the road is open for a significant distance beyond the intersection or there are significant origin/destination points beyond the intersection, the signs and barricades at this location should be located at the edge of the traveled way.
7. The Street Name (M4-12T) sign is to be placed above the DETOUR (M4-9S) sign.
8. For urban areas where there is a shorter distance between the intersection and the actual closure location, the ROAD CLOSED XX MILES AHEAD (R11-3a) sign may be replaced with a ROAD CLOSED TO THRU TRAFFIC (R11-4) sign. If adequate space does not exist between the intersection and the closure a single ROAD CLOSED AHEAD (CW20-3D) sign spaced as per the table above may replace the ROAD CLOSED 1000 FT (CW20-3B) and ROAD CLOSED 500 FT (CW20-3C) signs.
9. Signs and barricades shown shall be subsidiary to Item 502. Locations where these details will be required shall be as shown elsewhere in the plans.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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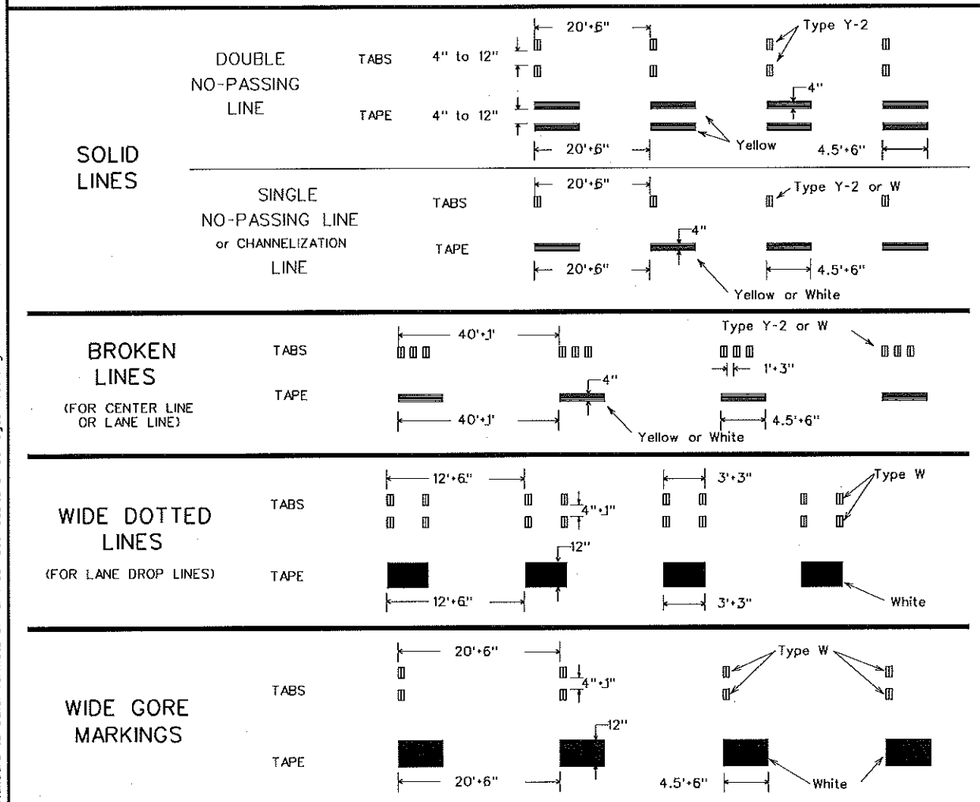
REVISIONS				
1-97 4-98 7-13	DIST.	COUNTY		SHEET NO.
2-98 3-03				79
113				

DATE:
FILE:

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



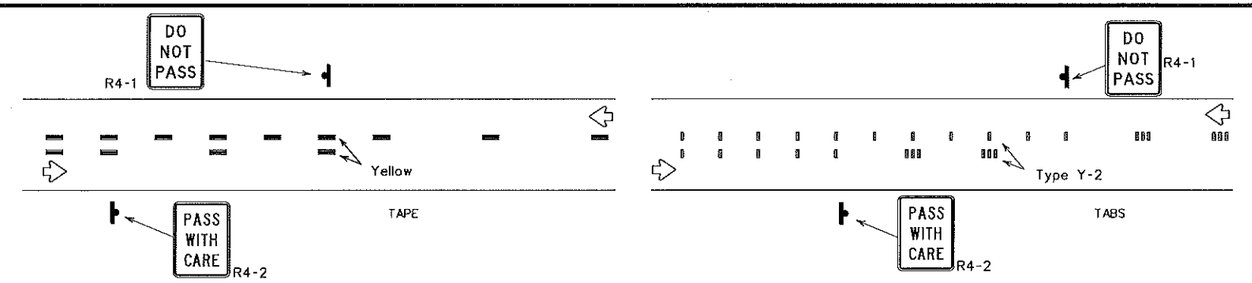
NOTES:

1. Short term pavement markings may be prefabricated markings (stick down tape) or temporary flexible-reflective roadway marker tabs unless otherwise specified elsewhere in plans.
2. Short term pavement markings shall NOT be used to simulate edge lines.
3. Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.
4. Temporary flexible-reflective roadway marker tabs will require normal maintenance replacement when used on roadways with an ADT per lane of up to 7500 vehicles with no more than 10% truck mix. When roadways exceed these values, additional maintenance replacement of devices should be planned.
5. No segment of roadway open to traffic shall remain without permanent pavement markings for a period greater than 14 colendor days. The Contractor will be responsible for maintaining short term pavement markings until permanent pavement markings are in place. When the Contractor is responsible for placement of permanent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 colendor days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
6. For two lane, two-way roadways, DO NOT PASS signs shall be erected to mark the beginning of sections where passing is prohibited and PASS WITH CARE signs shall be erected to mark the beginning of sections where passing is permitted. Signs shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and may be used to indicate the limits of no-passing zones for up to 14 colendor days. Permanent pavement markings should then be placed.
7. For low volume two lane, two-way roadways of 4000 ADT or less, no-passing lines may be omitted when approved by the Engineer. DO NOT PASS and PASS WITH CARE signs shall be erected (see note 6).
8. For exit gores where a lane is being dropped place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are not allowed for this purpose.

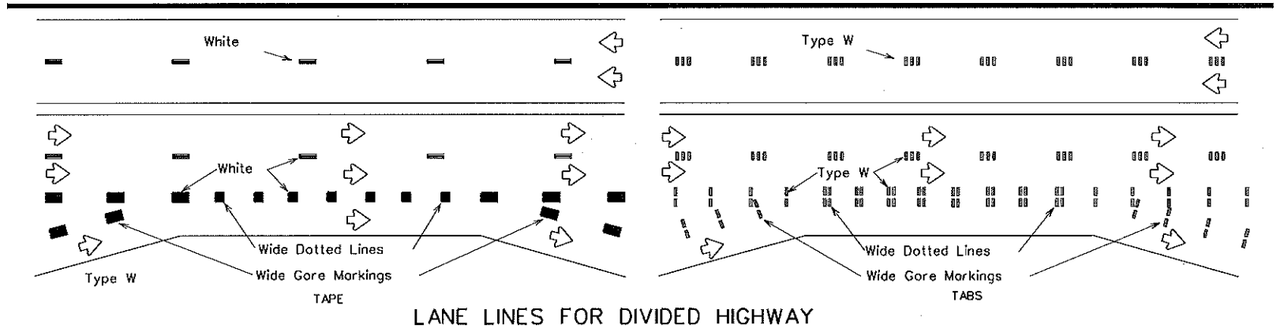
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

1. Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
2. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
3. When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low-beam head light at night, unless sight distance is restricted by roadway geometrics.
4. No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of Note 3.

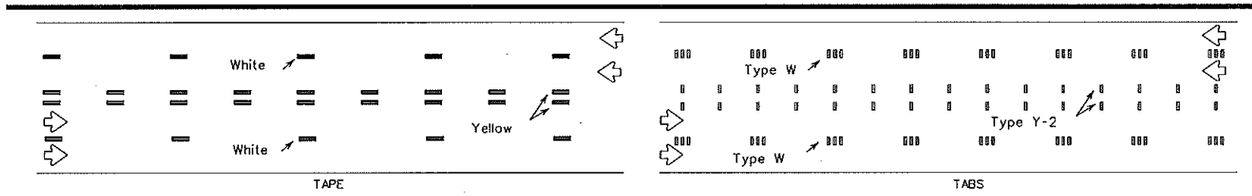
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



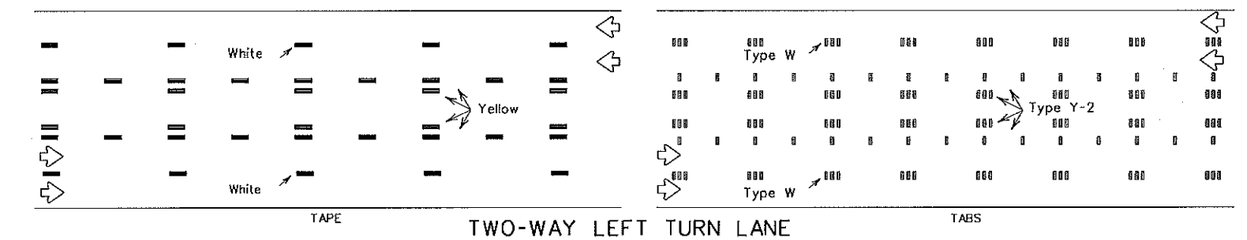
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



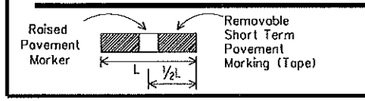
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



If raised pavement markers are used to supplement REMOVABLE short term markings, the markers shall be applied to the top of the tape at the approximate mid length of the tape. This allows an easier removal of raised markers and tape.

PREFABRICATED PAVEMENT MARKINGS

1. Temporary Removable Prefabricated Pavement Markings shall meet the requirements of DMS-8241.
2. Non-removable Prefabricated Pavement Markings shall meet the requirements of either DMS-8240 "Permanent Prefabricated Pavement Markings" or DMS-8243 "Temporary Costruction-Grade Prefabricated Pavement Markings."

RAISED PAVEMENT MARKERS

1. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and DMS-4200.

DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:

http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

FILE: wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS				
1-97	DIST	COUNTY		SHEET NO.
3-03				80
7-13				

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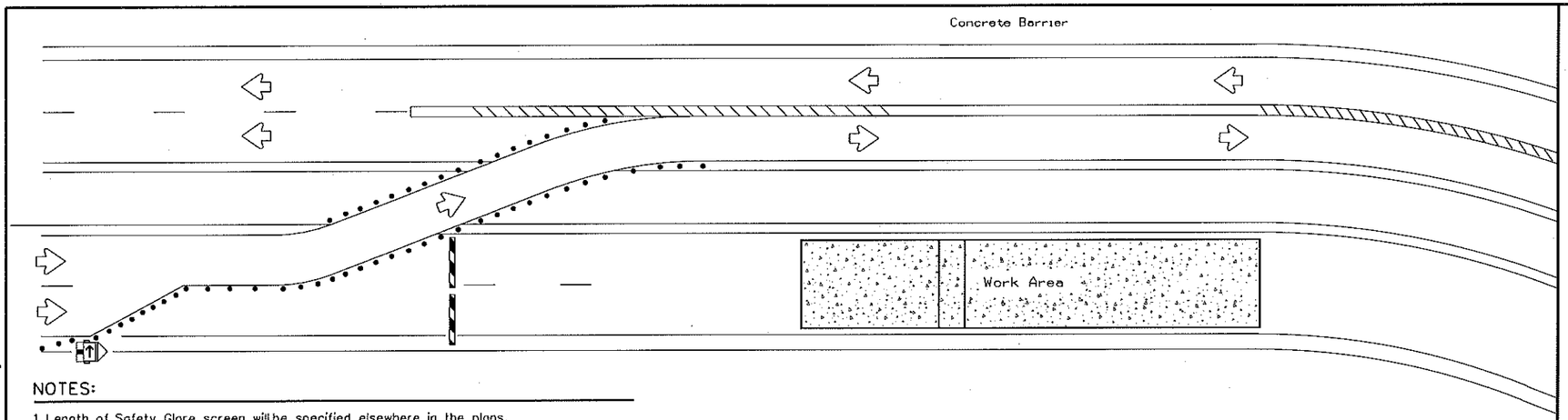


NOTES:

1. Length of Safety Glare screen will be specified elsewhere in the plans.
2. The cumulative nominal length of the modular safety glare screen units shall equal the length of the individual sections of temporary concrete traffic barrier on which they are installed so the joint between barrier sections will not be spanned by any one safety glare screen unit.
3. Screen Panel/blades will be designed such that reflective sheeting conforming with Departmental Material Specification DMS-8300, Sign Face Materials, Type B or C Yellow, minimum size of 2 inches by 12 inches can be attached to the edge of the panel/blade. The sheeting shall be attached to one glare screen panel/blade per section of concrete barrier not to exceed a spacing of 30 feet. Barrier reflectors are not necessary when panel/blades are installed with reflective sheeting as described.
4. Payment for these devices will be under statewide Special Specification "Modular Glare Screens for Headlight Barrier."
5. This detail is only intended to show types of locations where Glare Screens would be appropriate. Required signing and other devices shall be as shown elsewhere in the plans.

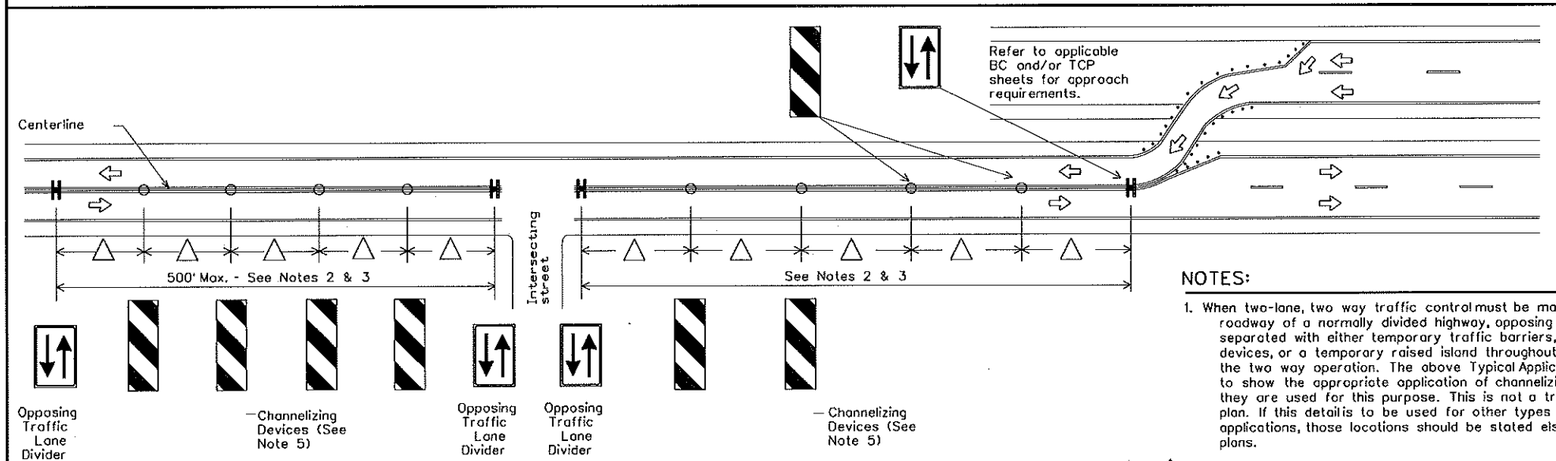
BARRIER DELINEATION WITH MODULAR GLARE SCREENS

LEGEND	
	Type 3 Barricade
• • •	Channelizing Devices
	Trailer Mounted Flashing Arrow Board
	Sign
\\\\	Safety glare screen

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
DELINEATORS AND OBJECT MARKERS	DMS-8600
MODULAR GLARE SCREENS FOR HEADLIGHT BARRIER	DMS-8610

Only pre-qualified products shall be used. A copy of the Compliant Work Zone Traffic Control Devices List" CWZTCD)describes pre-qualified products and their sources and may be found at the following web address:

http://www.txdot.gov/business/resources/producer-list.html



VERTICAL PANELS & OPPOSING TRAFFIC LANE DIVIDERS (OTLD) SEPARATING TWO-WAY TRAFFIC ON NORMALLY DIVIDED HIGHWAYS

NOTES:

1. When two-lane, two way traffic control must be maintained on one roadway of a normally divided highway, opposing traffic shall be separated with either temporary traffic barriers, channelizing devices, or a temporary raised island throughout the length of the two way operation. The above Typical Application is intended to show the appropriate application of channelizing devices when they are used for this purpose. This is not a traffic control plan. If this detail is to be used for other types of roads or applications, those locations should be stated elsewhere in the plans.

△2. Space devices according to the Tangent Spacing shown on the Device Spacing table on BC(9) but not exceeding 100'.

3. Every fifth device should be an OTLD except when spaced closer to accommodate an intersection. An OTLD should be the first device on each side of intersecting streets or roads.
4. Locations where surface mount bases with adhesives or self-righting devices will be required in order to maintain them in their proper position should be noted elsewhere in the plans.
5. Channelizing devices are to be vertical panels, 42" cones or tubular markers that are at least 36" tall. Tubular markers used to separate traffic should have a rubber base weighing at least 30 pounds. Tubular markers that are 42" tall or more shall have four bands of reflective material as detailed for 42" cones on BC(10). Tubular markers less than 42" but at least 36" tall shall have three bands of 3" wide white reflective material spaced 2" apart. Reflective material shall meet DMS-8300, Type A.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TYPICAL DETAILS

WZ(TD)-17

FILE: wztd-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 4-98 2-17 3-03 7-13	DIST	COUNTY		SHEET NO. 81
110				

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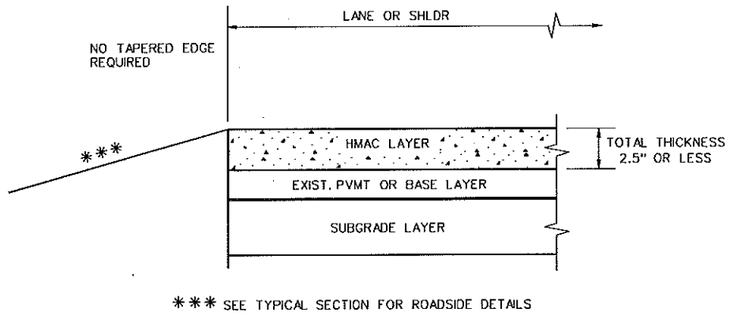
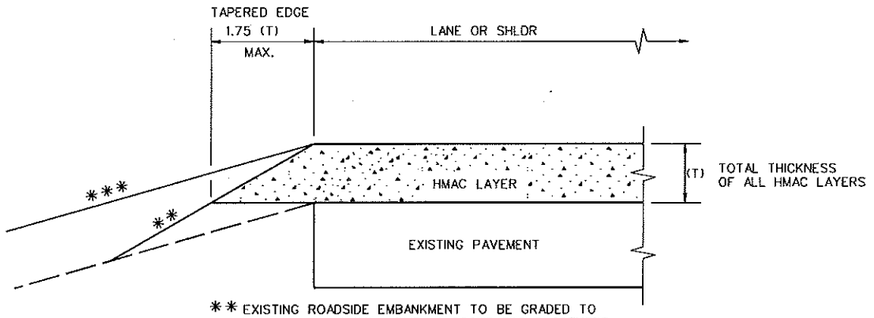


*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 1

THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS

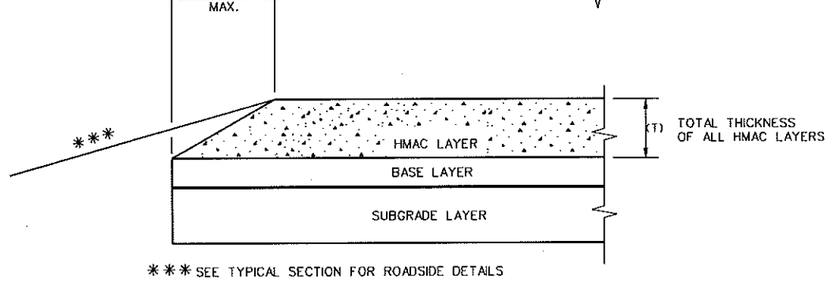


** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2

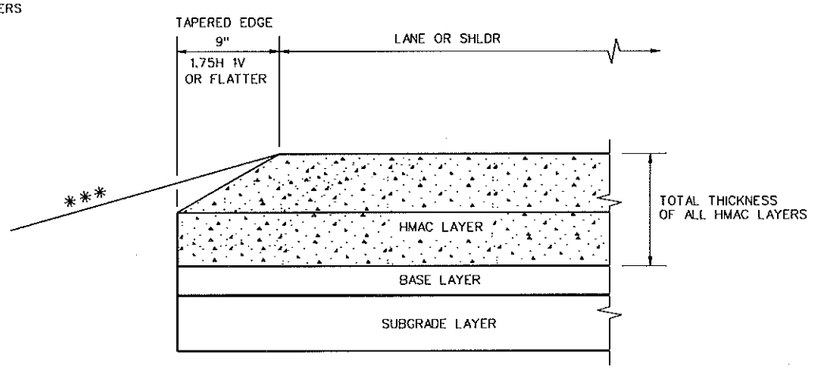
OVERLAY OF EXISTING PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3

NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4

NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 5" OR GREATER

(NOT TO SCALE)

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, A VERTICAL EDGE IS PERMISSIBLE FOR HMAC PLACED GREATER THAN 5" BELOW THE EDGE OF PAVEMENT AND FOR THICKNESS OF HMAC LESS THAN 2.5".
2. FOR FURTHER INFORMATION REGARDING THE ROADSIDE AND PAVEMENT DETAILS, SEE TYPICAL SECTIONS.
3. PAYMENT FOR TAPERED EDGE WILL BE IN ACCORDANCE WITH APPLICABLE ITEMS IN THE CONTRACT.
4. THE SLOPE OF THE TAPERED EDGE SHALL BE 1.75H 1V: OR FLATTER.
5. THE TAPERED EDGE SHALL BE PRODUCED BY USE OF A SCREED ATTACHMENT CAPABLE OF PRODUCING A SMOOTH COMPACTED SURFACE. ADDITIONAL COMPACTING EFFORT BEHIND THE SCREED IS NOT REQUIRED.

Texas Department of Transportation

Design Division Standard

TAPERED EDGE DETAILS HMAC PAVEMENT

TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
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REVISIONS				
	DIST	COUNTY		SHEET NO.
				82

DATE:
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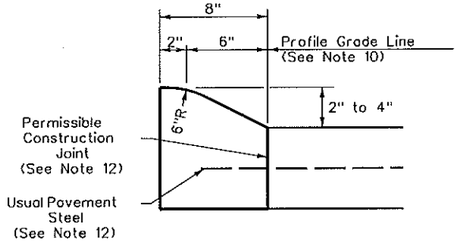
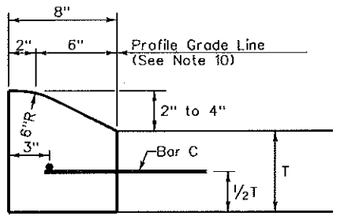


TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



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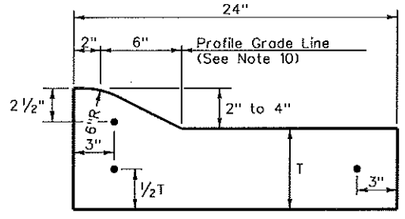
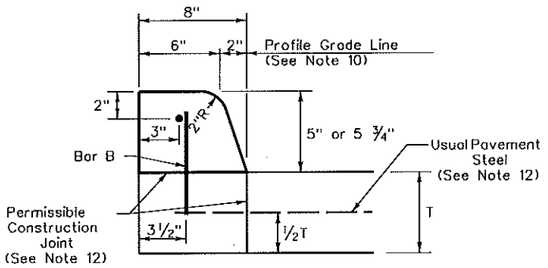
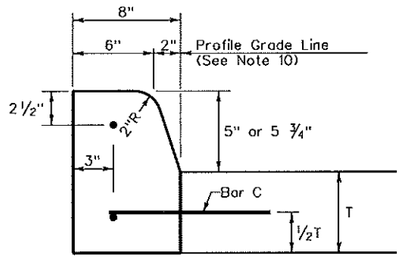


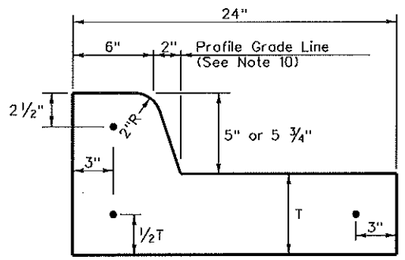
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



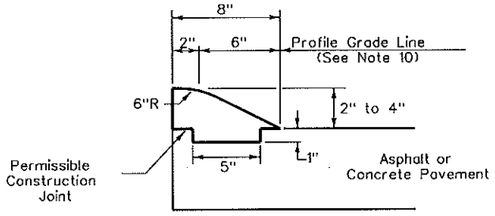
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



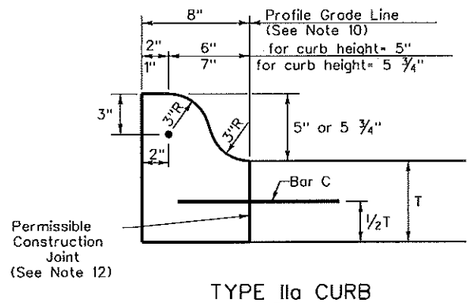
TYPE II CURB
5" - 5 ¾" HEIGHT



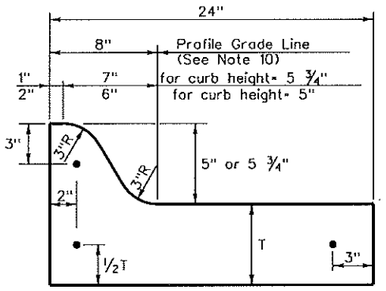
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



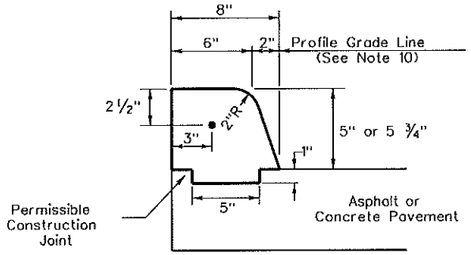
TYPE III CURB (KEYED)
2" - 4" HEIGHT



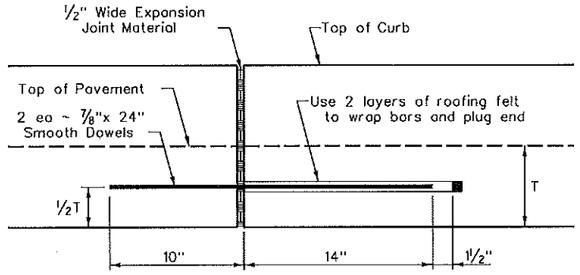
TYPE IIa CURB
5" - 5 ¾" HEIGHT



TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT

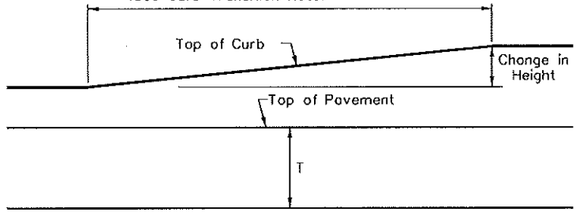


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

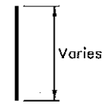
Curb Transition Note:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans,or as directed by the Engineer.



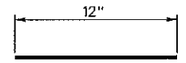
CURB TRANSITION
Note: To be paid for as Highest Curb

General Notes

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Producer List (MPL), maintained by TxDOT, Construction Division.
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is placed on existing concrete pavement, the pavement shall be drilled and the reinforcing bars grouted in place.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C-C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When vertical permissible construction joints are used, resulting in a longitudinal construction joint in the pavement, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans for longitudinal construction joints. Reinforcing steel for curb section shall then conform to that required for concrete curb.



BAR B



BAR C

Texas Department of Transportation

Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

CCCG-12

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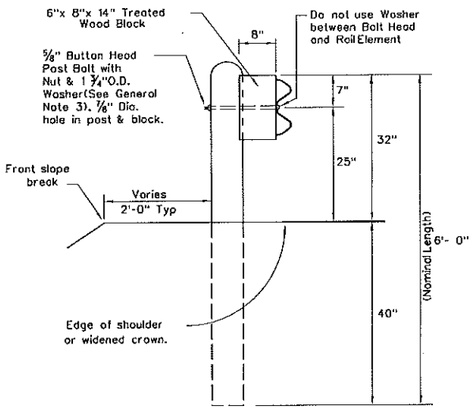
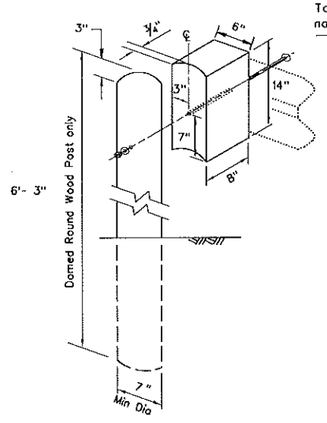
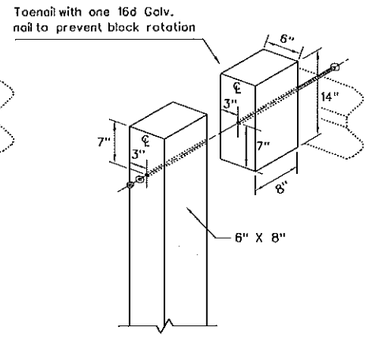


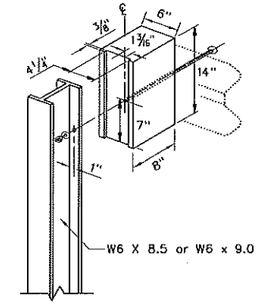
TYPICAL POST



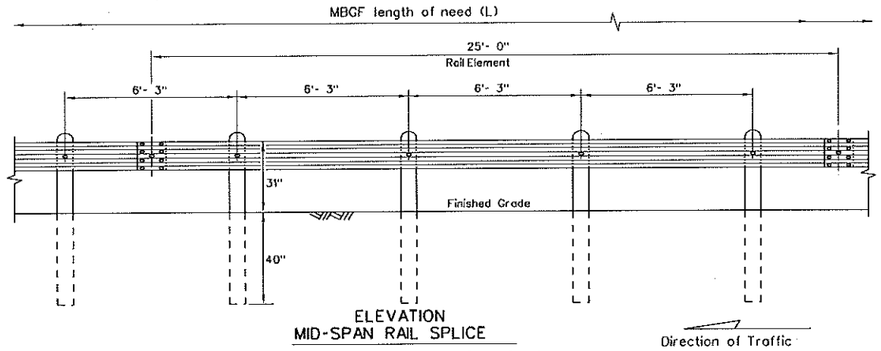
WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST

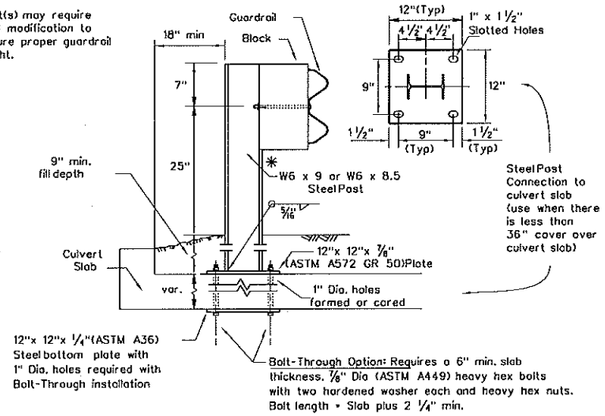


WOOD BLOCK TO STEEL POST



ELEVATION
MID-SPAN RAIL SPLICE

Showing a 25'- 0" section of W-Beam rail, 12'- 6" rail sections may also be supplied (See General Note 2)



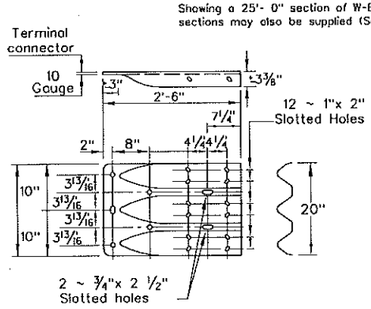
LOW FILL CULVERT POST

Culverts of 25 ft. or less, see GF(31)LS standard for "Long Span" option.

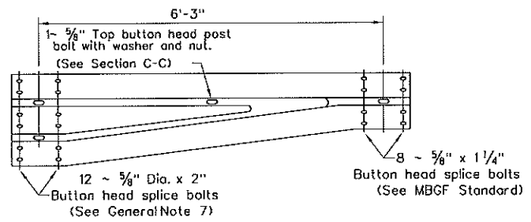
Epoxy Note:
Epoxy Anchor Option: This option may only be used if the culvert slab is 8" min. thick. Threaded anchor rods must be 7/8" Dia. ASTM A449 or A193 Grade B7 with heavy hex nut, and one hardened washer each. Embed anchor rods 6" with Hilti HIT RE 500 epoxy adhesive. Other Type III Class C epoxy adhesives meeting the requirements of DMS-6100, "Epoxies and Adhesives", may be used if it can be demonstrated that they meet or exceed the strength of Hilti HIT RE 500 with the same embedment depth and threaded rod dia. Follow the manufacturer's requirements for installing epoxied threaded rods. Extend rods 1/4" min. beyond nut.

GENERAL NOTES

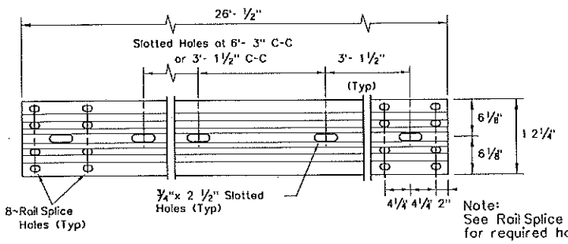
1. The type of post (round wood post, rectangular wood post, or steel post) will be as shown in the plans. The exact position of MBGF shall be shown in the plans or as directed by the Engineer. Steel posts to be galvanized in accordance with Item 445, "Galvanizing."
2. Rail element shall meet the requirements of Item 540,"Metal Beam Guard Fence" except as modified in the plans. The Contractor may furnish rail elements of 25'- 0", or 12'- 6" (nom.) lengths. Rail elements may have slotted holes at 3'-1½" C-C or 6'-3" C-C. A special length of rail may be manufactured to accommodate the downstream anchor terminal (DAT) and the transition sections of guardrail.
3. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 3/4" O.D.)washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 5/8" x 1 1/4" (or 2" long at triple rail splices) with a 5/8" double recessed nut (ASTM A563). Thrie beam "connection" 7/8" dia. (ASTM A325) hex bolts shall be of sufficient length to extend through the full thickness of the rail, washers, and nuts.
4. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
5. Crown shall be widened to accommodate the Metal Beam Guard Fence.
6. The lateral approach to the guard fence, shall have a maximum slope of 1V:10H.
7. If shown elsewhere in the plans or as directed by the Engineer, the guard fence may be flared at a rate of 25:1 or flatter.
8. Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be positioned so that the face of curb is located directly below or behind the face of the rail. Rail placed over curbs shall be installed so that the post bolt is located approximately 25 inches above the gutter pan or edge of shoulder.
9. If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, or drill two 12" dia. front to back overlapping holes, 24" into the rock. If solid rock is encountered below 18",drill a 12" dia. hole, 12" into the rock or to the standard embedment depth, whichever maybe less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
10. Posts shall not be set in concrete, of any depth.
11. Special fabrication will be required at installations having a curvature of less than 150 ft. radius.
12. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210,"Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL may furnish composite material posts and/or blocks.
13. For posts located partially or wholly between precast box culvert units, the use of a cast-in-place concrete closure between boxes is required. See Detail "A" on Bridge Standard SCP-MD.



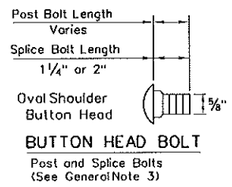
THRIE-BEAM TERMINAL CONNECTION
(SEE GENERAL NOTES 6 & 7 FOR REQUIRED HARDWARE)



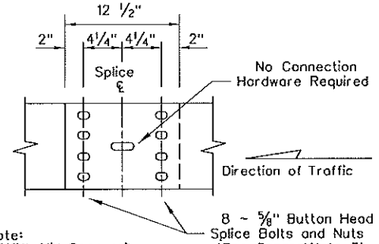
NON-SYMMETRICAL TRANSITION TO W-BEAM (10 Gauge)



ELEVATION 25'- 0"(NOM.) W-BEAM SECTION
12'- 6" RAIL SECTIONS MAY ALSO BE SUPPLIED (SEE GENERAL NOTE 2)

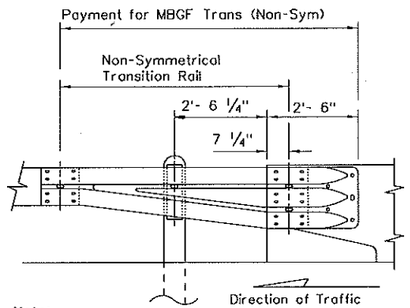


BUTTON HEAD BOLT
Post and Splice Bolts (See General Note 3)



Note:
GF(31), Mid-Span rail splices are required with 6'-3" post spacings.

MID-SPAN
RAIL SPLICE DETAIL



Note:
All rail elements shall be lapped in the direction of adjacent traffic.

DOWNSTREAM RAIL ATTACHMENT

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE

GF(31)-14

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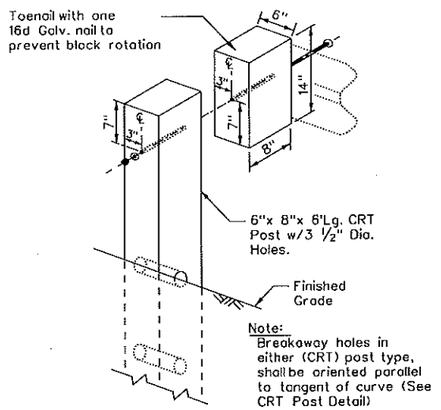
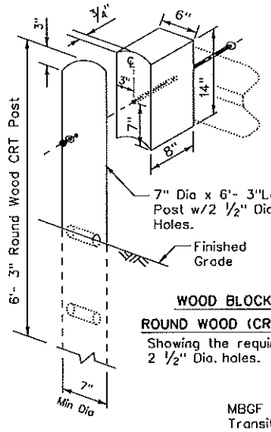


Note:
Breakaway holes in either (CRT) post type, shall be oriented parallel to tangent of curve (See CRT Post Detail)

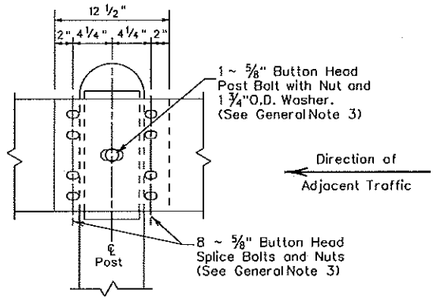
WOOD BLOCK TO RECTANGULAR WOOD (CRT) POST

Showing the required 3 ½" Dia. holes.

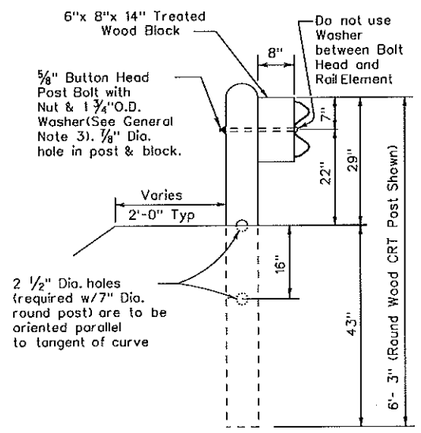


WOOD BLOCK TO ROUND WOOD (CRT) POST

Showing the required 2 ½" Dia. holes.

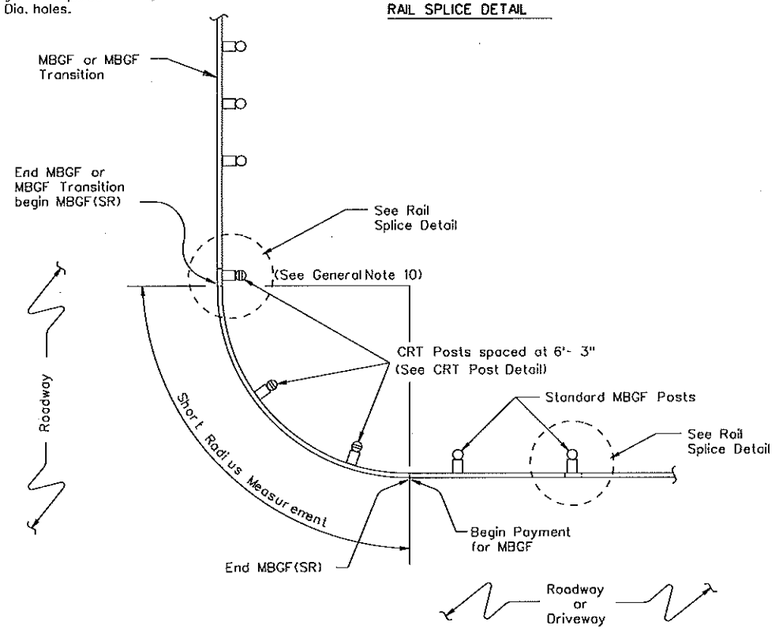


RAIL SPLICE DETAIL



(CRT) POST DETAIL
CONTROLLED RELEASE TERMINAL POST

Two or more wood CRT post(s) are required at any radius installation located at intersecting roadways or driveways.



PLAN VIEW
SHOWING TYPICAL RADIUS

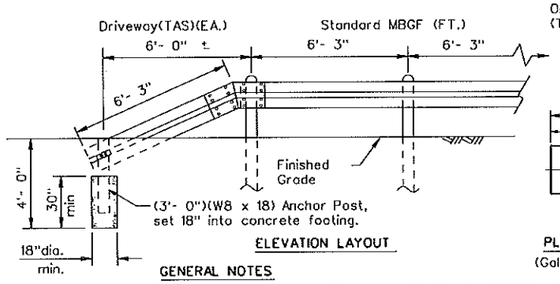
The required radius is shown elsewhere on the plans.

GENERAL NOTES

1. The type of (CRT) post (round wood post, or rectangular wood post) will be shown elsewhere in the plans. The exact position of MBGF shall be shown elsewhere in the plans or as directed by the Engineer.
2. Steel posts are not permitted at CRT post positions.
3. Rail element shall meet the requirements of Item 540,"Metal Beam Guard Fence" except as modified on the plans. The Contractor may furnish rail elements of 12 ½ or 25 foot nominal lengths.
4. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 ¾" O.D.)washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are ⅝" x 1¼" (or 2" long at triple rail splices) with a ⅝" double recessed nut (ASTM A563).
5. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
6. Crown shall be widened to accommodate the Metal Beam Guard Fence.
7. The lateral approach to the guard fence, shall have a slope rate of not more than 1V:10H.
8. Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be positioned so that the face of curb is located directly below or behind the face of the block. Rail placed over curbs shall be installed so that the post bolt is located approximately 21 inches above the gutter pan or roadway surface.
9. If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, 24" into the rock, or drill two 12" dia. front to back overlapping holes, 24" into the rock. If solid rock is encountered below 18",drill a 12" dia. hole, 12" into the rock or to the standard embedment depth, whichever is less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
10. Guardrail posts shall not be set in concrete, of any depth.
11. Special rail fabrication will be required at installations having a curvature of less than 150 ft. radius. The required radius shall be shown on the plans.
12. The terminal anchor section (TAS) post shall be set in Class A concrete (unless otherwise shown in the plans) in accordance with Item 421,"Hydraulic Cement Concrete." Concrete shall be subsidiary to the bid item requiring construction of the terminal anchor section (TAS). Terminal anchor post to be galvanized in accordance with Item 445, "Galvanizing."
13. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210,"Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.

"DRIVEWAY" TERMINAL ANCHOR SECTION

Only for use within driveway locations, where a standard (TAS) Terminal Anchor Section can not be installed.



ELEVATION LAYOUT

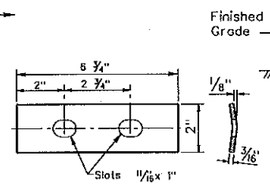
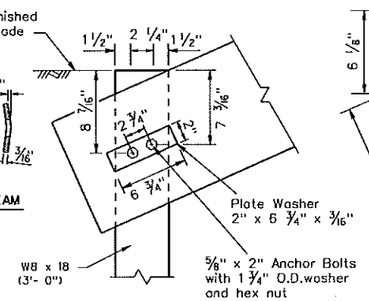
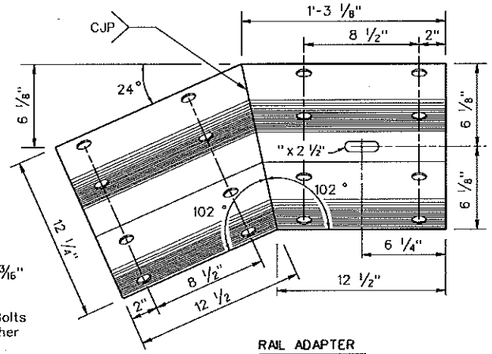


PLATE WASHER FOR METAL BEAM
(Galvanized after fabrication)



ANCHOR POST



RAIL ADAPTER
Rail - 10 gauge
(Galvanized after fabrication)

GENERAL NOTES

1. The "Driveway" Terminal Anchor Section is ONLY to be used within driveway locations, where the ROW is limited and a standard 25 ft.(TAS)Terminal Anchor Section,is too long.
2. Terminal anchor post shall be set in Class A concrete.
3. All steel shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE
(SHORT RADIUS)
MBGF(SR)-11

FILE: mbgfsr11.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
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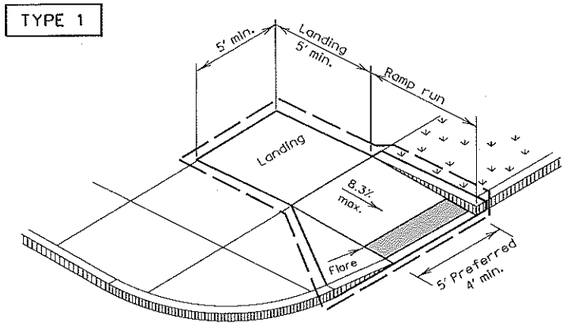
REVISIONS 12-2011	DIST	COUNTY		SHEET NO. 85

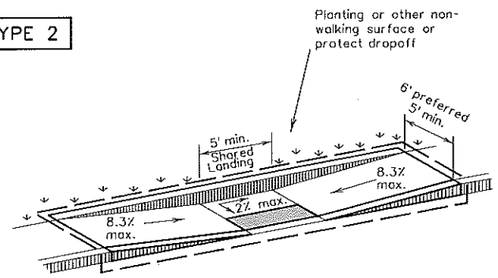
DATE:
FILE:

TYPE 1



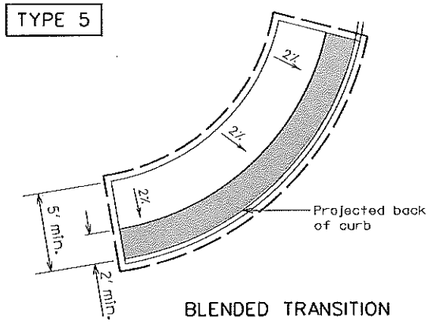
PERPENDICULAR CURB RAMP

TYPE 2



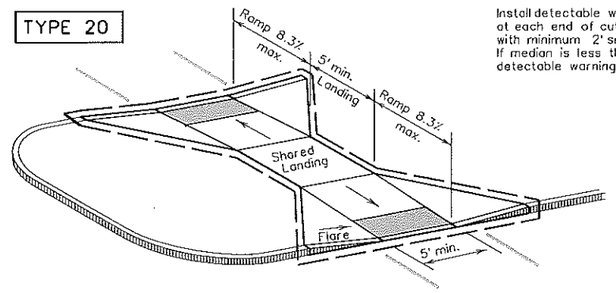
PARALLEL CURB RAMP
(Use only where water will not pond in the landing.)

TYPE 5



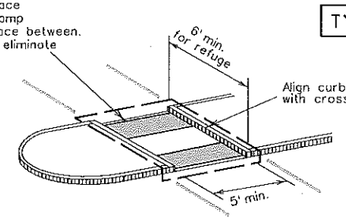
BLENDED TRANSITION

TYPE 20



Install detectable warning surface at each end of cut-through ramp with minimum 2' smooth surface between. If median is less than 6' wide, eliminate detectable warning surfaces.

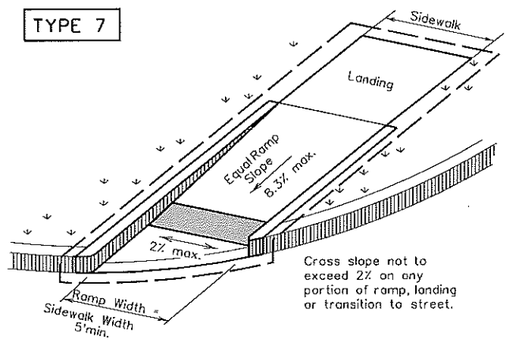
TYPE 21



Curb details are shown elsewhere in the plans.

CURB RAMPS AT MEDIAN ISLANDS

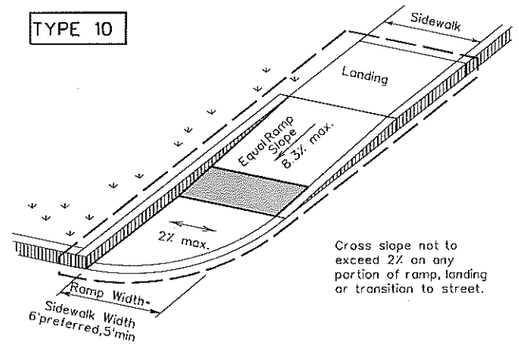
TYPE 7



Cross slope not to exceed 2% on any portion of ramp, landing or transition to street.

(Sidewalk set back from curb)

TYPE 10

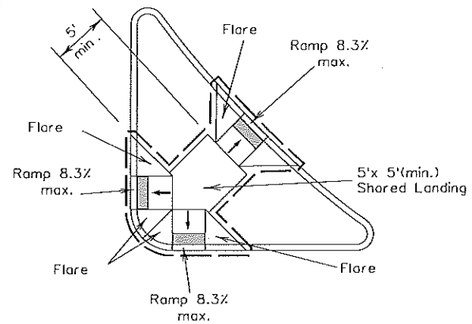


Cross slope not to exceed 2% on any portion of ramp, landing or transition to street.

(Sidewalk adjacent to curb)

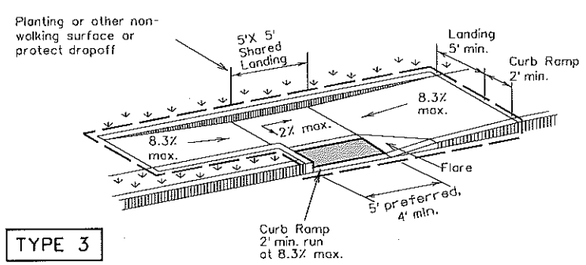
DIRECTIONAL RAMPS WITHIN RADIUS

TYPE 22

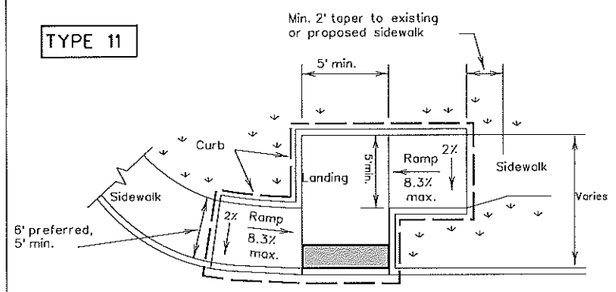


COMBINATION ISLAND RAMPS

TYPE 3

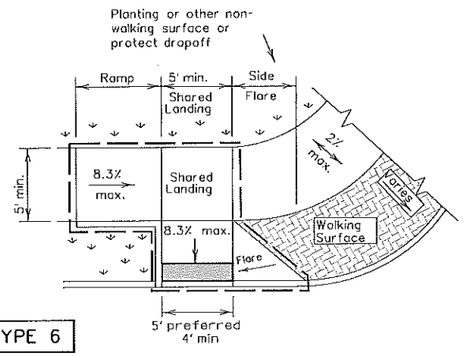


TYPE 11



OFFSET PARALLEL CURB RAMP

TYPE 6



COMBINATION CURB RAMPS

NOTES / LEGEND:

See General Notes on sheet 2 of 4 for more information.

Denotes planting or non-walking surface not part of pedestrian circulation path.

Ramp Limits of Payment

Detectable Warning Surface

SHEET 1 OF 4

Texas Department of Transportation | Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-12A

FILE: ped12a.dgn	DN: TxDOT	CK: RM	DW: TxDOT	CK: VP
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REVISIONS				
VP June 13, 2012	DIST	COUNTY		SHEET NO.
				86

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FILE:

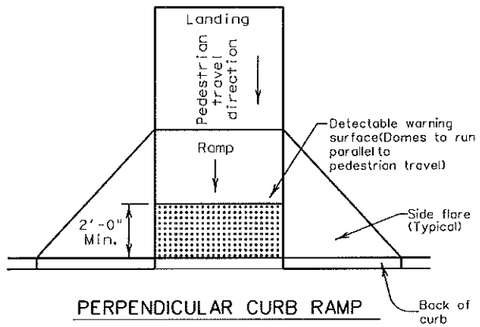
General Notes

Curb Ramps

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Lesser slopes that will still drain properly should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
4. Landings shall be 5'x 5' minimum with a maximum 2% slope in any direction.
5. Maneuvering space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
6. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the current edition of the Texas Accessibility Standards (TAS) and 16 TAC 68.102.
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Handrails are not required on curb ramps. Provide curb ramps wherever an accessible route crosses (penetrates) a curb.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Provide a smooth transition where the curb ramps connect to the street.
16. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
17. Existing features that comply with TAS may remain in place unless otherwise shown on the plans.

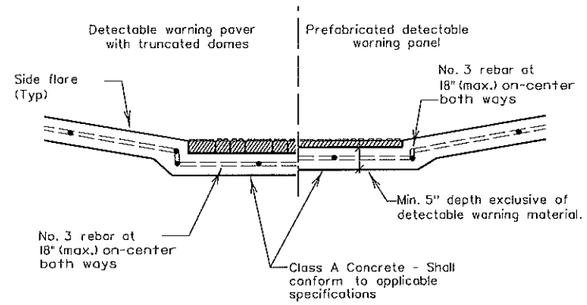
Detectable Warning Material

18. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with Section 705 of the TAS. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
19. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
20. Detectable warning surfaces must be slip resistant and not allow water to accumulate.
21. Detectable warning surfaces shall be a minimum of 24" in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
22. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb. Align the rows of domes to be perpendicular to the grade break between the ramp run and the street. Detectable warning surfaces may be curved along the corner radius.
23. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

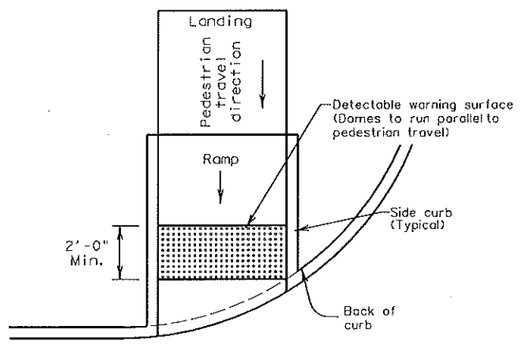


PERPENDICULAR CURB RAMP

Typical placement of detectable warning surface on sloping ramp run.

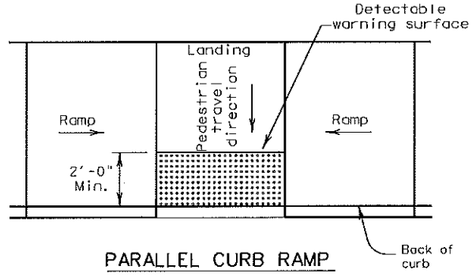


SECTION: CURB RAMP AT DETECTABLE WARNING



DIRECTIONAL CURB RAMP

Typical placement of detectable warning surface on sloping ramp run.



PARALLEL CURB RAMP

Typical placement of detectable warning surface on landing at street edge.

DETECTABLE WARNINGS

Detectable Warning Pavers

24. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
25. Lay full-size units first followed by closure units consisting of at least 25 percent of a full unit. Cut detectable warning paver units using a power saw.

Sidewalks

26. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within one or more reach ranges specified in TAS 308.
27. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
28. Street grades and cross slopes shall be as shown elsewhere in the plans.
29. Changes in level greater than 1/4 inch are not permitted.
30. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than 5% must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with TAS 505.
31. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
32. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
33. Sidewalk details are shown elsewhere in the plans.

Texas Department of Transportation | Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-12A

FILE: ped12a.dgn	DN: TxDOT	CK: RM	DW: TxDOT	CK: VP		
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VP June 13, 2012	DIST	COUNTY			SHEET NO.	
					87	

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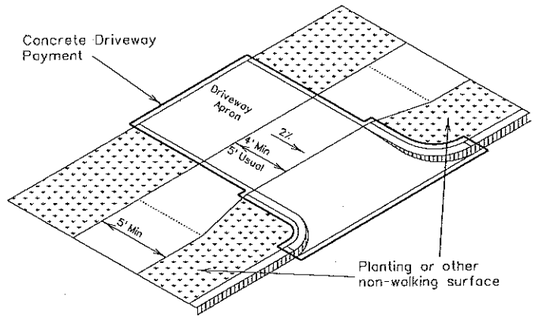
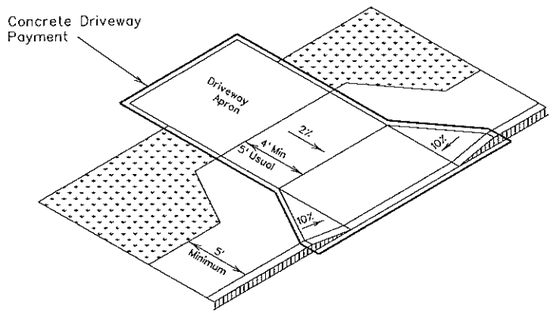
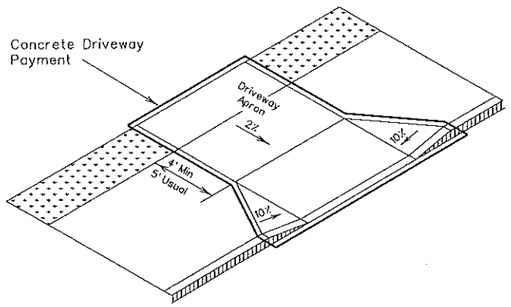


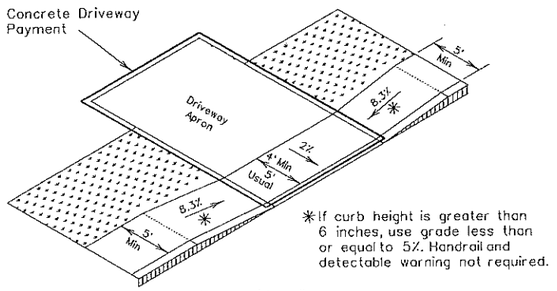
Setback sidewalk



Apron offset sidewalk



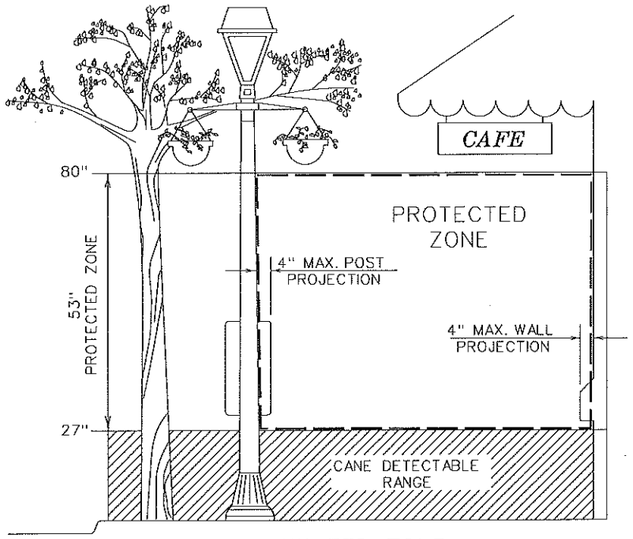
Wide sidewalk



*If curb height is greater than 6 inches, use grade less than or equal to 5%. Handrail and detectable warning not required.

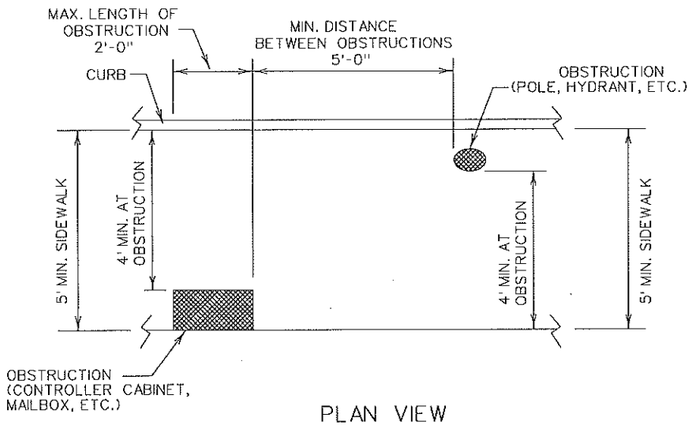
Ramp sidewalk

SIDEWALK TREATMENT AT DRIVEWAYS



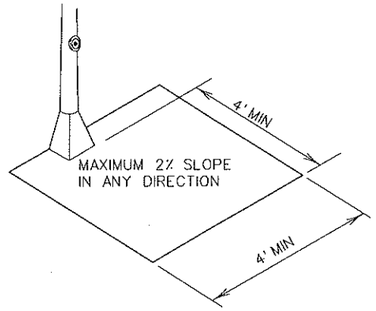
PROTECTED ZONE

In pedestrian circulation area, maximum 4" projection for post or wall mounted objects between 27"and 80" above the surface.

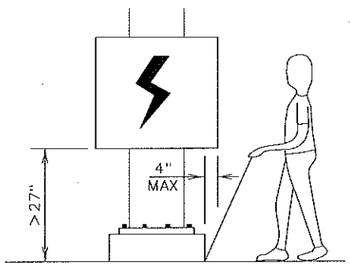


PLAN VIEW
PLACEMENT OF STREET FIXTURES

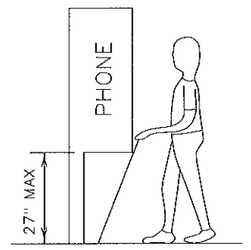
(ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' x 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.)



CLEAR GROUND SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



When an obstruction of a height greater than 27" from the surface would create a protrusion of more than 4" into the pedestrian circulation area, construct additional curb or foundation at the bottom to provide a maximum 4" overhang.



Protruding objects of a height 27" are detectable by cane and do not require additional treatment.

DETECTION BARRIER FOR VERTICAL CLEARANCE <80"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-12A

FILE: ped12a.dgn	DN: TxDOT	CK: RM	DW: TxDOT	CK: VP	
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REVISIONS VP June 13, 2012	DIST	COUNTY		SHEET NO. 88	

DATE:
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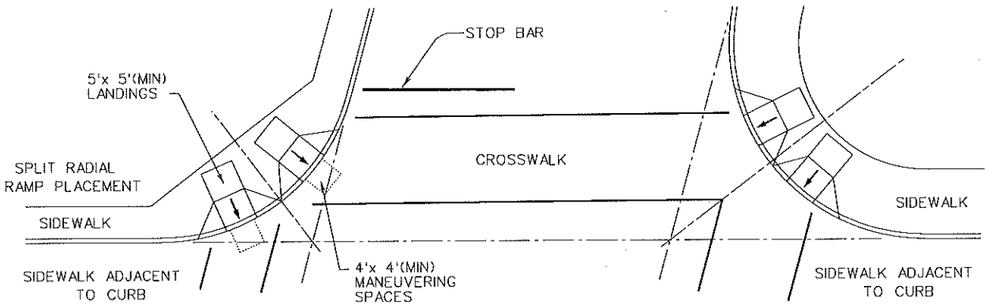
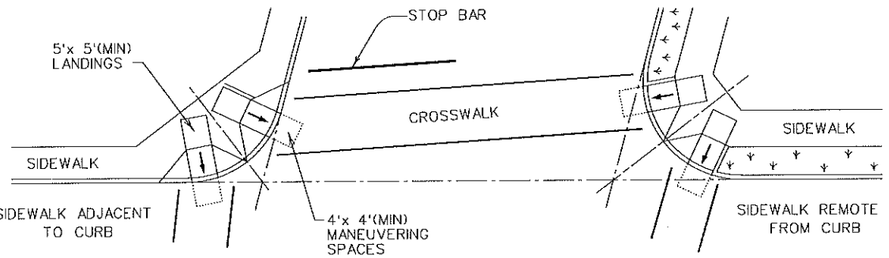
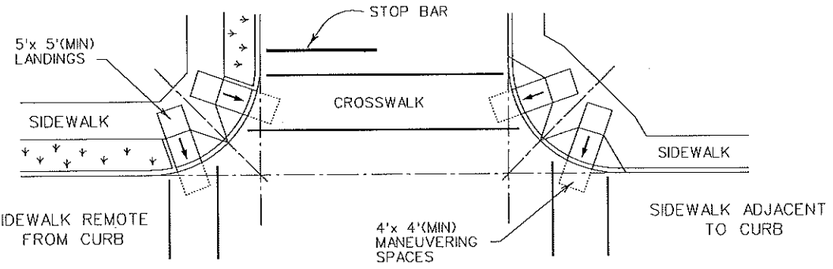


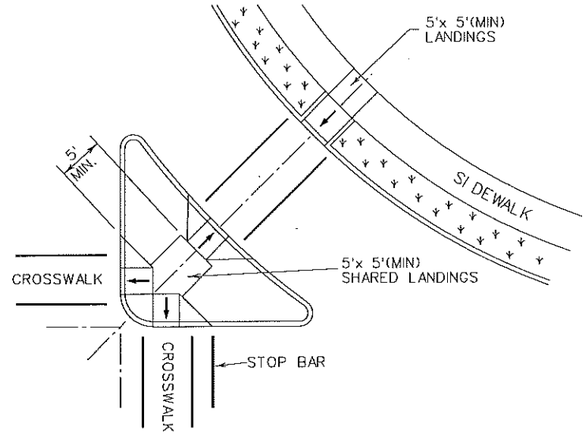
SKEWED INTERSECTION WITH "LARGE" RADIUS



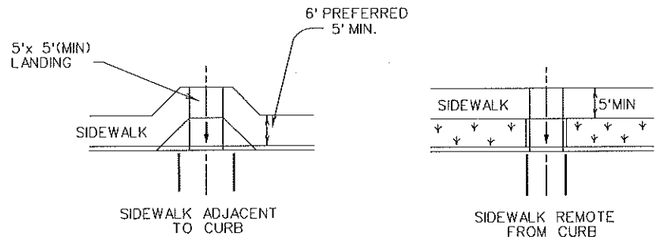
SKEWED INTERSECTION WITH "SMALL" RADIUS



NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND



MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

TYPICAL CROSSING LAYOUTS

SHEET 4 OF 4

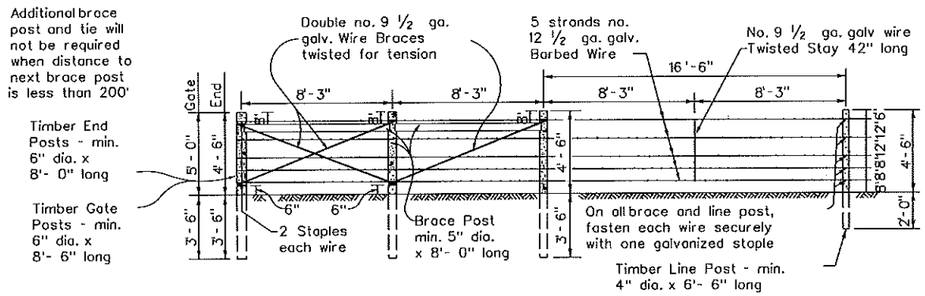
Texas Department of Transportation | Design Division Standard

PEDESTRIAN FACILITIES
CURB RAMPS

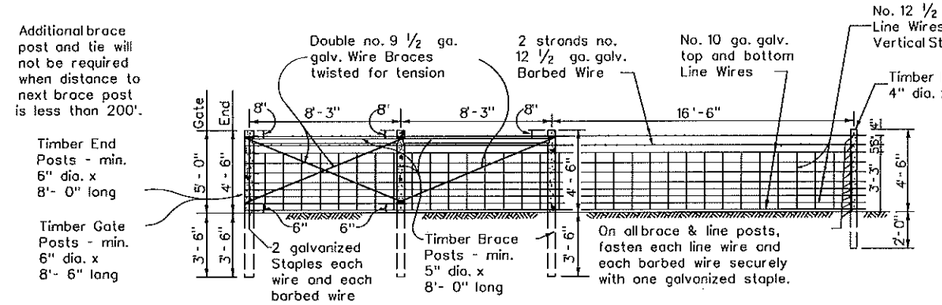
PED-12A

FILE: ped12a.dgn	DN: TxDOT	CK: RM	DW: TxDOT	CK: VP		
©TxDOT March 2002	CONT	SECT	JOB		HIGHWAY	
REVISIONS						
VP June 13, 2012	DIST	COUNTY			SHEET NO.	
					89	

DATE:
FILE:



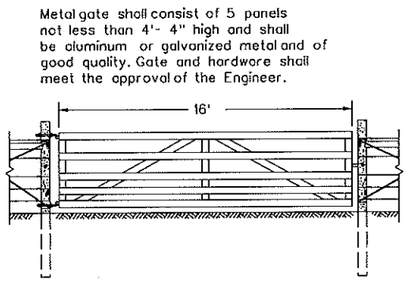
SECTION GALVANIZED BARBED WIRE FENCE WITH WOOD POSTS
Bracing Detail Used at Ends and Gates
TYPE "A" FENCE
(See General Note 6)



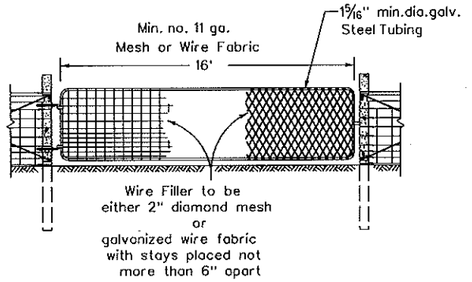
SECTION GALVANIZED WOVEN WIRE FENCE WITH WOOD POSTS
Bracing Detail Used at Ends and Gates
TYPE "B" FENCE
(See General Note 6)

TABLE OF EQUIVALENT SIZES FOR OPTIONAL SHAPE

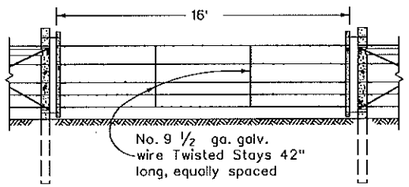
Minimum Diameter of Round Post (Inches)	Minimum Equivalent Dimension for Each Side of Square Post (Inches)
4	3 ½
5	4 ½
6	5 ¼



DETAIL TYPE 1 GATE



DETAIL TYPE 2 GATE

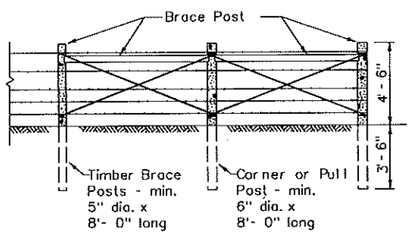


DETAIL TYPE 3 GATE

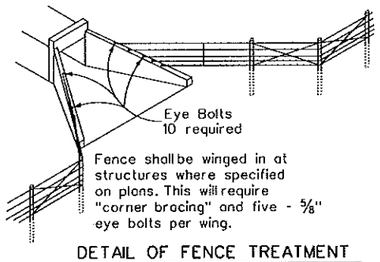
GENERAL NOTES

1. Any high point which interferes with the placing of wire mesh shall be excavated to provide 2" clearance.
2. Latches for Type 1 and Type 2 gates shall be good commercial quality and design latches of the spring, fork or chain type. All latches shall be suitable for the gate and shall be approved by the Engineer.
3. Hinges for Type 2 gates shall be commercial design approved by the Engineer suitable for post and gate.
4. Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
5. If rock is encountered at a depth less than the embedded depth required, a 15" or larger diameter hole shall be drilled for the post and the post shall be set in concrete. If rock is encountered at a depth of 1'- 6" or more below the ground surface, the hole shall be drilled to the required depth. If rock is encountered at a depth less than 1'- 6" below the ground surface, the holes shall be drilled a minimum of 2'- 0" into the rock or to the depth whichever is the lesser depth.
6. Barbed Wire shall be in accordance with ASTM A 121 (Class 1) Design designation 12-2-4-14R or 12-2-5-14R, or as approved by the Engineer.

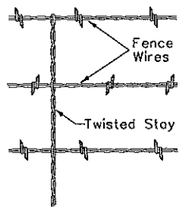
   Woven Wire Fence (Type B) shall be in accordance with ASTM A 116 (Class 1) No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
7. The location of gates and corner posts will be as indicated elsewhere on these plans.
8. Square wood posts may be used in lieu of round posts provided minimum equivalent size requirements, as shown are met. All wood posts shall be in accordance with Item 552, "Wire Fence."



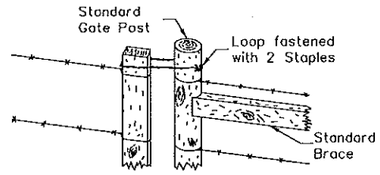
CORNER OR PULL POST ASSEMBLY



DETAIL OF FENCE TREATMENT AT STRUCTURES

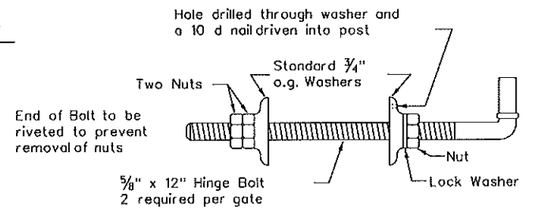


DETAIL OF STAY
(Barbed wire fence)

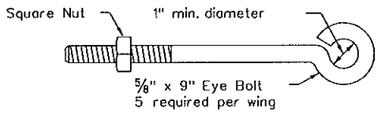


Loop to be made from two strands twisted no. 9 ½ ga. galv. smooth wire, and to be securely fastened to gate post with two galv. staples.

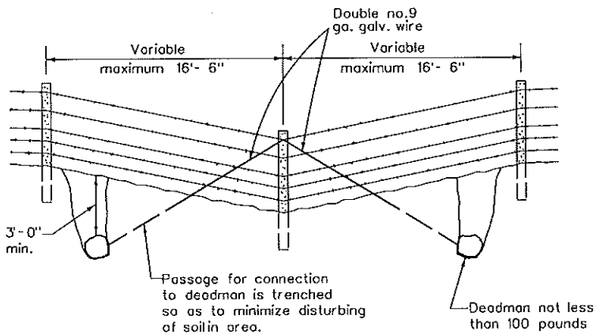
DETAIL FASTENER TYPE 3 GATE



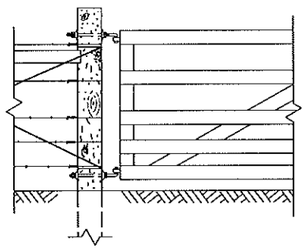
DETAIL OF GATE HINGE BOLT ASSEMBLY



DETAIL OF EYE BOLT



DETAIL OF FENCE SAG
(Single Line Connection)



DETAIL SHOWING INSTALLATION OF HINGES OF TYPE 1 & 2 GATE

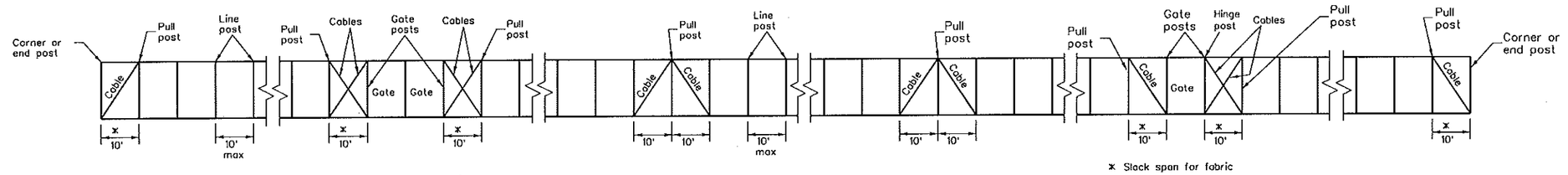
Texas Department of Transportation

Design Division Standard

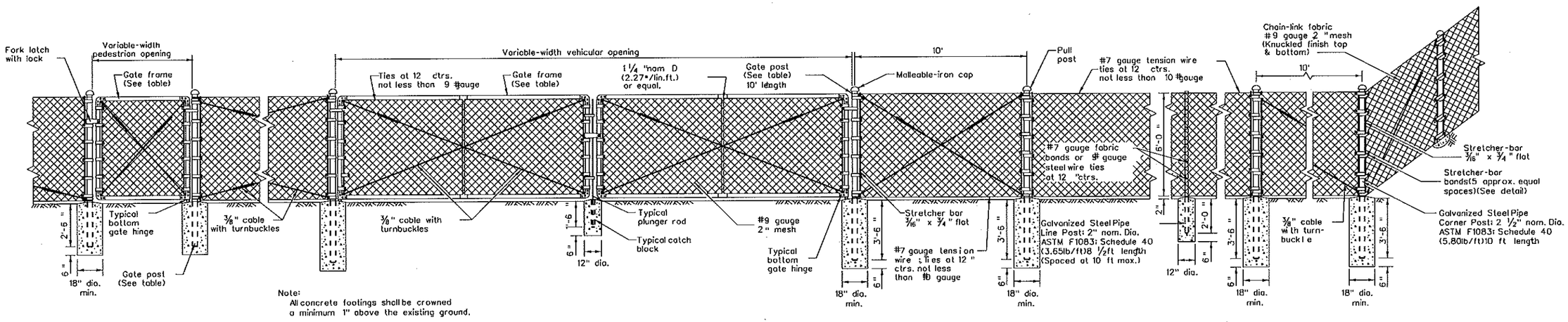
BARBED WIRE AND WOVEN WIRE FENCE
(WOOD POSTS)
WF(1)-10

FILE: wf110.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.
				90

DATE:
FILE:



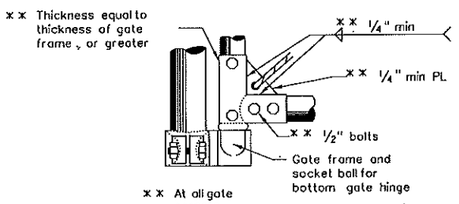
TYPICAL CABLE AND POST ARRANGEMENT



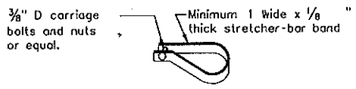
Note:
All concrete footings shall be crowned a minimum 1" above the existing ground.

CHAIN-LINK BARRIER FENCE (6 FT.)

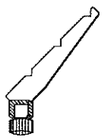
Foundation designs shown are "minimums" for a 6 ft. fence. Taller fences may require larger foundation designs.



TYPICAL BOTTOM GATE HINGE

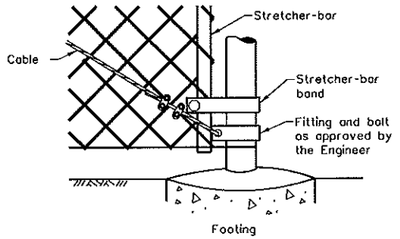


TYPICAL STRETCHER-BAR BAND

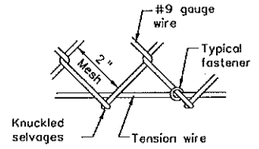


"OPTIONAL" 3 WIRE 45° BARBED WIRE ARM

Barbed wire arm related items shall conform to Item 550, "Chain Link Fence."



TERMINAL POST DETAIL



FABRIC & TENSION WIRE DETAIL, TOP & BOTTOM

GATE (TYPES AND SIZES)	
Single Inclusive	Double Inclusive
Up to 6' Over 6' to 12' Over 12' to 18' Over 18'	Up to 12' Over 12' to 26' Over 26' to 36' Over 36'

GATE FRAME (WEIGHT)		GATE POST (WEIGHT)	
SIZE	WT./LIN. FT.	SIZE	WT./LIN. FT.
1 1/2" nom dia. or equal	2.72 Lbs.	2 1/2" nom dia. or equal	5.79 Lbs.
		3 1/2" nom dia. or equal	9.11 Lbs.
		6" nom dia.	18.97 Lbs.
		8" nom dia.	24.70 Lbs.

GENERAL NOTES

1. Items hereon shall conform to Item 550, "Chain Link Fence."
2. Typical installation plan may vary as shown elsewhere on the plans or as directed by the Engineer. Location of gates shown elsewhere on plans.
3. Gate-frame members shall be bolted at frame corners to joint fittings with four 1/2 bolts per joint.
4. All cable connections are to be made with two 3/8 cable clamps.
5. All pull posts and end posts and their foundations shall have the same respective dimensions as those shown for corner post.
6. All pull post shall be furnished with two stretcher bars.
7. One end of each turnbuckle may be attached directly to fittings with a clevis.
8. Concrete footings are to be crowned at the top to shed water.

Texas Department of Transportation

Design Division Standard

CHAIN LINK FENCE

CLF-10

FILE: clf10.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
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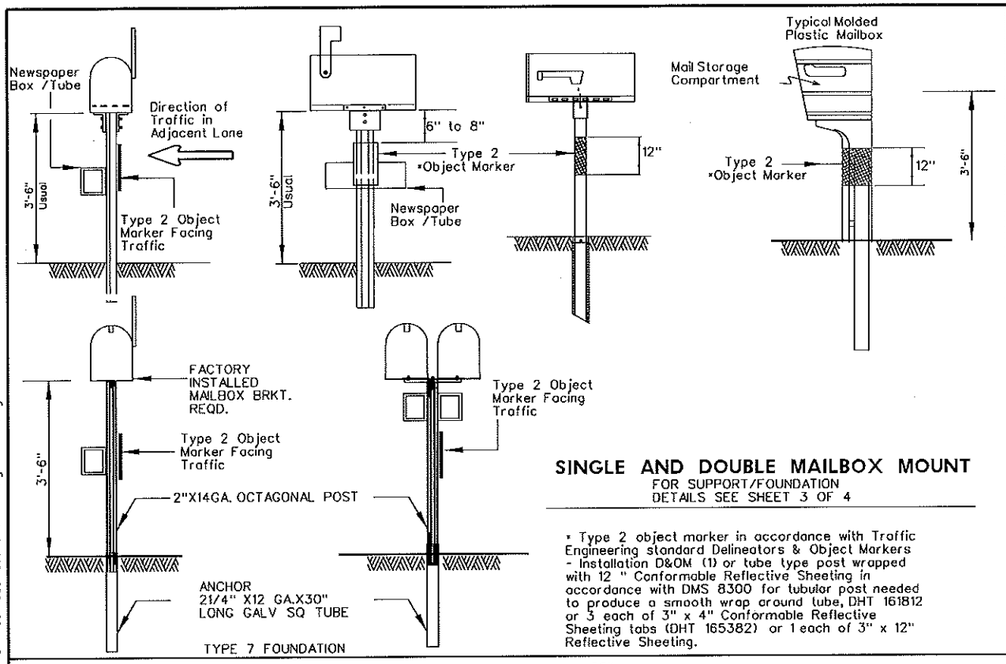
REVISIONS				
	DIST	COUNTY		SHEET NO.
				91



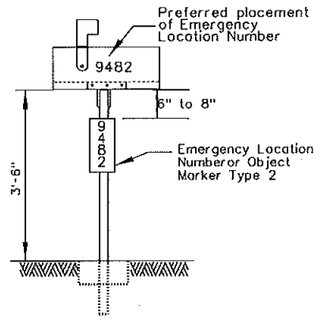
SINGLE AND DOUBLE MAILBOX MOUNT

FOR SUPPORT/FOUNDATION DETAILS SEE SHEET 3 OF 4

* Type 2 object marker in accordance with Traffic Engineering standard Delineators & Object Markers - Installation D&OM (1) or tube type post wrapped with 12 " Conformable Reflective Sheeting in accordance with DMS 8300 for tubular post needed to produce a smooth wrap around tube, DHT 161812 or 3 each of 3" x 4" Conformable Reflective Sheeting tabs (DHT 165382) or 1 each of 3" x 12" Reflective Sheeting.

Note: Mailbox installations in sidewalk areas shall be in accordance with the latest TxDOT Pedestrian Facilities Curb ramps standard *PED-XX for pedestrian facilities.

*PED-XX: XX is the standard year for example PED- 12 , PED-13,etc.



PLACEMENT OF EMERGENCY LOCATION NUMBER

Location Number shall be placed on: 1. A yellow, type A plate with class 1 flat surface reflective sheeting in accordance with DMS 8600. The color of numbers shall be black. or 2: A green or blue plate with white numbers attached to post beside the object marker. Other contrasting color configuration, as approved , may be used. (Use Same type plate as used for the type 2 Object Marker. Recommended sign size is 6" by 15").

TYPICAL MAILBOX SIZE				LIGHT WEIGHT MATERIAL	
				SHEET METAL	**PLASTIC
SIZE	LENGTH (INCHES)	WIDTH (INCHES)	HEIGHT (INCHES)	MAXIMUM WEIGHT (POUNDS)	
SMALL	19 1/2	6	7	5	5
MEDIUM	22 1/2	8	11 1/2	7	7
LARGE	23 1/2*	11 1/2*	13 1/2*	10	10

* Maximum allowed dimensions for mailbox
** Excluding Molded Plastic on 4 X 4 Post

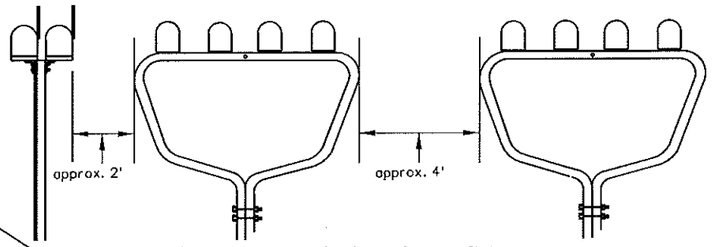
LOCKABLE ARCHITECTURAL MAILBOX SIZE (INCHES)					
VIEW	TOP	BOTTOM	FRONT SIDE	BACK SIDE	WEIGHT
SIDE	18	15	18.3	15	(POUNDS)
BACK	11 1/2	11 1/2		15	22.4

SEE TOP RIGHT CORNER OF SHEET 2 OF 4

MAILBOX SIZES

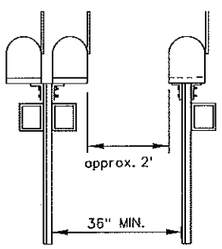
Mailboxes shall be made of light weight sheet metal or light weight plastic. Lockable architectural mailboxes shall meet the requirements of the above table.

Heavy steel, cast iron or decorative mailboxes shall not be used on the state highway system.



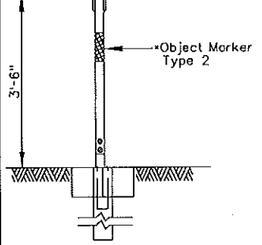
4' Clear Distance between multiple installations and 2' clearance between double or single installations and the multiple installation. DHT *'s 164116 or 149339.

MULTIPLE MAILBOX PLACEMENT

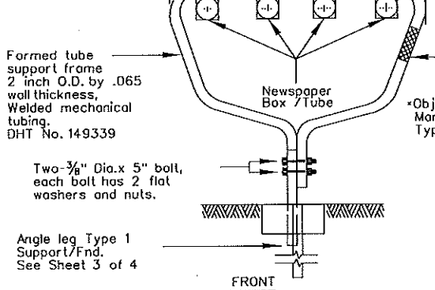


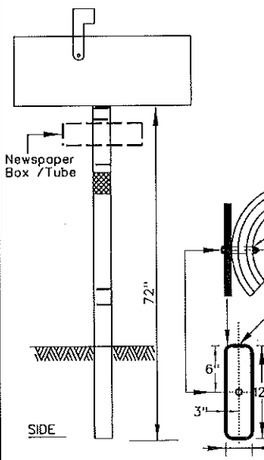
Clear Distance between single or double mounted posts. (Normally when 3 or more mailboxes are in one location, a multiple support is used).

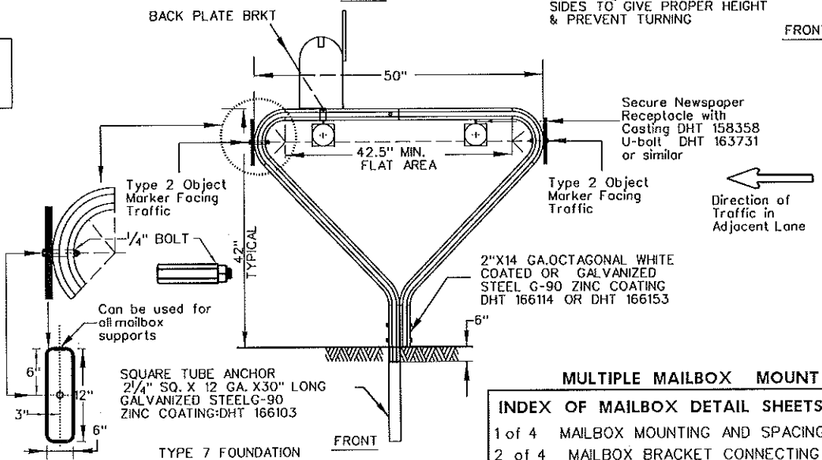
SINGLE & DOUBLE MAILBOX PLACEMENT



FOR SUPPORT/FOUNDATION DETAILS SEE SHEET 3 OF 4

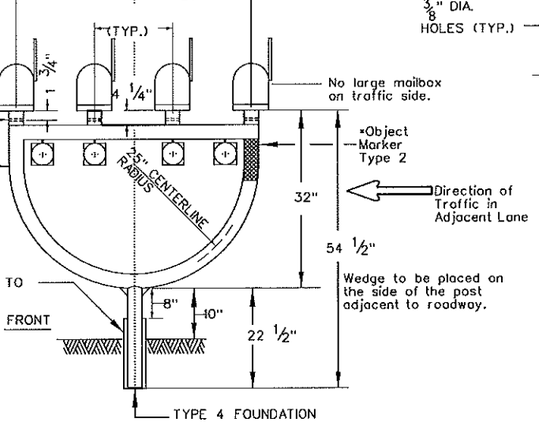




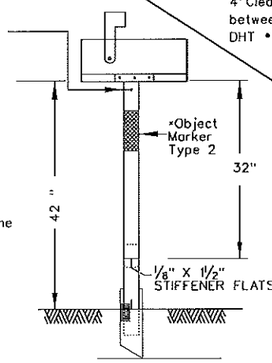


MULTIPLE MAILBOX MOUNT

NOTE: - ALL WELDS 1/4" AROUND ALL JOINTS. POWDERCOAT WHITE



DOUBLE AND MULTIPLE MAILBOX MOUNT



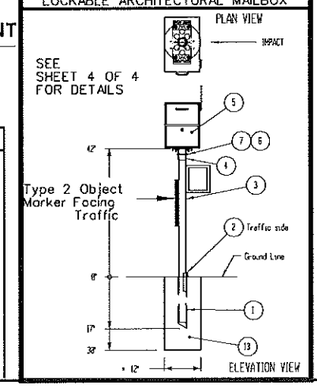
FOR SUPPORT/FOUNDATION DETAILS SEE SHEET 3 OF 4
FOR DHT NUMBERS SEE SHEET 4 OF 4

NEWSPAPER RECEPTACLE

A light weight receptacle for newspaper delivery can be attached to mailbox posts as shown on this page if the receptacle:

- Does not touch the mailbox.
- Does not present a hazard to traffic or delivery of the mail.
- Does not extend beyond the front of the mailbox.
- Does not display advertising, except the publication title.
- Newspaper receptacles on separate supports are prohibited.

LOCKABLE ARCHITECTURAL MAILBOX



INDEX OF MAILBOX DETAIL SHEETS

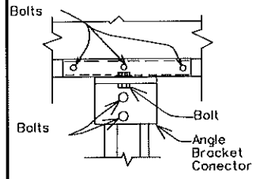
Texas Department of Transportation

Maintenance Division Standard

MAILBOX MOUNTING AND SPACING

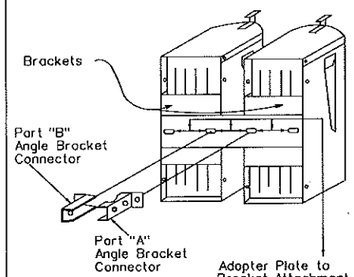
MB-15(1)

FILE: MB1415.DGN	DN: JEO	CK: JEO	DW:	CK:
©TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS: Added additional newspaper receptacle for double mailbox support	DIST	COUNTY		SHEET NO. 92



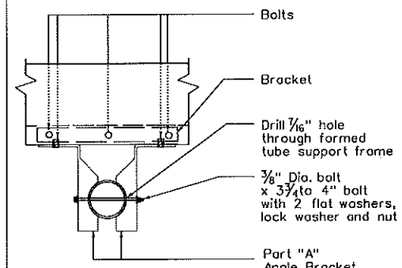
For bolt sizes see details below for "SMALL MAILBOX" and "MEDIUM AND LARGE MAILBOXES"

SINGLE MAILBOX

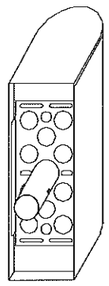


(Not permitted for Large Mailboxes)

DOUBLE MAILBOX

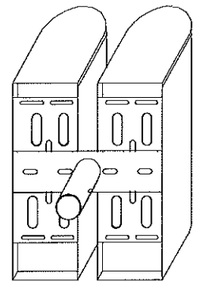


MULTIPLE MAILBOX



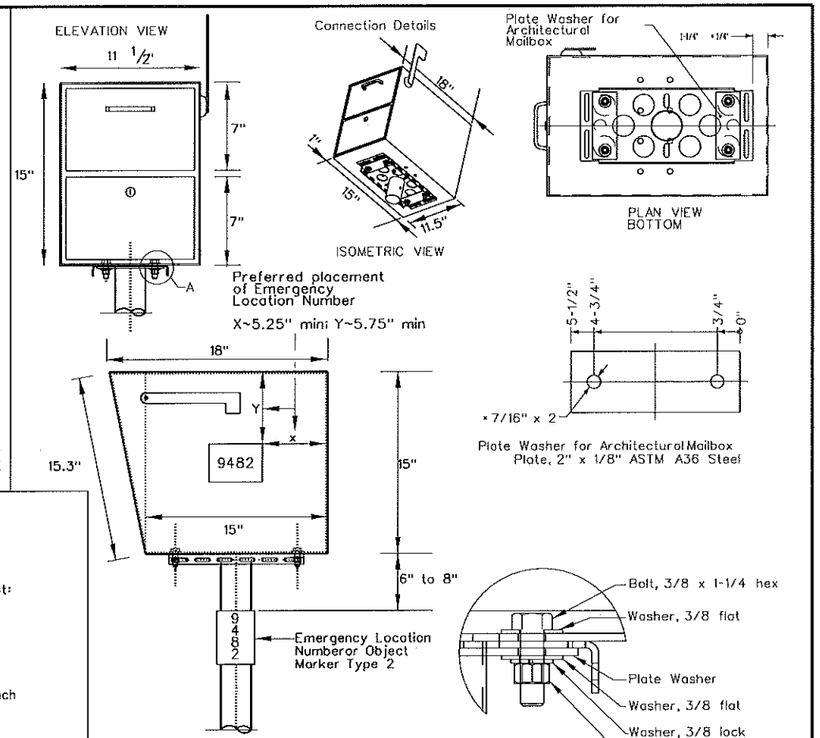
To be used with 2⅜" OD RR or thinwall Steel posts.

WELDED SINGLE MAILBOXBRACKET

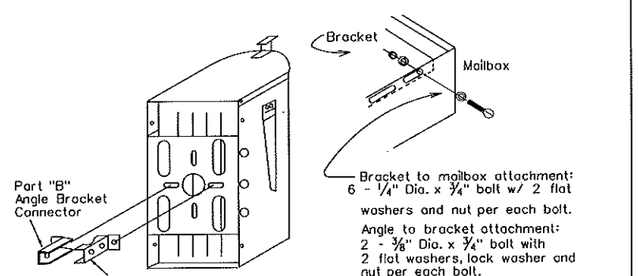


To be used with thinwall Steel posts. Not to be used with RR posts.

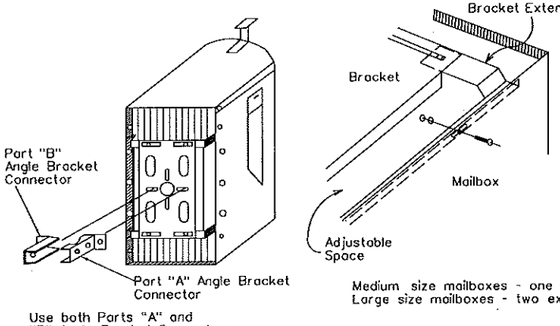
WELDED DOUBLE MAILBOX BRACKET WITHADAPTER PLATE



LOCKABLE ARCHITECTURAL MAILBOX CONNECTION DETAILS



SMALL MAILBOX



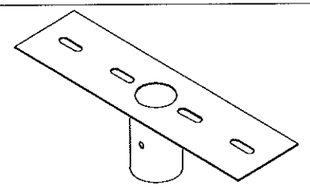
Use both Parts "A" and "B" Angle Bracket Connectors for Winged Channel Posts

Medium size mailboxes - one extension bracket
Large size mailboxes - two extension brackets

MEDIUM AND LARGE MAILBOXES

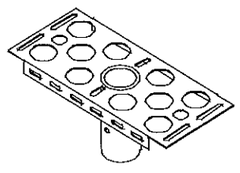
GENERAL NOTES

1. Connecting hardware detailed on this sheet is for the hardware that the Department stocks at the Regional Warehouses. This hardware is available to the contractor only when so stated elsewhere in the plans or specification.
2. Hardware for mounting mailboxes to the support/foundation furnished by industry should be used when shown on the Maintenance Divisions "Approved Products List." Only mailbox hardware that have been crash tested in accordance with NCHRP Report 350, will be on the approved list.
3. Hardware furnished by industry shall be erected in accordance with the manufacturer's recommendation.
4. Bracket and bracket extension shall be constructed of 14 gauge galvanized steel sheet metal.
5. The angles, brackets and adapter plates shall be constructed of 12 gauge galvanized steel sheet metal.
6. Items with evidence of damage to the galvanized coating or wet storage stains (white rust) will not be accepted.



DHT 162323

For use with galvanized thinwall steel posts DHT • 143426 or powder-coated thinwall steel post DHT • 162911.

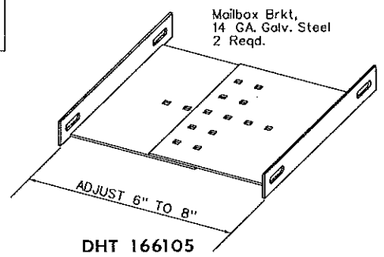


DHT 161443

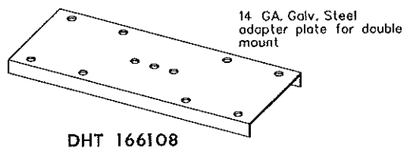
For use with RCR post DHT • 161442 or galvanized thinwall steel post DHT • 143426 or powder-coated thinwall steel post. DHT • 162911.

DHT #3789

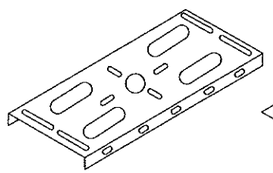
Used for mounting two Mailboxes on the same post.



DHT 166105

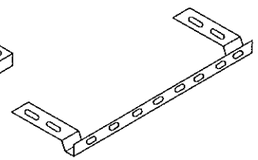


DHT 166108



DHT 148939

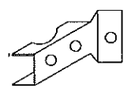
Mailbox Bracket



DHT 148938

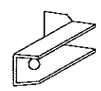
Used for extending 6" wide bracket to attach larger mailboxes.

Bracket Extension



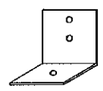
DHT 159489

Part "A" Angle Bracket Connector



DHT 159490

Part "B" Angle Bracket Connector



DHT 2917

Angle Bracket For Temporary Mailbox

HARDWARE AT TXDOT REGIONAL WAREHOUSES

Brackets and adapter plate shown in this section should be available to the Contractor when stated elsewhere in plans or specifications.

See Table of Applicable DHT Numbers on sheet 4 of 4 for DHT description and unit of measure.

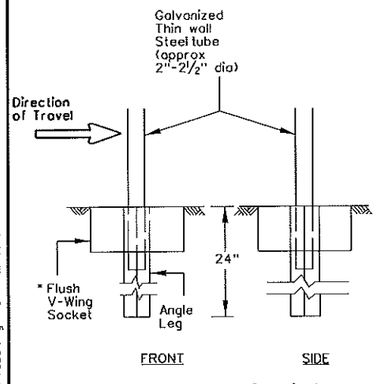
SHEET 2 OF 4

Texas Department of Transportation | Maintenance Division Standard

MAILBOX BRACKET CONNECTING DETAILS

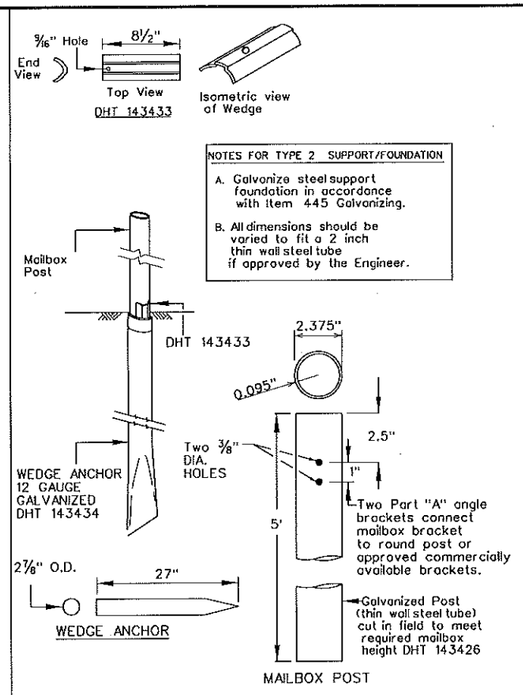
MB-15(1)

FILE: MB1411D.DGN	DN: JEO		CK:	DW: JEO	CK:
©TxDOT APRIL 2015	CONT	SECT	JOB		HIGHWAY
REVISIONS ADDED DHT 163730					
	DIST	COUNTY			SHEET NO.
					93



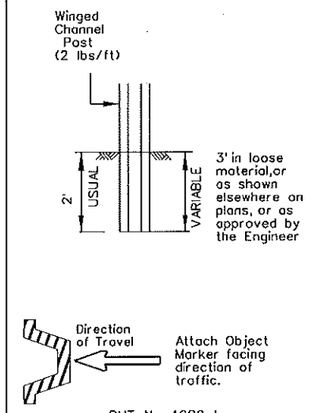
TYPE 1 SUPPORT/FOUNDATION

THIN WALL STEEL TUBE w/ V-LOC ANCHORAGE



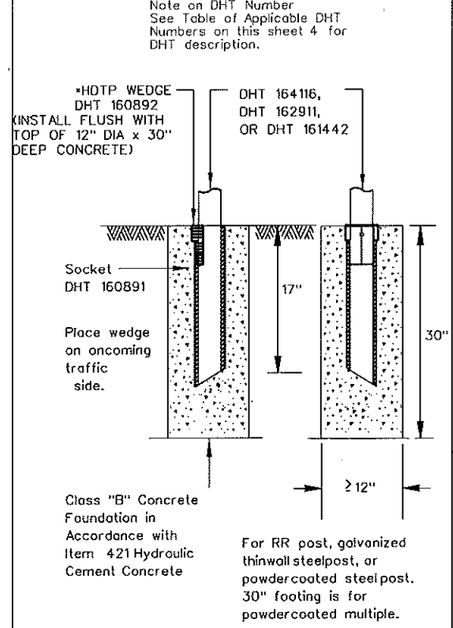
TYPE 2 SUPPORT/FOUNDATION

THIN WALL STEEL TUBE w/ WEDGE ANCHOR SYSTEM



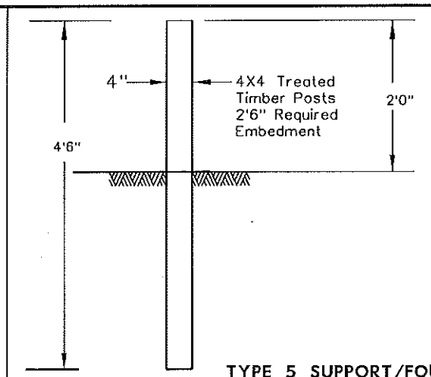
TYPE 3 SUPPORT/FOUNDATION

WINGED CHANNEL POST



TYPE 4 SUPPORT/FOUNDATION

FOR WHITECOATED STEEL POST, MULTIPLE POST, AND RECYCLED RUBBER.

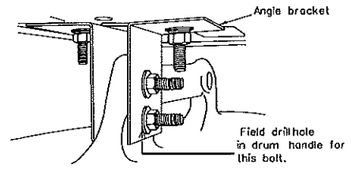


TYPE 5 SUPPORT/FOUNDATION

FOR ONE PIECE MOLDED PLASTIC MAILBOX

ONE PIECE MOLDED PLASTIC MAILBOXES

Molded Plastic Mailboxes shall be installed on 4"x4" treated timber posts only. The use of steel pipe or structural tubing in place of timber post is prohibited.

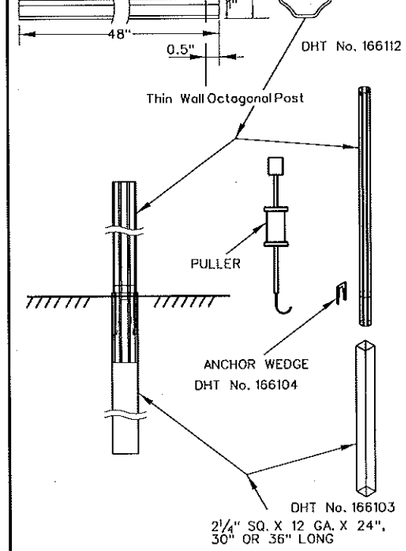


Placed on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).

Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

TYPE 6 TEMPORARY MAILBOX SUPPORT

CONNECTION DETAIL



TYPE 7 MAILBOX SUPPORT/FOUNDATION

CONNECTION DETAIL

GENERAL NOTES

1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. type 1, 2, 3, 4 or 7 supports or foundation can be used for single or double mailbox installations. The RCR post should be used only for a single installation with a small mailbox. The Type 5 support/foundation is used for the single molded plastic mailbox. The Type 4 support/foundation is used for the 2.375" O.D. RR post, thin wall steel post, and white multiple mailbox post.
4. The Type 1 or type 7 support/foundation can be used for a multiple mailbox mount.
5. The Type 4 support should be used with thin wall steel pipe for the medium, large and double mailbox installations.
6. Use a concrete footing as shown or when directed. Concrete footing will be required when soils do not hold the support/foundations in a stable condition.

MB-(X) ASSM TY (XXX) (X) (XX) (OPTIONAL)

Type of Mailbox
- S - Single
- D - Double
- M - Multiple
- SP - Single Plastic

Type of Post
- WC - Winged Channel Post
- RR - Recycled Rubber
- TWW - Thin Walled White Tubing
- TWG - Thin Walled Galvanized Tubing
- TIM - Timber

Type of Foundation
- Ty 1 - V-Loc
- Ty 2 - Wedge Anchor Steel System
- Ty 3 - Winged Channel post
- Ty 4 - Wedge Anchor Plastic System
- Ty 5 - 4 X 4 Post
- Ty 7 - Wedge Anchor

Type of Bracket
- AB - Angle Bracket.
- TB - 2.375" Tube Bracket

DOUBLE AND LARGE MAILBOXES MUST BE ON STEEL POST.

*HDTP: High density thermoplastic polyesters

Texas Department of Transportation

Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB-15(1)

FILE: MB15(1).DGN	DN: JEO	CK:	DW: JEO	CK:
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REVISIONS				
	DIST	COUNTY		SHEET NO.
				94

LOCKABLE ARCHITECTURAL MAILBOX

SINGLE-MOUNT INSTALLATION PARTS			
#	PART NAME	PART/DHT #	QTY
1	SOCKET, TYPE 4 FOUNDATION	160891	1
2	WEDGE FOR TYPE 4 FOUNDATION	160892	1
3	THIN-WALL WHITE STEEL TUBE 2.375 OD	162911	1
4	BRACKET FOR ATTACHING MAILBOX	161443	1
5	ARCHITECTURAL MAILBOX	SEE NOTE	1
6	NUT, 5/16" HEX	NUT, 5/16" HEX	1
7	BOLT, 5/16 X 3 HEX	GRADE 5	1
8	PLATE WASHER FOR ARCHITECTURAL MAILBOX	SEE SEE SHEET 2	2
9	WASHER, 3/8 FLAT		8
10	WASHER, 3/8 LOCK		4
11	NUT, 3/8 HEX		4
12	BOLT, 3/8 X 1-1/4 HEX	GRADE 5	4
13	CONCRETE, CLASS B (2000 PSI)		1

LOCKABLE ARCHITECTURAL MAILBOX DETAILS

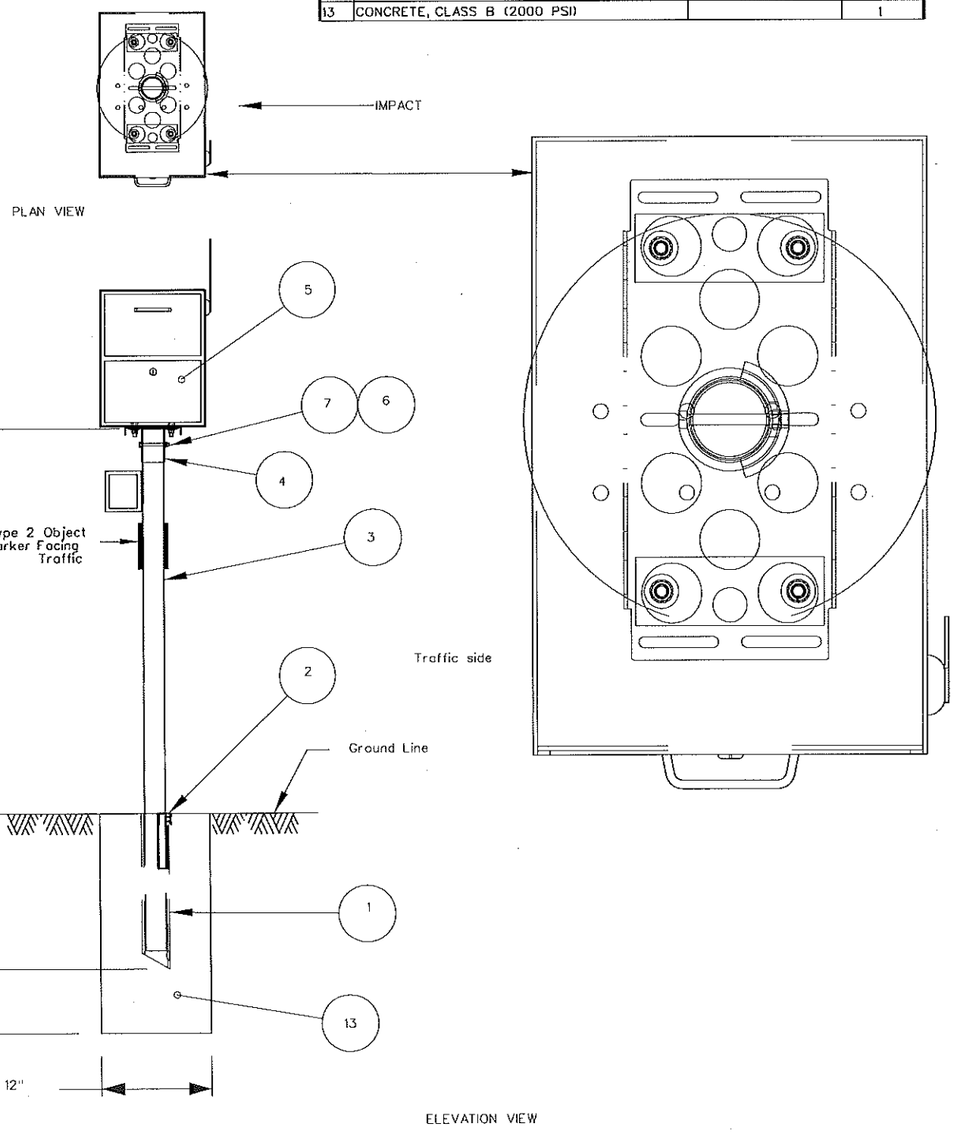


TABLE OF APPLICABLE DHT NUMBERS	
DHT NUMBER	DESCRIPTION
	FOUNDATIONS
46625	WEDGE FOR V-WING SOCKET FOR TYPE 1 FOUNDATION
149340	V-WING SOCKET FOR TYPE 1 FOUNDATION
143433	WEDGE FOR TYPE 2 FOUNDATION
143434	ANCHOR FOR TYPE 2 FOUNDATION
166103	ANCHOR FOR TYPE 7 FOUNDATION
160891	SOCKET FOR TYPE 4 FOUNDATION
160892	WEDGE FOR TYPE 4 FOUNDATION
166104	WEDGE FOR TYPE 7 FOUNDATION
	POSTS
4289	WINGED CHANNEL MAILBOX POST
149339	MULTIPLE MAILBOX POST (GALVANIZED TUBING)
164116	MULTIPLE MAILBOX POST (WHITE COATED)
166114	MULTIPLE MAILBOX POST (WHITE COATED OCTAGONAL)
166153	MULTIPLE MAILBOX POST (GALVANIZED OCTAGONAL)
161442	RECYCLED RUBBER POST. FOR SMALL MAILBOX ONLY
143426	THIN-WALL GALVANIZED STEEL TUBE 2.375" OUTER DIAMETER
162911	THINWALL WHITE STEEL TUBE 2.375" OUTER DIAMETER
166152	SINGLE OR DOUBLE THIN-WALL MAILBOX POST GALVANIZED 2" OCTAGONAL
166112	SINGLE OR DOUBLE THIN-WALL MAILBOX POST WHITECOATED 2" OCTAGONAL
	REFLECTIVE SHEETING
161812	REFLECTIVE SHEETING FOR EMERGENCY LOCATION NUMBER PANEL
	CONNECTING HARDWARE
2917	ANGLE BRACKET USED FOR TEMPORARY MAILBOX SUPPORT
166105	BRACKET FOR SINGLE MOUNTING OF MAILBOXES (MOUNTING KIT)
3789	PLATE FOR DOUBLE MOUNTING OF MAILBOXES
166108	BRACKET FOR DOUBLE MOUNTING OF MAILBOXES (MOUNTING KIT)
166111	BRACKET FOR MULTIPLE MOUNTING OF MAILBOXES (MOUNTING KIT)
148939	BRACKET FOR ATTACHING SMALL OR MEDIUM SIZE MAIL BOX
148938	EXTENDER TO BRACKET FOR ATTACHING LARGE MAILBOX
159489	ANGLE BRACKET PART A
159490	ANGLE BRACKET PART B
162323	BRACKET FOR DOUBLE MOUNTING OF MAILBOXES ON THINWALL STEEL POST, GALVANIZED OR POWDERCOATED.
161443	BRACKET FOR ATTACHING MAILBOX TO RECYCLED RUBBER POST AND TO MULTIPLE WHITE MAILBOX POST
158358	CASTING (NEWSPAPER RECEPTACLE BRACKET)
163731	U-BOLT (NEWSPAPER RECEPTACLE BRACKET)
160698	BOLT:HEX HEAD, GALV:3/8"DIA X 3/4"L HD, W/2-FLAT WASHERS
163750	BOLT:HEX HEAD, GALV:3/8" X 1-1/2, 16 NC, W/WASHERS
160701	BOLT:HEX HEAD, GALV:3/8"DIA X 2-1/2"L, HD, W/2-FLAT WASHERS
163730	BOLT:HEX HEAD, GALV:3/8" X 3-1/2", NC, W/NUT, 2 FLAT WASHERS
160699	BOLT:HEX HEAD, GALV:3/8"DIA X 3-3/4"L HD, W/2-FLAT WASHERS
160700	BOLT:HEX HEAD, GALV:3/8"DIA X 4"L HD, W/2-FLAT WASHERS

Texas Department of Transportation | Maintenance Division Standard

DHT NUMBERS TABLE

MB-15(1)

FILE: MB14(1).DGN	DN:	CK:	DW:	CK:
©TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.
				95

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

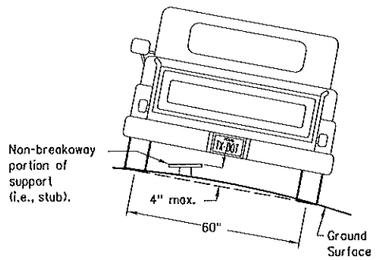
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

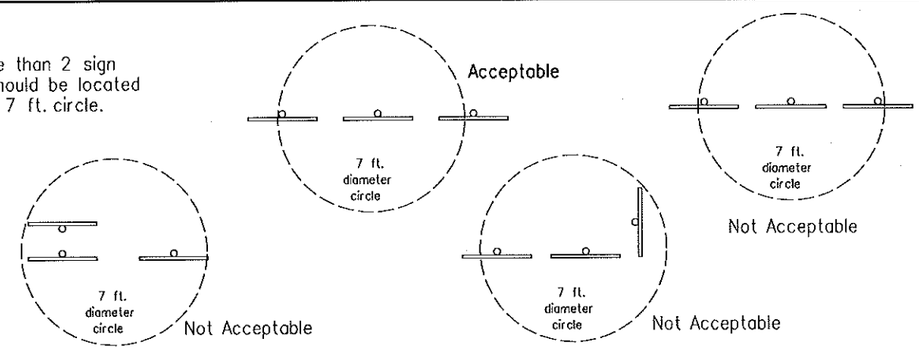
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



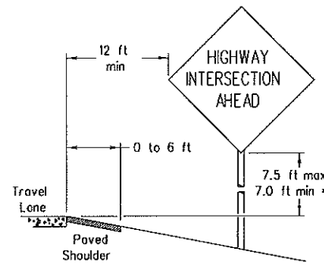
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheelpaths).

No more than 2 sign posts should be located within a 7 ft. circle.



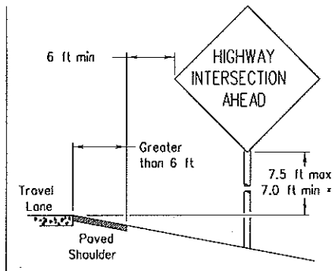
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

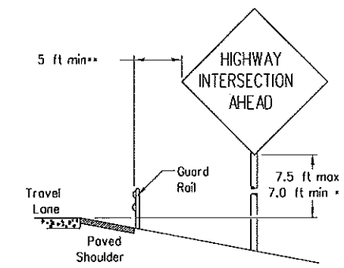
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



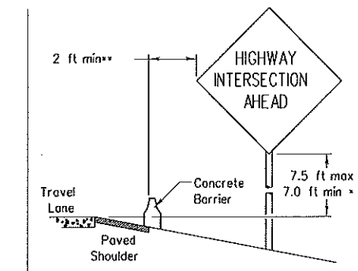
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

BEHIND BARRIER



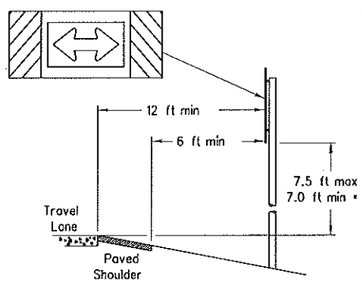
BEHIND GUARDRAIL



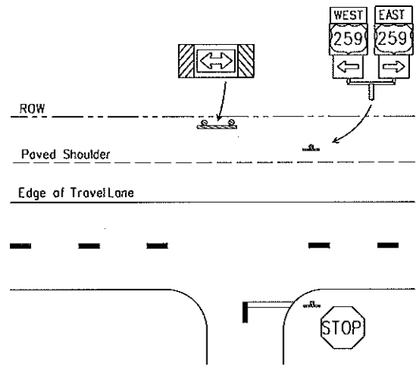
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

T-INTERSECTION



When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

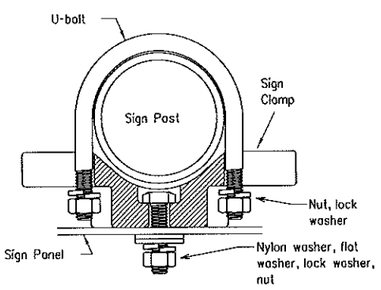
The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

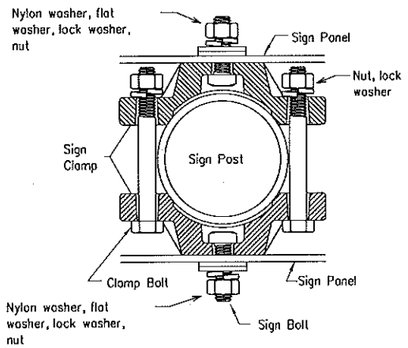


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

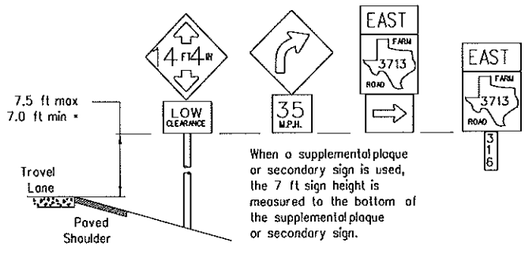
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



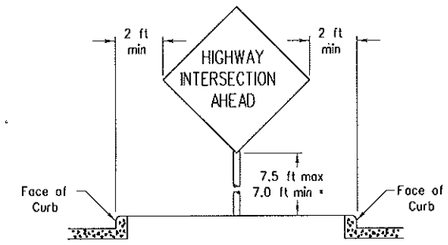
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



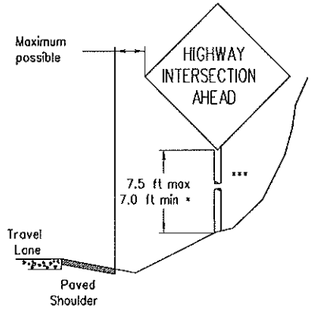
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

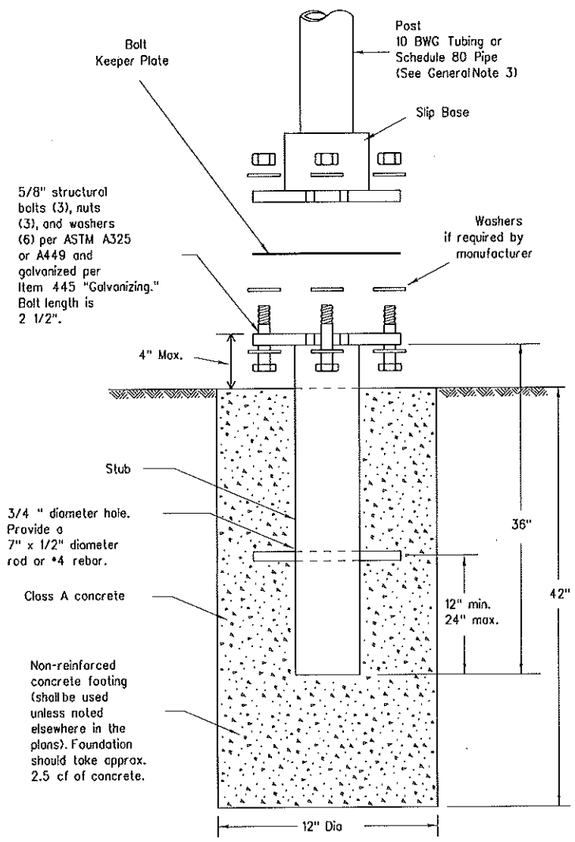
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

©TxDOT July 2002	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08 REVISIONS	CONT	SECT	JOB	HIGHWAY
	DIST	COUNTY		SHEET NO.
				96

DATE:
FILE:

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer list.htm_ The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   - 10 BWG Tubing (2.875" outside diameter)
     - 0.134" nominal wall thickness
     - Seamless or electric-resistance welded steel tubing or pipe
     - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
     - Other steels may be used if they meet the following:
       - 55,000 PSI minimum yield strength
       - 70,000 PSI minimum tensile strength
       - 20% minimum elongation in 2"
     - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
     - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
     - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
   - Schedule 80 Pipe (2.875" outside diameter)
     - 0.276" nominal wall thickness
     - Steel tubing per ASTM A500 Gr C
     - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
       - 46,000 PSI minimum yield strength
       - 62,000 PSI minimum tensile strength
       - 21% minimum elongation in 2"
     - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
     - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
     - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

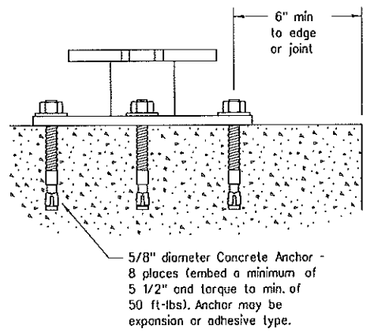
Foundation

1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support

1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

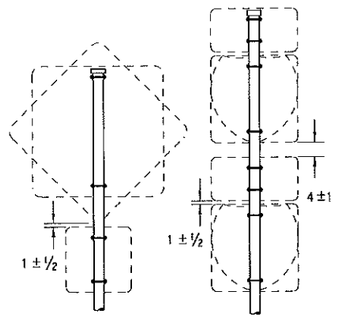
SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
DIST	COUNTY		SHEET NO.
			97

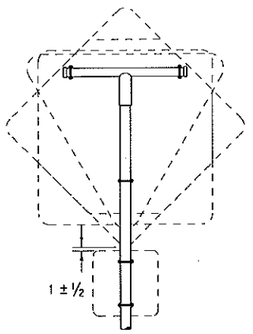
9-08 REVISIONS

DATE:
FILE:

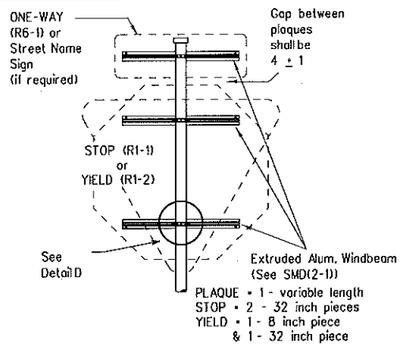
268



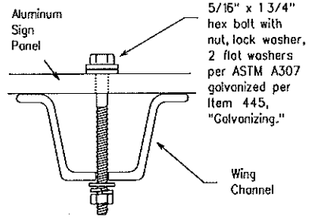
SM RD SGN ASSM TY XXXXX(1)XX(P)



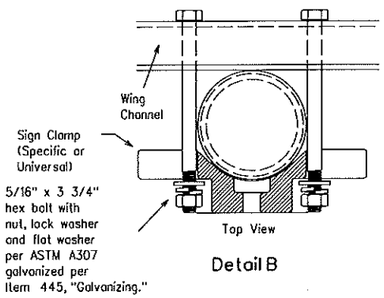
SM RD SGN ASSM TY XXXXX(1)XX(T)



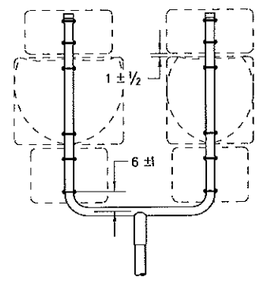
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



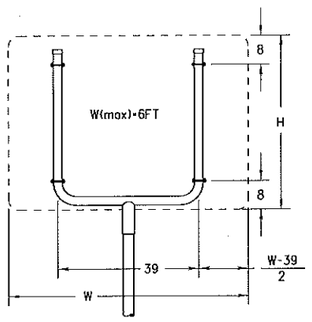
Detail A



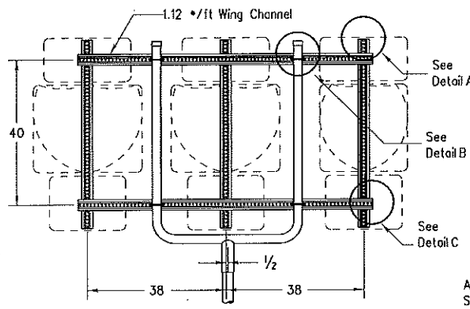
Detail B



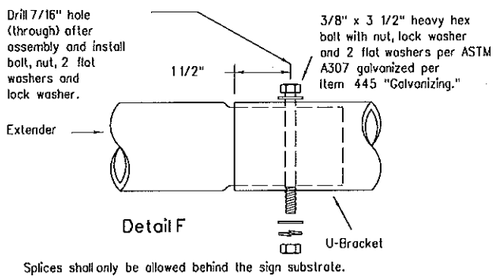
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

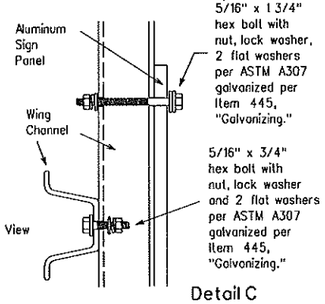


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

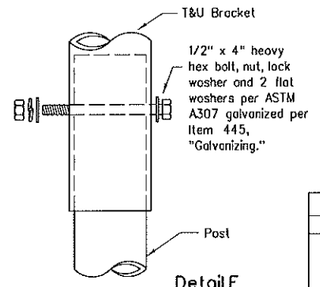


Detail F

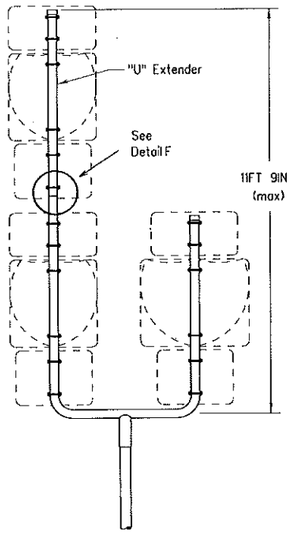
Splices shall only be allowed behind the sign substrate.



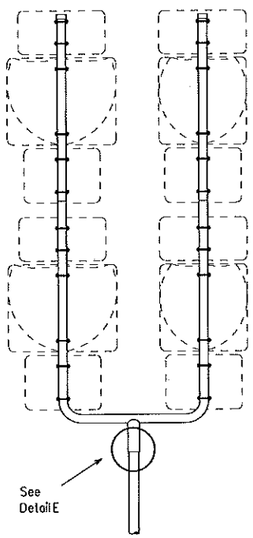
Detail C



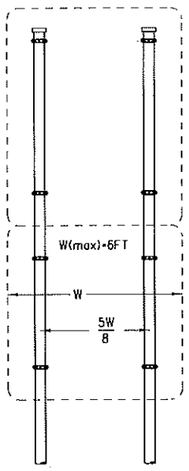
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

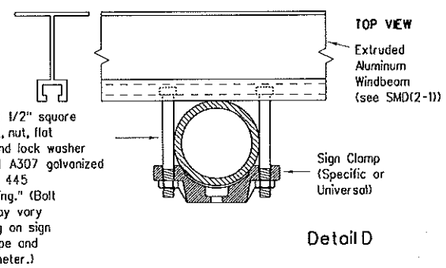


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

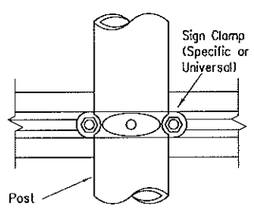


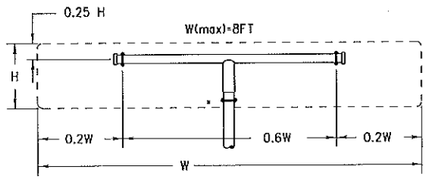
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

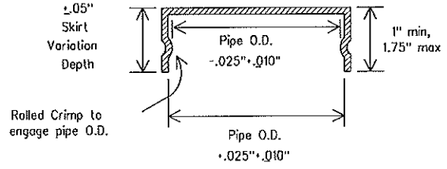




All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

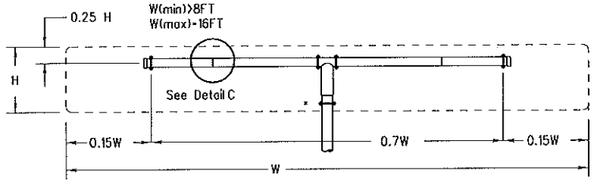
SMD(SLIP-2)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
DIST	COUNTY		SHEET NO.
			98

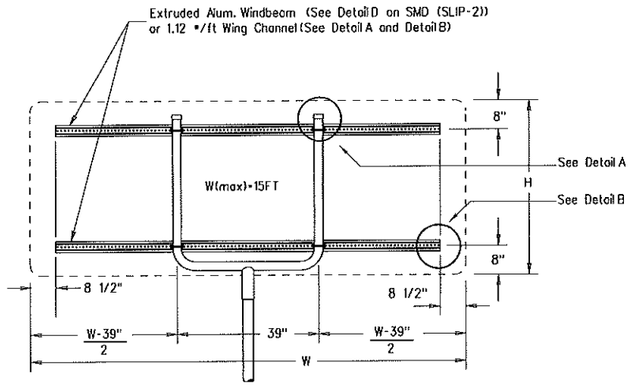
9-08 REVISIONS

DATE:
FILE:

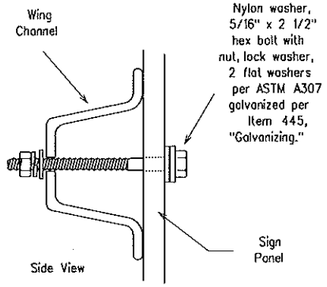
26C



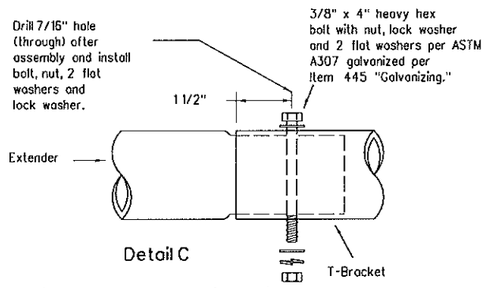
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

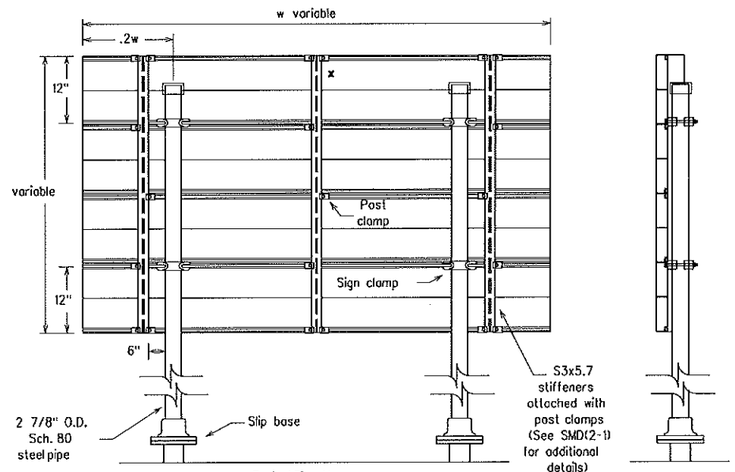


Detail B



Detail C

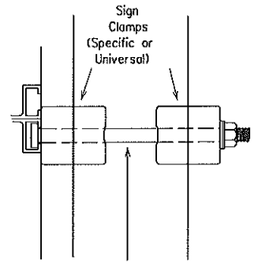
Splices shall only be allowed behind the sign substrate.



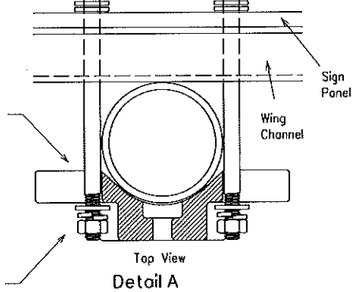
Typical Sign Mount

SM RD SGN ASSM TY S80(2)XX(P-EXAL)

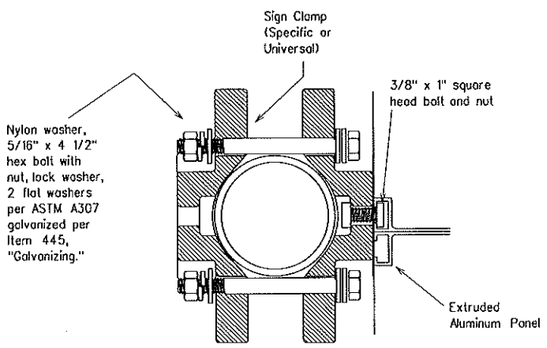
x Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



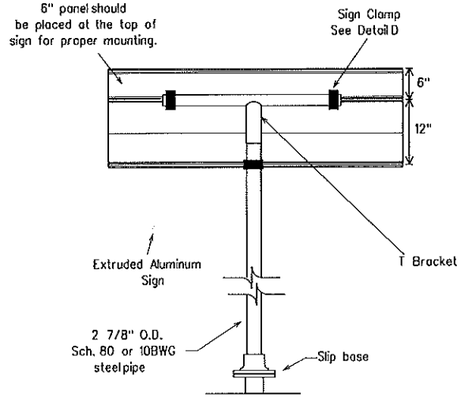
Detail E



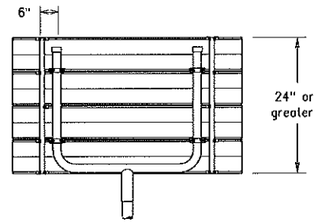
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
DIST	COUNTY		SHEET NO.
			99

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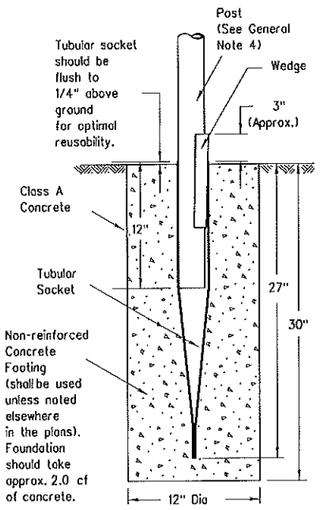
26D

DATE:
FILE:

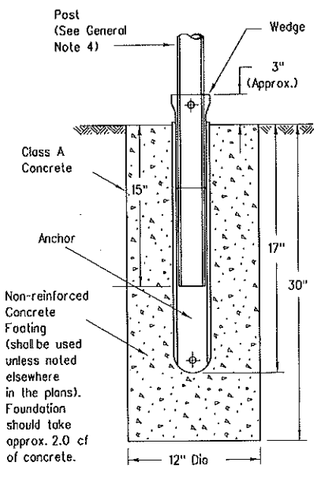
DATE:
FILE:

Wedge Anchor Steel System



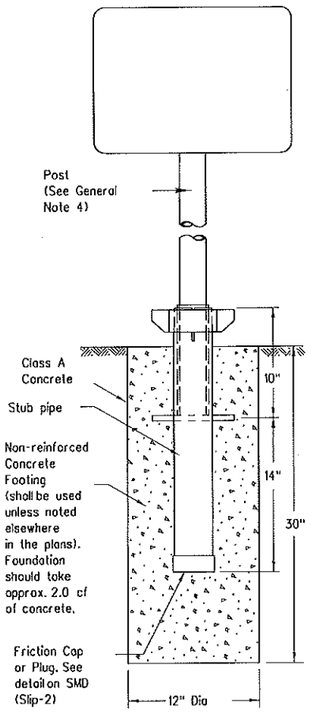
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

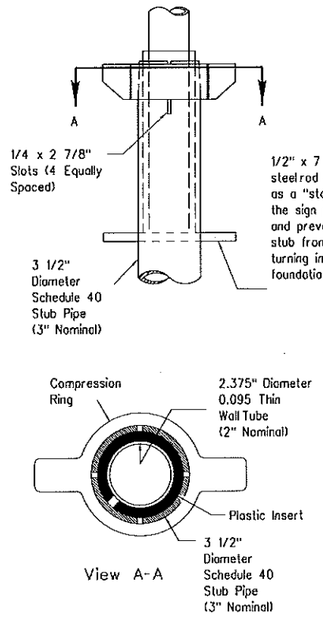


SMD RD SGN ASSM TY TWT(X)WP(X)

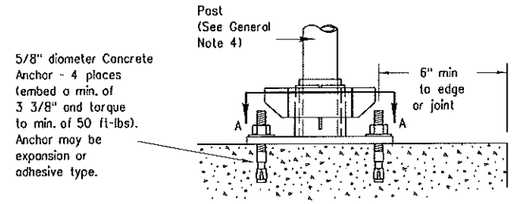
Universal Anchor System with Thin-Walled Tubing Post



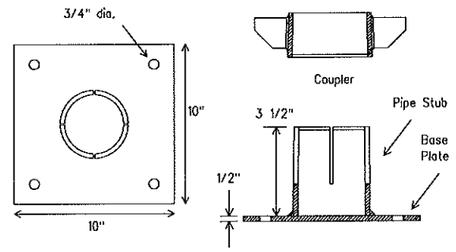
SM RD SGN ASSM TY TWT(X)UA(P)



Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

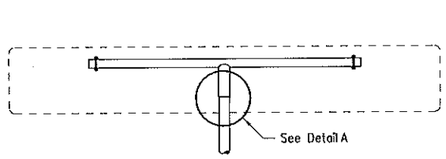


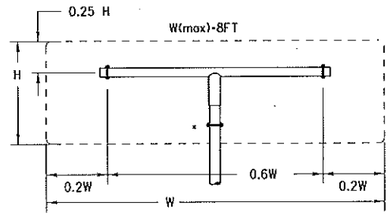
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



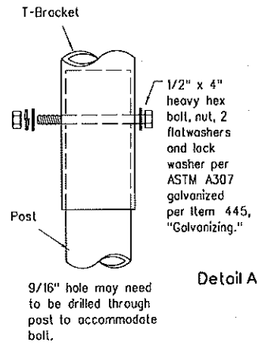
SM RD SGN ASSM TY TWT(X)UB(P)

Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)
(* - See General Note 6)



Detail A

NOTE

The devices shall be installed per manufacturer's recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   Other steels may be used if they meet the following:
   55,000 PSI minimum yield strength
   70,000 PSI minimum tensile strength
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximately 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
DIST	COUNTY		SHEET NO.
			100

9-08 REVISIONS

26E

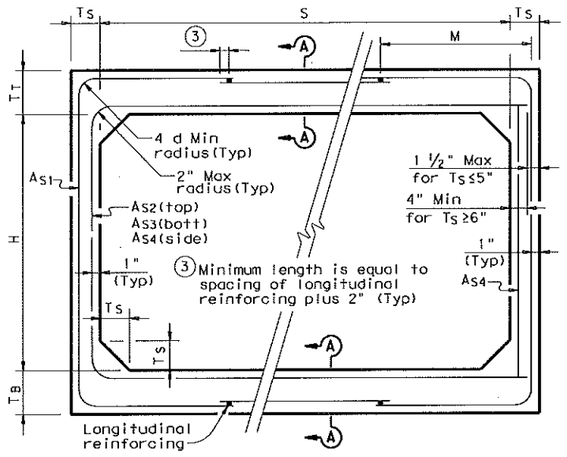
DATE:
FILE:

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (in²/ft) ②								① Lift Weight (Tons)
S (ft)	H (ft)	T_T (in)	T_B (in)	T_S (in)	(ft)	(in)	A_{S1}	A_{S2}	A_{S3}	A_{S4}	A_{S5}	A_{S6}	A_{S7}	A_{S8}	
10	5	10	10	10	<2	-	0.30	0.36	0.30	0.24	0.24	0.24	0.24	0.24	17.5
10	5	10	10	10	2<3	58	0.35	0.39	0.34	0.24	-	-	-	-	17.5
10	5	10	10	10	3-5	53	0.28	0.31	0.30	0.24	-	-	-	-	17.5
10	5	10	10	10	10	52	0.33	0.35	0.36	0.24	-	-	-	-	17.5
10	5	10	10	10	15	47	0.42	0.46	0.47	0.24	-	-	-	-	17.5
10	5	10	10	10	20	47	0.55	0.59	0.61	0.24	-	-	-	-	17.5
10	5	10	10	10	25	47	0.68	0.73	0.75	0.24	-	-	-	-	17.5
10	6	10	10	10	<2	-	0.28	0.38	0.33	0.24	0.24	0.24	0.24	0.24	18.5
10	6	10	10	10	2<3	58	0.32	0.42	0.37	0.24	-	-	-	-	18.5
10	6	10	10	10	3-5	52	0.26	0.34	0.33	0.24	-	-	-	-	18.5
10	6	10	10	10	10	52	0.30	0.38	0.39	0.24	-	-	-	-	18.5
10	6	10	10	10	15	47	0.39	0.49	0.51	0.24	-	-	-	-	18.5
10	6	10	10	10	20	47	0.50	0.63	0.65	0.24	-	-	-	-	18.5
10	6	10	10	10	25	47	0.61	0.78	0.80	0.24	-	-	-	-	18.5
10	7	10	10	10	<2	-	0.25	0.40	0.36	0.24	0.24	0.24	0.24	0.24	19.5
10	7	10	10	10	2<3	58	0.30	0.45	0.40	0.24	-	-	-	-	19.5
10	7	10	10	10	3-5	58	0.24	0.36	0.35	0.24	-	-	-	-	19.5
10	7	10	10	10	10	52	0.28	0.40	0.42	0.24	-	-	-	-	19.5
10	7	10	10	10	15	47	0.36	0.52	0.54	0.24	-	-	-	-	19.5
10	7	10	10	10	20	47	0.46	0.67	0.69	0.24	-	-	-	-	19.5
10	7	10	10	10	25	47	0.56	0.82	0.85	0.24	-	-	-	-	19.5
10	8	10	10	10	<2	-	0.24	0.41	0.38	0.24	0.24	0.24	0.24	0.24	20.5
10	8	10	10	10	2<3	64	0.27	0.47	0.43	0.24	-	-	-	-	20.5
10	8	10	10	10	3-5	58	0.24	0.38	0.38	0.24	-	-	-	-	20.5
10	8	10	10	10	10	52	0.26	0.42	0.44	0.24	-	-	-	-	20.5
10	8	10	10	10	15	47	0.34	0.54	0.57	0.24	-	-	-	-	20.5
10	8	10	10	10	20	47	0.43	0.69	0.72	0.24	-	-	-	-	20.5
10	9	10	10	10	<2	-	0.24	0.42	0.41	0.24	0.24	0.24	0.24	0.24	21.5
10	9	10	10	10	2<3	70	0.26	0.50	0.46	0.24	-	-	-	-	21.5
10	9	10	10	10	3-5	64	0.24	0.40	0.40	0.24	-	-	-	-	21.5
10	9	10	10	10	10	58	0.25	0.43	0.46	0.24	-	-	-	-	21.5
10	9	10	10	10	15	52	0.32	0.56	0.59	0.24	-	-	-	-	21.5
10	9	10	10	10	20	47	0.40	0.71	0.75	0.24	-	-	-	-	21.5
10	10	10	10	10	<2	-	0.24	0.44	0.44	0.24	0.24	0.24	0.24	0.24	22.5
10	10	10	10	10	2<3	79	0.25	0.52	0.48	0.24	-	-	-	-	22.5
10	10	10	10	10	3-5	70	0.24	0.42	0.43	0.24	-	-	-	-	22.5
10	10	10	10	10	10	64	0.24	0.44	0.48	0.24	-	-	-	-	22.5
10	10	10	10	10	15	52	0.30	0.57	0.61	0.24	-	-	-	-	22.5
10	10	10	10	10	20	52	0.38	0.73	0.77	0.24	-	-	-	-	22.5

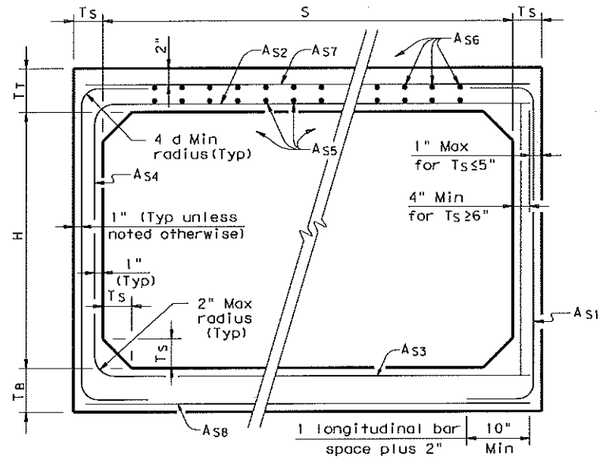
① For Box Length = 8'-0"

② A_{S1} thru A_{S4}, A_{S7} and A_{S8} are minimum required areas of reinforcement per linear foot of box length. A_{S6} and A_{S5} are minimum required areas of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

SECTION A-A

(TOP AND BOTTOM SLAB JOINT REINFORCEMENT)

GENERAL NOTES:

Designs shown conform to ASTM C1577.

Refer to ASTM C1577 for information or details not shown.

All concrete shall be Class "H" Concrete with a minimum compressive strength of 5,000 psi.

See SCP-MD standard sheet for miscellaneous details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Shop plans for alternate designs shall be submitted in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

10'-0" SPAN

SCP-10

FILE: scp10sts.dgn	DN: GAF	CK: LMV	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.
				101

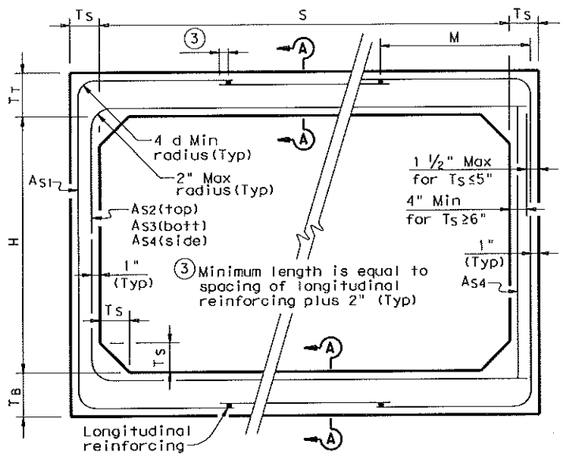
DATE:
FILE:

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (in²/ft) ②								① Lift Weight (Tons)
S (ft)	H (ft)	T_T (in)	T_B (in)	T_S (in)	(ft)	(in)	A_{S1}	A_{S2}	A_{S3}	A_{S4}	A_{S5}	A_{S6}	A_{S7}	A_{S8}	
12	4	12	12	12	<2	-	0.38	0.31	0.29	0.29	0.29	0.29	0.29	0.29	22.8
12	4	12	12	12	2<3	73	0.44	0.37	0.30	0.29	-	-	-	-	22.8
12	4	12	12	12	3-5	66	0.37	0.30	0.29	0.29	-	-	-	-	22.8
12	4	12	12	12	10	66	0.44	0.34	0.35	0.29	-	-	-	-	22.8
12	4	12	12	12	15	59	0.60	0.46	0.48	0.29	-	-	-	-	22.8
12	4	12	12	12	20	59	0.78	0.60	0.61	0.29	-	-	-	-	22.8
12	4	12	12	12	25	59	0.97	0.74	0.75	0.29	-	-	-	-	22.8
12	6	12	12	12	<2	-	0.32	0.36	0.32	0.29	0.29	0.29	0.29	0.29	25.2
12	6	12	12	12	2<3	66	0.38	0.43	0.36	0.29	-	-	-	-	25.2
12	6	12	12	12	3-5	59	0.32	0.36	0.33	0.29	-	-	-	-	25.2
12	6	12	12	12	10	59	0.38	0.41	0.42	0.29	-	-	-	-	25.2
12	6	12	12	12	15	53	0.51	0.55	0.57	0.29	-	-	-	-	25.2
12	6	12	12	12	20	53	0.65	0.71	0.72	0.29	-	-	-	-	25.2
12	6	12	12	12	25	53	0.81	0.87	0.89	0.29	-	-	-	-	25.2
12	8	12	12	12	<2	-	0.29	0.41	0.38	0.29	0.29	0.29	0.29	0.29	27.6
12	8	12	12	12	2<3	66	0.33	0.49	0.42	0.29	-	-	-	-	27.6
12	8	12	12	12	3-5	59	0.29	0.41	0.38	0.29	-	-	-	-	27.6
12	8	12	12	12	10	59	0.34	0.46	0.48	0.29	-	-	-	-	27.6
12	8	12	12	12	15	53	0.44	0.61	0.64	0.29	-	-	-	-	27.6
12	8	12	12	12	20	53	0.57	0.78	0.81	0.29	-	-	-	-	27.6
12	8	12	12	12	25	53	0.69	0.96	0.99	0.29	-	-	-	-	27.6
12	10	12	12	12	<2	-	0.29	0.45	0.43	0.29	0.29	0.29	0.29	0.29	30.0
12	10	12	12	12	2<3	73	0.29	0.54	0.48	0.29	-	-	-	-	30.0
12	10	12	12	12	3-5	66	0.29	0.45	0.43	0.29	-	-	-	-	30.0
12	10	12	12	12	10	59	0.31	0.49	0.53	0.29	-	-	-	-	30.0
12	10	12	12	12	15	53	0.40	0.65	0.70	0.29	-	-	-	-	30.0
12	10	12	12	12	20	53	0.51	0.84	0.88	0.29	-	-	-	-	30.0
12	10	12	12	12	25	53	0.62	1.03	1.07	0.29	-	-	-	-	30.0
12	12	12	12	12	<2	-	0.29	0.49	0.48	0.33	0.29	0.29	0.29	0.29	32.4
12	12	12	12	12	2<3	93	0.29	0.59	0.53	0.29	-	-	-	-	32.4
12	12	12	12	12	3-5	80	0.29	0.49	0.48	0.29	-	-	-	-	32.4
12	12	12	12	12	10	73	0.29	0.52	0.58	0.29	-	-	-	-	32.4
12	12	12	12	12	15	59	0.37	0.69	0.74	0.29	-	-	-	-	32.4
12	12	12	12	12	20	59	0.46	0.87	0.93	0.29	-	-	-	-	32.4

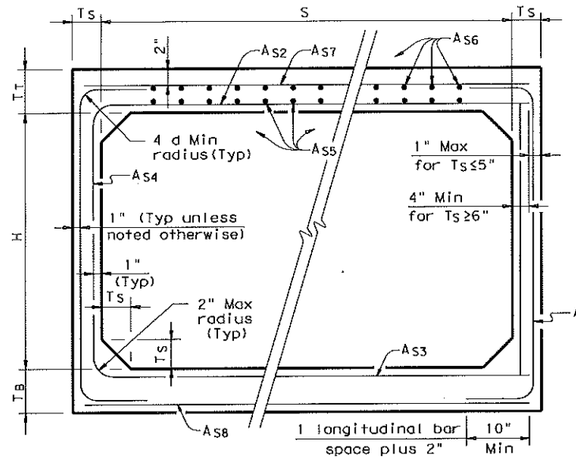
① For Box Length = 8'-0"

② A_{S1} thru A_{S4}, A_{S7} and A_{S8} are minimum required areas of reinforcement per linear foot of box length. A_{S6} and A_{S5} are minimum required areas of reinforcement per linear foot of box width.



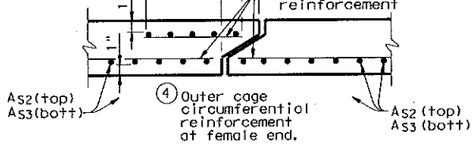
CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT



SECTION A-A

(TOP AND BOTTOM SLAB JOINT REINFORCEMENT)

GENERAL NOTES:

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Refer to ASTM C1577 for information or details not shown.

All concrete shall be Class "H" Concrete with a minimum compressive strength of 5,000 psi.

See SCP-MD standard sheet for miscellaneous details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Shop plans for alternate designs shall be submitted in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

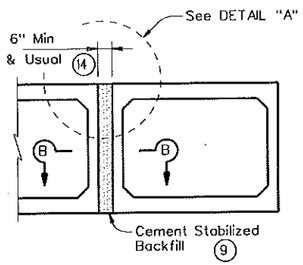
SINGLE BOX CULVERTS PRECAST

12'-0" SPAN

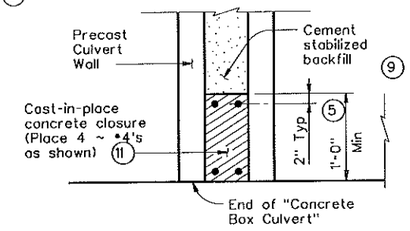
SCP-12

FILE: scp12sts.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF	
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY	
REVISIONS					
	DIST	COUNTY		SHEET NO.	
				102	

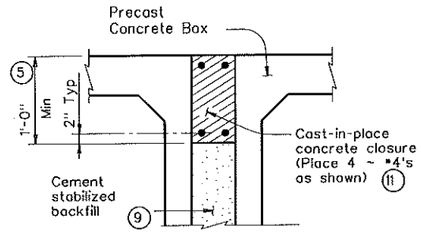
DATE:
FILE:



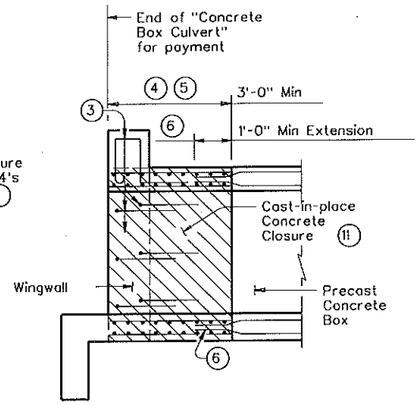
MULTIPLE UNIT PLACEMENT



SECTION B-B

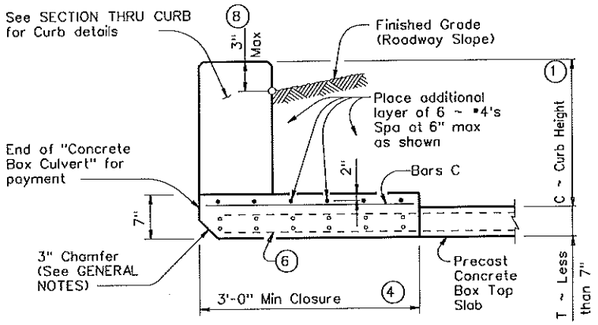


DETAIL "A" (13)

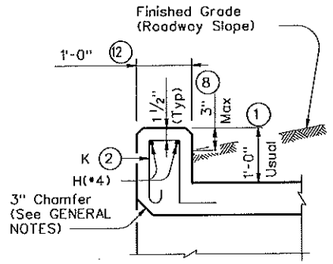


WINGWALL CONNECTION

(Also applies to Safety End Treatment)

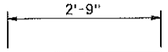


SECTION THRU TOP SLABS LESS THAN 7"

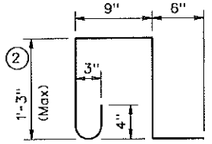


SECTION THRU CURB

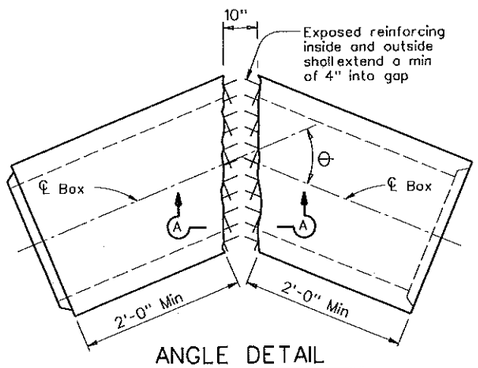
(10) QUANTITIES PER FOOT OF CURB	
Reinforcing Steel	4.18 Lb
Concrete	0.037 CY



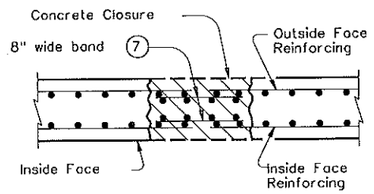
BARS C ~ #4
(Spa = 1'-0" Max)



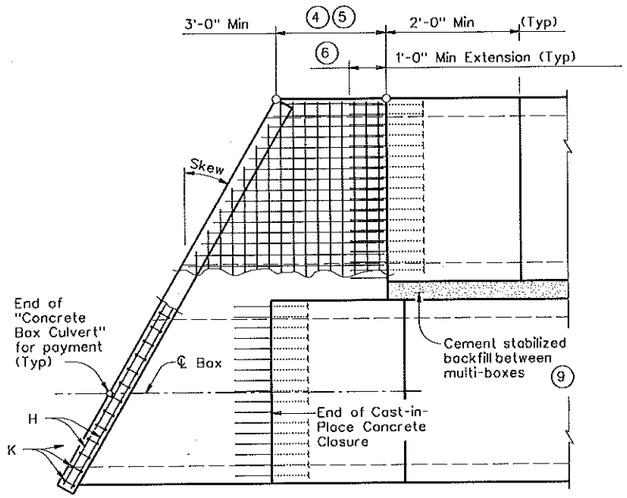
BARS K ~ #4
(Spa = 1'-0" Max)
(Length = 4'-3")



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement)

(1) 0" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail or curbs taller than 1'-0", refer to ECD standard. For structures with T6 traffic rail, refer to T6-CM standard. For structures with traffic rail, other than T6, refer to RAC standard.

(2) For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

(3) Curb, Wingwall or Safety End Treatment reinforcing shall extend into concrete closure. Any reinforcing that does not fit into the closure shall be bent or trimmed as necessary.

(4) Cast-in-place concrete closure shall be 3'-0" min. Boxes shall be cast short or broken back in the field. All reinforcing in the closure shall be the same size and spacing as in the precast box section. Except where shown otherwise, the cast-in-place closure shall be flush with the inside and outside faces of the precast box section.

(5) For multiple unit placements the length of the closure for the interior walls may be adjusted as necessary. The length of the top slab, bottom slab, and exterior wall closure shall not be less than 3'-0". See Section B-B detail when interior walls are cast full length.

(6) Precast box reinforcing shall extend a minimum of 1'-0" into concrete closure (Typ).

(7) Bands of reinforcing matching the inside and outside face reinforcing shall be placed in the gaps of the top and bottom slabs. A band matching the outside face reinforcing of the wall shall be placed in the gaps of the walls (placed in the outside face only). The bands shall be tack welded to the exposed reinforcing at each point of contact.

(8) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, curbs shall project no more than 3" above finished grade.
- For structures with bridge rail, curbs shall be flush with finished grade.

Curb heights shall be reduced, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(9) Cement Stabilized Backfill between boxes is considered part of the Box Culvert for payment.

(10) All curb concrete and reinforcing is considered part of the Box Culvert for payment.

(11) Any additional concrete and reinforcing required for the closures shall be considered as subsidiary to the Concrete Box Culvert.

(12) 1'-0" typical. 2'-0" when RAC standard is referred to elsewhere in the plans.

(13) For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in DETAIL "A".

(14) This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

All closure concrete shall be Class "C" with a minimum compressive strength of 3600 psi and shall be placed according to the Item, "Concrete Substructures".

Any additional concrete required for the closures shall be considered as subsidiary to the Concrete Box Culvert.

Refer to the Single Box Culverts Precast standard for details not shown.

The bottom edge of the top slab closure shall be chamfered 3 inches at the entrance.

HL93 LOADING

Texas Department of Transportation

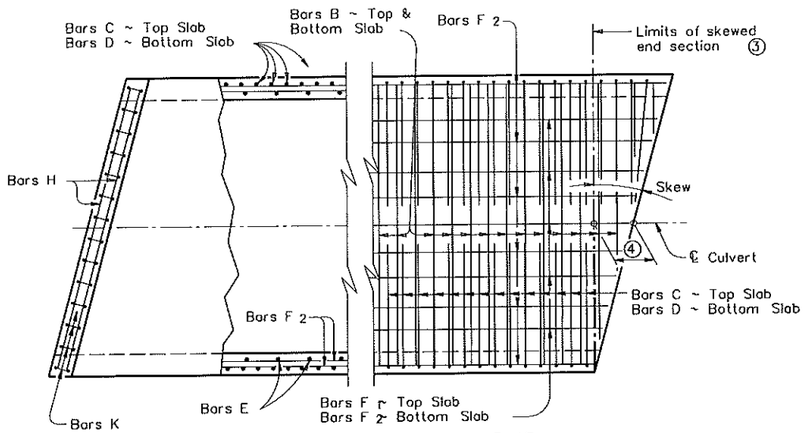
Bridge Division Standard

BOX CULVERTS
PRECAST
MISCELLANEOUS DETAILS

SCP-MD

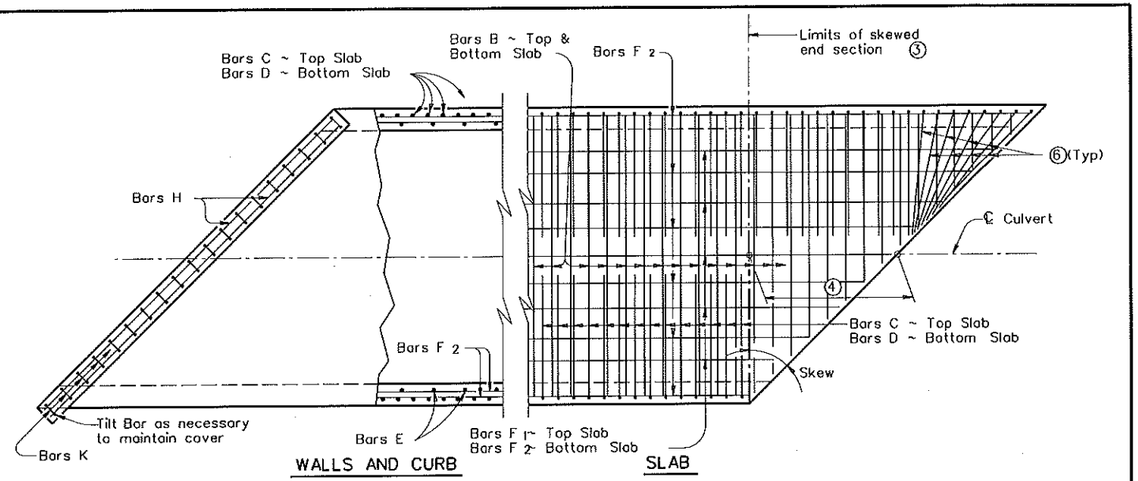
FILE: scpmdsts.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO. 103

DATE:
FILE:

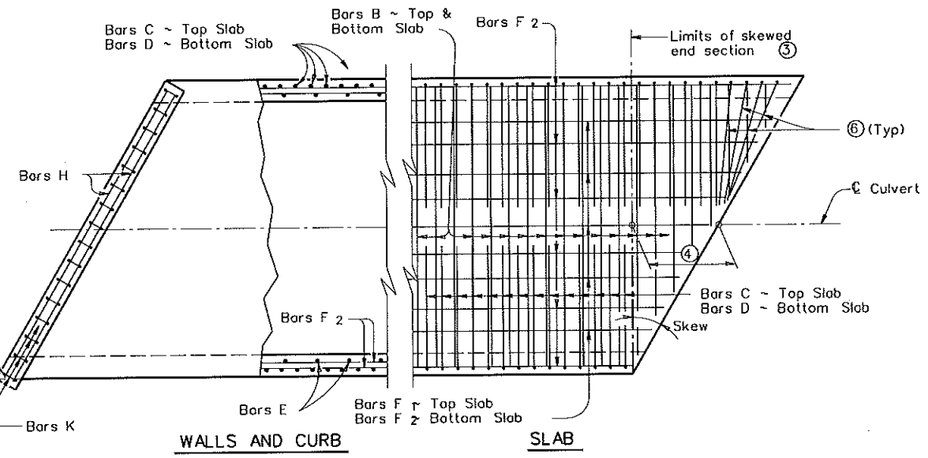


PLAN OF SKEWED ENDS ~ FROM 0° TO 15°⑦

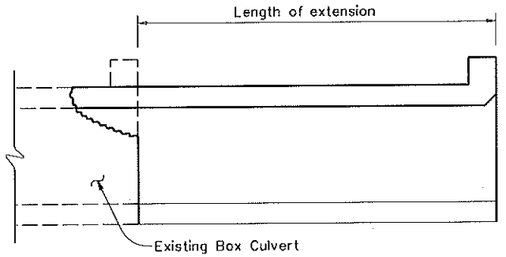
② When the spacing between Bars B becomes less than half of the normal spacing, bars shall be cut to avoid fouling
③ The length of Bars B and E will vary in the skewed end sections
④ [One half of overall width] x [Tan of the skew angle]
⑤ Bars F 1 and F 2 shall be continuous through the angle section. They shall be bent to remain parallel to the walls of the Box Culvert.
⑥ When necessary to avoid fouling in acute corners, the slab extension leg of Bars C and Bars D may be shortened to a minimum of 1'-6" for skews of 30° and 45°.
⑦ For skews of 15° or less, the contractor has the option of placing Bars B, C and D parallel to the skewed end while maintaining spacing along centerline box. Lengths of Bars B shown on the standards shall be increased to accommodate the skew.



PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



LENGTHENING DETAIL ①

① For box culverts with less than 2'-0" of fill, the top slab shall be broken back to provide a minimum 1'-10" lap of the existing longitudinal bars with the longitudinal bars in the extension. If the depth of fill is 2'-0" or greater, the top slab shall be broken back to provide a 1'-0" minimum embedment of existing longitudinal reinforcing into the extension. Alternatively, if the fill height is greater than 2'-0", the existing curb may be left in place and 2'-0" long #6 bars shall be drilled and grouted 1'-0" into the existing top slab at 1'-6" center to center spacing. Wings and apron shall be broken back as necessary to install the extension. Exposed wingwall and apron reinforcing may be removed or cleaned and included in the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, horizontal and vertical transitions shall be formed as directed by the Engineer. Bottom slabs shall match to maintain an uninterrupted flow line. Existing and new reinforcing shall be field bent into transition maintaining specified cover requirements.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

All reinforcing steel shall be Grade 60.

All concrete shall be Class "C" with these exceptions: use Class "S" for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.

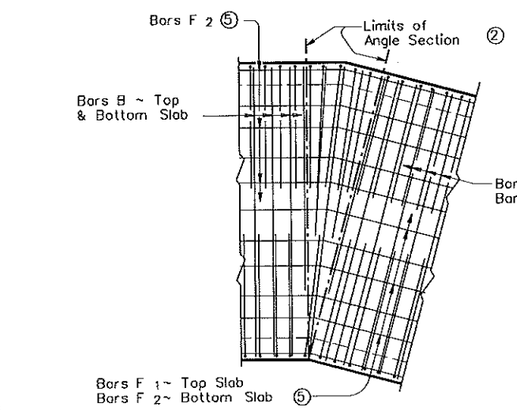
Class "C" concrete shall have a minimum compressive strength of 3,600 psi. Class "S" concrete shall have a minimum compressive strength of 4,000 psi.

The use of permanent forms is not allowed.

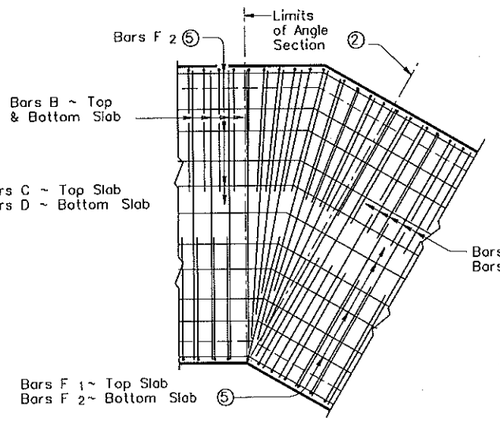
Refer to Single Box Culverts Cast-in-Place standard for details of straight sections of culvert. For skewed sections and angle sections refer to Single Box Culverts Cast-in-Place standard for slab and wall dimensions, bar sizes, maximum bar spacing, and any other details not shown. For Skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume and reinforcing steel weight by dividing the values shown on the culvert standards by the cosine of the skew angle.

Laps for Bars H, when required, shall be 1'-9" for uncoated bars and 2'-7" for epoxy coated.

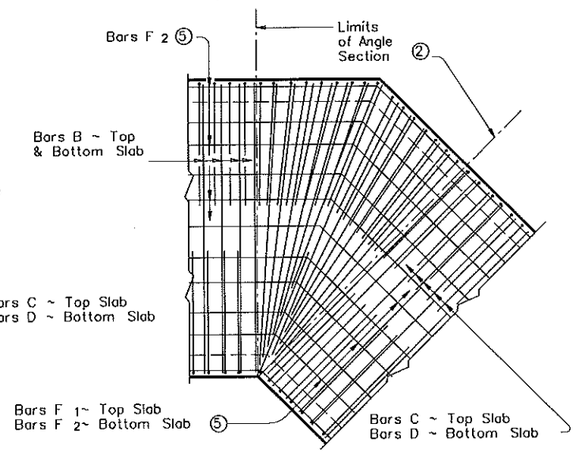
HL93 LOADING



PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°

Texas Department of Transportation

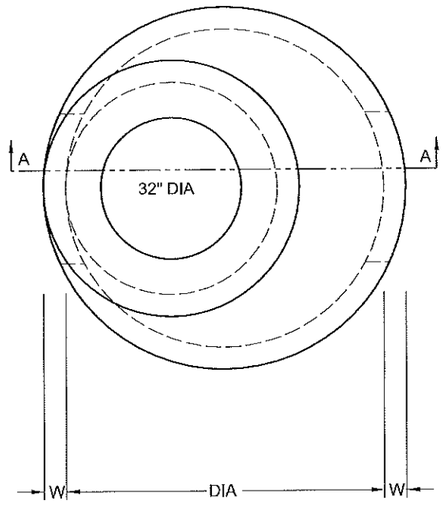
Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

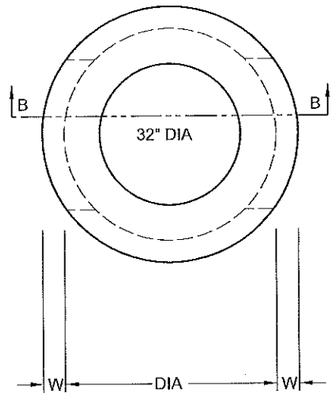
SCC-MD

FILE: sccmdste.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.
				104

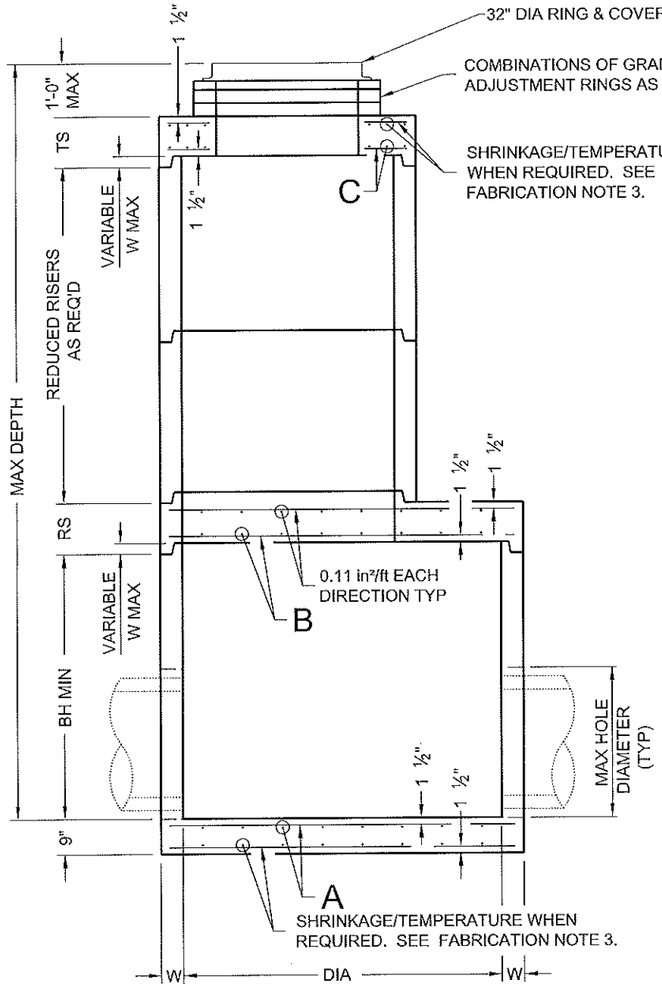
DATE:
FILE:



PLAN VIEW "A"

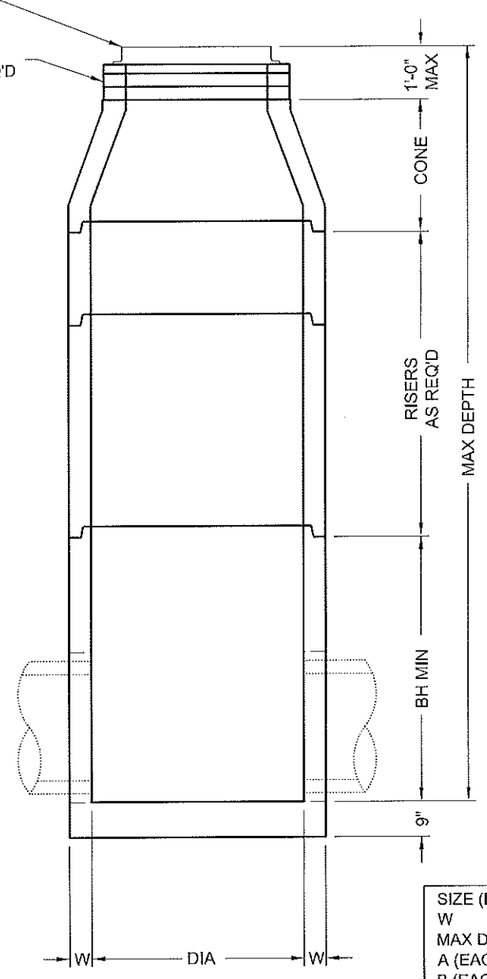


PLAN VIEW "B"



SECTION A-A

ROUND REDUCED RISER OPTION
SHOWING FLAT SLAB TOP



SECTION B-B

ROUND RISER OPTION
SHOWING CONE

FABRICATION NOTES:
1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR. Provide circumferential reinforcing steel in vertical walls of base, riser and cone in accordance with ASTM C478.
3. Slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in²/ft each way.
4. Manufacture base and risers to nearest 3" increment.
5. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
6. Provide lifting devices in conformance with Manufacturer's recommendations.
7. Provide cast iron solid cover, unless noted otherwise elsewhere in the plans.

INSTALLATION NOTES:
1. Cones may be concentric or eccentric. Reduction cones are acceptable. See Manufacturer for cone dimensions.
2. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary to this item.
3. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
4. Do not grout rubber gasket joints without Manufacturer's recommendation.
5. Initial installation of grade adjustment rings is limited to 1'-0" Max as shown.
6. Grade adjustment rings may be increased to 2'-0" Max when future construction affects final grade of structure. Make adjustments greater than 2'-0" with additional risers. Adjustments may be made up to the Max depth shown. Structure must be evaluated if Max depth will be exceeded.

GENERAL NOTES:
1. Designed according to ASTM C478.
2. Payment for manhole is per Item 465, "Junction Boxes, Manholes, and Inlets" by type and size.
3. Pipe OD + placement tolerance must be equal or less than Max hole diameter. For rigid pipe, placement tolerance is 4" Max, 2" Min. For flexible pipe, consult boot/seal manufacturer's specification for placement tolerance.

Cover dimensions are clear dimensions, unless noted otherwise.

SIZE (DIA)	48 in	60 in	72 in
W	5 in	6 in	7 in
MAX DEPTH	25 ft	25 ft	25 ft
A (EACH WAY)	0.22 in²/ft	0.30 in²/ft	0.45 in²/ft
B (EACH WAY)	N/A	0.37 in²/ft	0.62 in²/ft
C (EACH WAY)	0.24 in²/ft	0.46 in²/ft	0.46 in²/ft
BH MIN	12 in	36 in	36 in
TS	9 in	9 in	9 in
RS	N/A	9 in	12 in
REDUCED RISER DIA	N/A	48 in	48/60 in
MAX HOLE DIA	32 in	40 in	54 in

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRECAST ROUND MANHOLE

PRM

FILE: prestd02.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.
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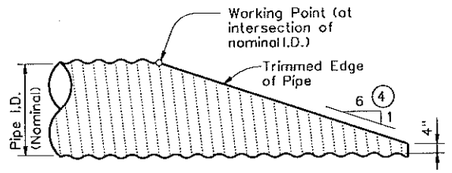
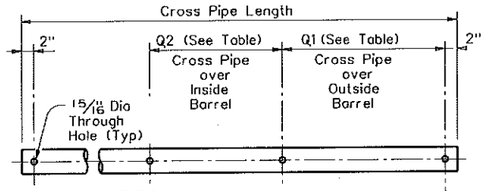


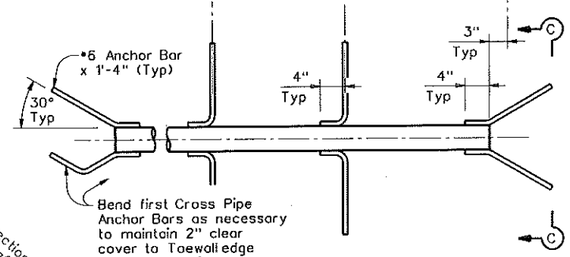
NOTE: All Cross Pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

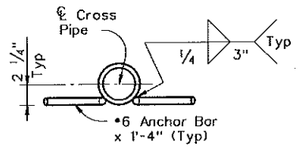
(Showing Corrugated Metal Pipe Culvert.)
(Details at Concrete Pipe Culvert are similar.)



PIPE W/ BOLTED ANCHOR

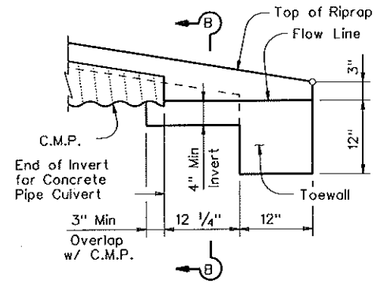


PIPE W/ ANCHOR BARS



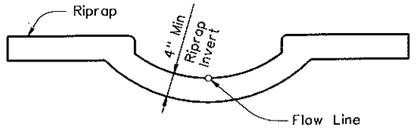
SECTION C-C

CROSS PIPE DETAILS



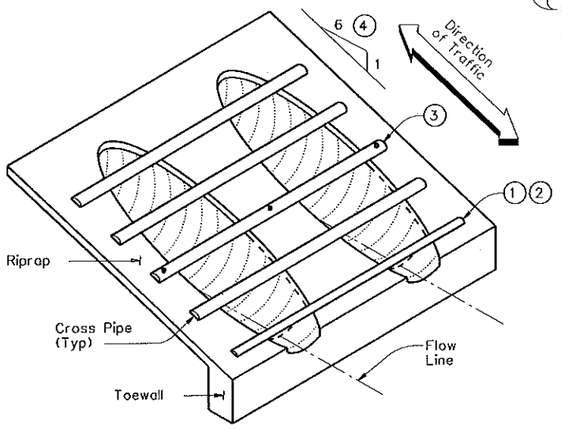
DETAIL "A"

(Showing Invert with Corrugated Metal Pipe Culvert. Concrete Pipe Culvert details are similar. Cross Pipes not shown for clarity.)



SECTION B-B

(Cross Pipes not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, & RIPRAP QUANTITIES (2)							
Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for use of Cross Pipes	Cross Pipe Size
12"	0.6	9"	N/A	2'- 1"	1'- 9"	3 or more Pipe Culverts	3" Std (3.500" O.D.)
15"	0.7	11"	N/A	2'- 5"	2'- 2"		
18"	0.8	1'- 2"	N/A	2'-10"	2'- 8"		
21"	0.9	1'- 4"	N/A	3'- 2"	3'- 1"		
24"	0.9	1'- 7"	N/A	3'- 6"	3'- 7"		
27"	1.0	1'- 8"	N/A	3'-10"	3'-11"	3 or more Pipe Culverts	3 1/2" Std (4.000" O.D.)
30"	1.1	1'-10"	N/A	4'- 2"	4'- 4"	2 or more Pipe Culverts	
33"	1.2	1'-11"	4'- 2"	4'- 5"	4'- 8"	All Pipe Culverts	
36"	1.3	2'- 1"	4'- 5"	4'- 9"	5'- 1"	All Pipe Culverts	4" Std (4.500" O.D.)
42"	1.5	2'- 4"	4'-11"	5'- 5"	5'-10"		
48"	1.7	2'- 7"	5'- 5"	6'- 0"	6'- 7"	All Pipe Culverts	5" Std (5.563" O.D.)
54"	2.0	3'- 0"	5'-11"	6'- 9"	7'- 6"		
60"	2.2	3'- 3"	6'- 5"	7'- 4"	8'- 3"		
66"	2.4	3'- 3"	6'-11"	7'-10"	8'- 9"		
72"	2.7	3'- 4"	7'- 5"	8'- 5"	9'- 4"		

(1) The proper installation of the first Cross Pipe is critical for vehicle safety. The top of the first Cross Pipe must be placed at no more than 6" above the flow line.

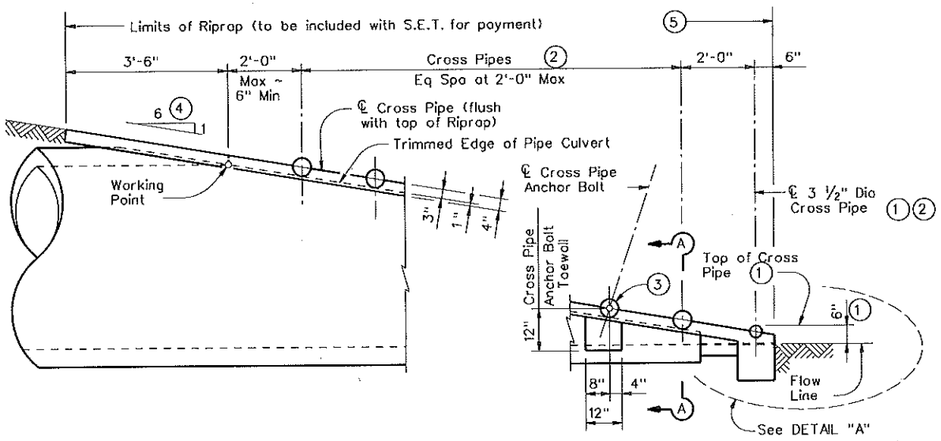
(2) Size of Cross Pipes, except the first bottom pipe, shall be as shown in the PIPE SIZE table. The first bottom pipe shall be 3 1/2" Standard Pipe (4" O.D.).

(3) The third Cross Pipe from the bottom of the Culvert shall always be installed using a bolted connection. Care shall be taken to ensure that Riprap concrete does not flow into the Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, all other Cross Pipes may also be installed using the bolted connection details.

(4) Match Cross Slope as shown elsewhere in the plans. Cross Slope of 6:1 or flatter is required for vehicle safety.

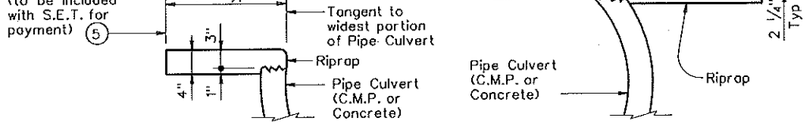
(5) Riprap placed beyond the limits shown will be paid as Concrete Riprap in accordance with Item 432, "Riprap".

(6) Quantities shown are for one end of one reinforced Concrete Pipe Culvert. For multiple pipe culverts or for Corrugated Metal Pipe Culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.



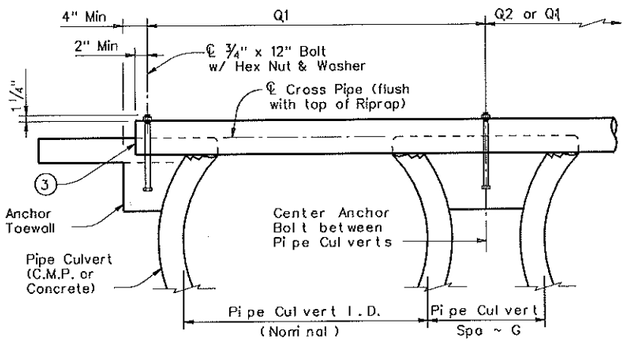
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing Concrete Pipe Culvert.)
(Details at Corrugated Metal Pipe Culvert are similar.)



SHOWING TYPICAL PIPE CULVERT & RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

GENERAL NOTES:

Cross Pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Safety End Treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Cross Pipes.

Riprap and all necessary inverts shall be Concrete Riprap conforming to the requirements of Item 432, "Riprap".

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

Cross Pipes shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Bolts and nuts shall conform to ASTM A307.

All steel components, except concrete reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 72" DIA
PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

SETP-PD

FILE: setppdse.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
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REVISIONS				
11-10: Add note for synthetic fibers.	DIST	COUNTY		SHEET NO. 106

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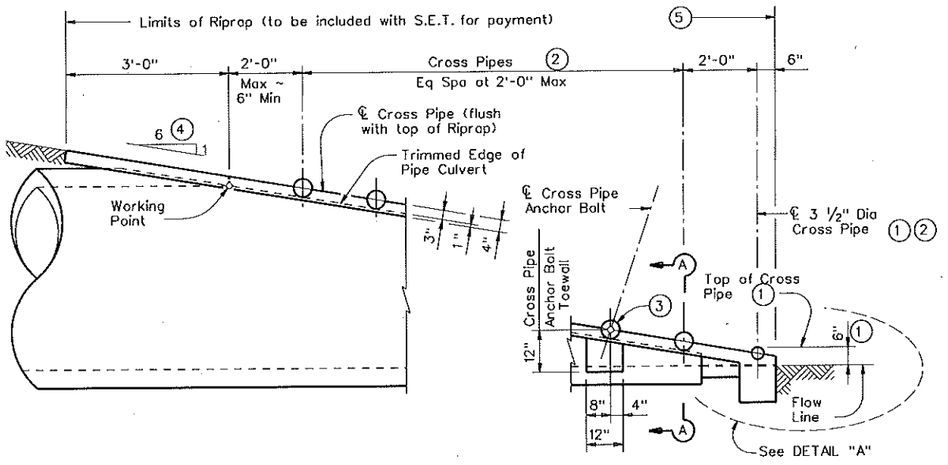


SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing Concrete Pipe Culvert.)
(Details at Corrugated Metal Pipe Culvert are similar.)

CROSS PIPE LENGTHS & REQUIRED PIPE SIZES (2)

CORRUGATED METAL PIPE CULVERTS

Design	Conc Riprap (CY) (6)	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for use of Cross Pipes	Cross Pipe Size
1	0.6	17"	13"	1'- 0"	N/A	2'- 8"	2'- 5"	3 or more Pipe Culverts	3" Std (3.500" O.D.)
2	0.7	21"	15"	1'- 2"	N/A	3'- 1"	2'-11"		
3	0.9	28"	20"	1'- 5"	N/A	3'- 9"	3'- 9"	3 or more Pipe Culverts	3 ½" Std (4.000" O.D.)
4	1.0	35"	24"	1'- 8"	4'- 4"	4'- 6"	4'- 7"	All Pipe Culverts	4" Std (4.500" O.D.)
5	1.2	42"	29"	1'-11"	4'-11"	5'- 2"	5'- 5"		
6	1.4	49"	33"	2'- 2"	5'- 6"	5'-11"	6'- 3"	All Pipe Culverts	5" Std (5.563" O.D.)
7	1.6	57"	38"	2'- 5"	6'- 2"	6'- 8"	7'- 2"		
8	1.8	64"	43"	2'-10"	6'- 9"	7'- 6"	8'- 2"		
9	1.9	71"	47"	3'- 2"	7'- 4"	8'- 3"	9'- 1"		

CONCRETE PIPE CULVERTS

Design	Conc Riprap (CY) (6)	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for use of Cross Pipes	Cross Pipe Size
1	0.6	22"	13 ½"	1'- 0"	N/A	3'- 1"	2'-10"	3 or more Pipe Culverts	3" Std (3.500" O.D.)
2	0.7	26"	15 ½"	1'- 2"	N/A	3'- 6"	3'- 4"		
3	0.9	28 ½"	18"	1'- 5"	N/A	3'-10"	3'-9 ½"	3 or more Pipe Culverts	3 ½" Std (4.000" O.D.)
4	1.0	36 ¼"	22 ½"	1'- 8"	4'- 5"	4'- 7"	4'-8 ¼"	All Pipe Culverts	4" Std (4.500" O.D.)
5	1.2	43 ¾"	26 ⅝"	1'-11"	5'- 1"	5'- 4"	5'-6 ¾"		
6	1.4	51 ⅛"	31 ⅝"	2'- 2"	5'- 8"	6'- 1"	6'-5 ¼"	All Pipe Culverts	5" Std (5.563" O.D.)
7	1.6	58 ½"	36"	2'- 5"	6'- 4"	6'-10"	7'-3 ½"		
8	1.8	65"	40"	2'-10"	6'-10"	7'- 7"	8'- 3"		
9	1.9	73"	45"	3'- 2"	7'- 6"	8'- 5"	9'- 3"		

(1) The proper installation of the first Cross Pipe is critical for vehicle safety. The top of the first Cross Pipe must be placed at no more than 6" above the flow line.

(2) Size of Cross Pipes, except the first bottom pipe, shall be as shown in the PIPE SIZE table. The first bottom pipe shall be 3 ½" Standard Pipe (4" O.D.).

(3) The third Cross Pipe from the bottom of the Culvert shall always be installed using a bolted connection. Care shall be taken to ensure that Riprap concrete does not flow into the Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, all other Cross Pipes may also be installed using the bolted connection details.

(4) Match Cross Slope as shown elsewhere in the plans. Cross Slope of 6:1 or flatter is required for vehicle safety.

(5) Riprap placed beyond the limits shown will be paid as Concrete Riprap in accordance with Item 432, "Riprap".

(6) Quantities shown are for one end of one Pipe Culvert. For multiple Pipe Culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

GENERAL NOTES:

Cross Pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Safety End Treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Cross Pipes.

Riprap and all necessary inverts shall be Concrete Riprap conforming to the requirements of Item 432, "Riprap".

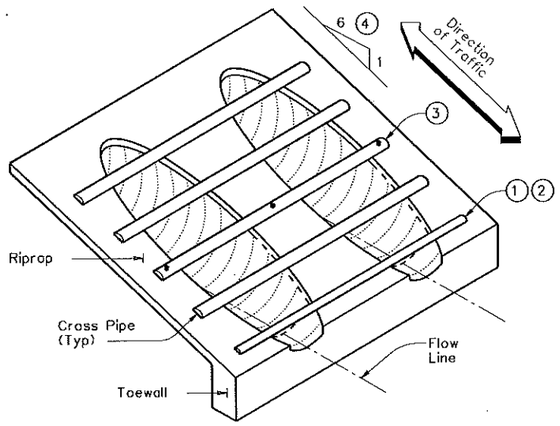
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

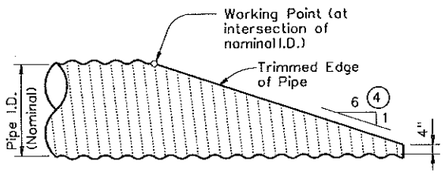
Cross Pipes shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Bolts and nuts shall conform to ASTM A307.

All steel components, except concrete reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.



ISOMETRIC VIEW OF TYPICAL INSTALLATION



NOTE: All Cross Pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing Corrugated Metal Pipe Culvert.)
(Details at Concrete Pipe Culvert are similar.)

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR DESIGN 1 TO 9
ARCH PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

SETP-PD-A

FILE: setppase.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
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REVISIONS				
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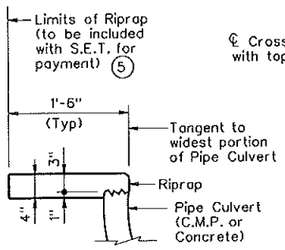
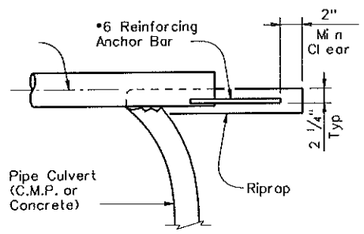
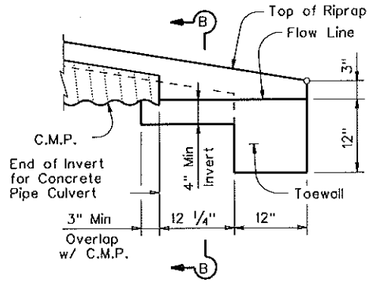


SHOWING TYPICAL PIPE CULVERT & RIPRAP

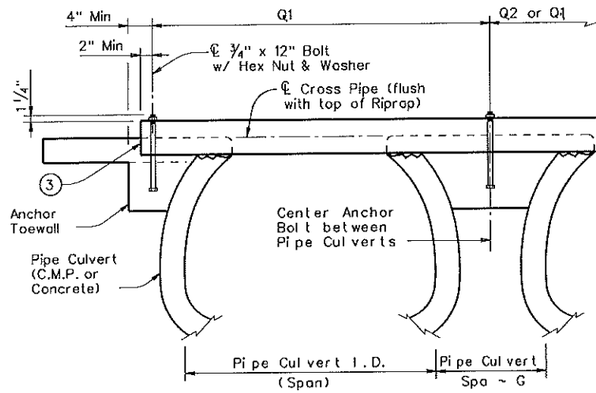


SHOWING CROSS PIPE WITH ANCHOR BAR



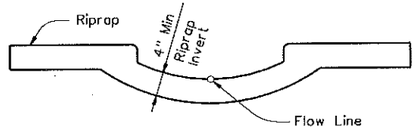
DETAIL "A"

(Showing Invert with Corrugated Metal Pipe Culvert. Concrete Pipe Culvert details are similar. Cross Pipes not shown for clarity.)



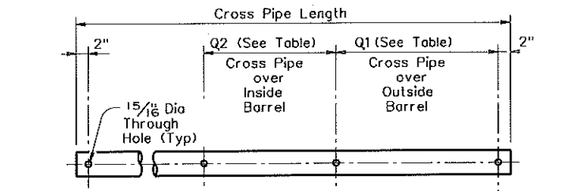
SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

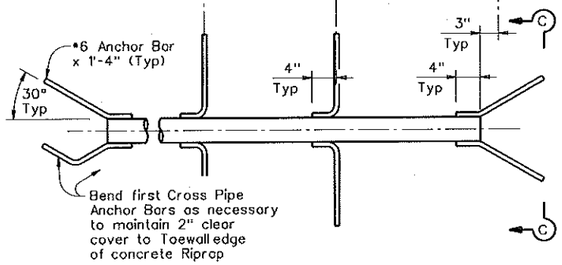


SECTION B-B

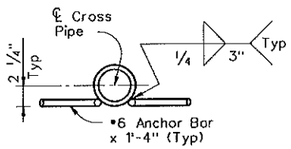
(Cross Pipes not shown for clarity.)



PIPE W/ BOLTED ANCHOR



PIPE W/ ANCHOR BARS



SECTION C-C

CROSS PIPE DETAILS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR DESIGN 1 TO 9
ARCH PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

SETP-PD-A

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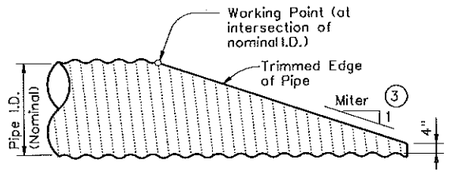
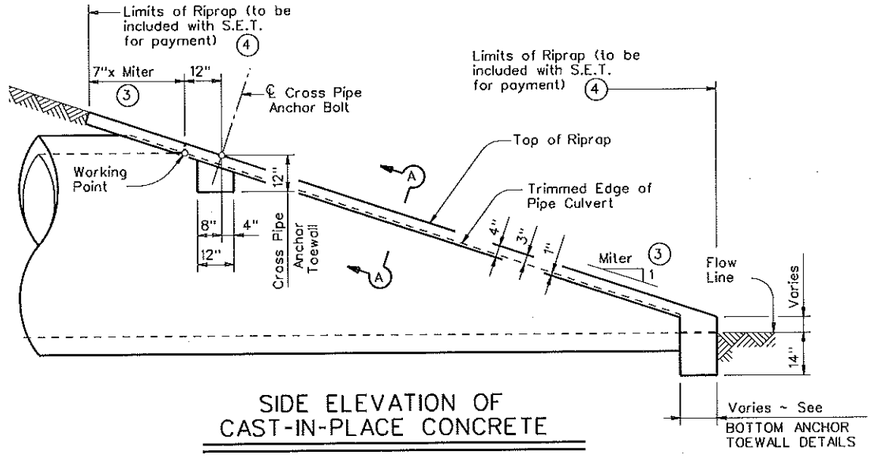


NOTE: All Pipe Runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

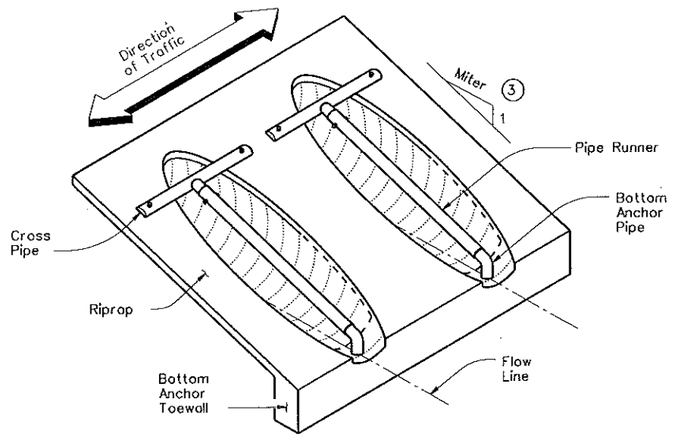
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing Corrugated Metal Pipe Culvert. Details of Concrete Pipe Culvert are similar.)



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing Concrete Pipe Culvert. Details of Corrugated Metal Pipe Culvert are similar. Pipe Runners not shown for clarity)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

CROSS PIPE LENGTHS & PIPE RUNNER LENGTHS (1)(2)

Nominal Culvert I.D.	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length											
			3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
			0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
24"	1'- 7"	3'- 5"	N/A	N/A	N/A	5'-10"	N/A	N/A	N/A	8'- 1"	N/A	N/A	N/A	12'- 9"
27"	1'- 8"	3'- 8"	N/A	N/A	5'- 5"	6'-11"	N/A	N/A	7'- 7"	9'- 7"	N/A	N/A	11'-11"	14'-11"
30"	1'-10"	3'-11"	N/A	N/A	6'- 4"	8'- 0"	N/A	N/A	8'- 9"	11'- 0"	N/A	N/A	13'- 8"	17'- 0"
33"	1'-11"	4'- 2"	6'- 2"	6'- 5"	7'- 3"	9'- 1"	8'- 6"	8'-10"	10'- 0"	12'- 5"	13'- 3"	13'- 9"	15'- 5"	19'- 2"
36"	2'- 1"	4'- 5"	6'-11"	7'- 3"	8'- 2"	10'- 2"	9'- 6"	9'-11"	11'- 2"	13'-10"	14'- 9"	15'- 3"	17'- 2"	21'- 3"
42"	2'- 4"	4'-11"	8'- 6"	8'-10"	9'-11"	12'- 4"	11'- 7"	12'- 0"	13'- 6"	16'- 8"	17'- 9"	18'- 5"	20'- 8"	25'- 7"
48"	2'- 7"	5'- 5"	10'- 1"	10'- 5"	11'- 9"	N/A	13'- 7"	14'- 2"	15'-10"	N/A	20'- 9"	21'- 6"	24'- 2"	N/A
54"	3'- 0"	5'-11"	11'- 8"	12'- 1"	N/A	N/A	15'- 8"	16'- 3"	N/A	N/A	23'-10"	24'- 8"	N/A	N/A
60"	3'- 3"	6'- 5"	13'- 3"	N/A	N/A	N/A	17'- 9"	N/A	N/A	N/A	26'-10"	N/A	N/A	N/A

TYPICAL PIPE CULVERT MITERS (3)

Side Slope	0° Skew	15° Skew	30° Skew	45° Skew
3:1	3:1	3.106:1	3.464:1	4.243:1
4:1	4:1	4.141:1	4.619:1	5.657:1
6:1	6:1	6.212:1	6.928:1	8.485:1

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (2)

Nominal Culvert I.D.	Single Pipe Culvert	Multiple Pipe Culverts
12" thru 21"	Skews thru 45°	Skews thru 45°
24"	Skews thru 45°	Skews thru 30°
27"	Skews thru 30°	Skews thru 15°
30"	Skews thru 15°	Skews thru 15°
33"	Skews thru 15°	Always required
36"	Normal(No Skew)	Always required
42" to 60"	Always required	Always required

STANDARD PIPE SIZES & MAX PIPE RUNNER LENGTHS (1)

Pipe Size	Pipe O.D.	Pipe I.D.	Mox Pipe Runner Length
2" STD	2.375"	2.067"	N/A
3" STD	3.500"	3.068"	10'- 0"
4" STD	4.500"	4.026"	19'- 8"
5" STD	5.563"	5.047"	34'- 2"

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (5)

Nominal Culvert I.D.	3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
12"	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.8
15"	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9
18"	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9	1.0
21"	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.2
24"	0.6	0.7	0.7	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.1	1.3
27"	0.7	0.7	0.8	0.9	0.8	0.9	0.9	1.1	1.1	1.1	1.2	1.4
30"	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.2	1.2	1.2	1.3	1.6
33"	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.3	1.3	1.4	1.5	1.7
36"	0.9	0.9	0.9	1.1	1.1	1.1	1.2	1.4	1.4	1.5	1.6	1.8
42"	1.0	1.0	1.1	1.3	1.2	1.3	1.3	1.6	1.6	1.7	1.8	2.1
48"	1.1	1.1	1.2	N/A	1.4	1.4	1.5	N/A	1.9	1.9	2.1	N/A
54"	1.3	1.3	N/A	N/A	1.6	1.6	N/A	N/A	2.1	2.1	N/A	N/A
60"	1.4	N/A	N/A	N/A	1.7	N/A	N/A	N/A	2.3	N/A	N/A	N/A

(1) Size of Pipe Runner shall be as shown in the tables. Cross Pipe shall be the same size as the Pipe Runner. Cross Pipe Stub Out and Bottom Anchor Pipe shall be the next smaller size pipe as shown in the STANDARD PIPE SIZES table.

(2) This standard allows for the placement of only one pipe runner across each culvert pipe opening. In order to limit the clear opening to be traversed by an errant vehicle, the following conditions must be met:

For 60" culvert pipes, the skew must not exceed 0°.
For 54" culvert pipes, the skew must not exceed 15°.
For 48" culvert pipes, the skew must not exceed 30°.
For all culvert pipe sizes 42" and less, the skew must not exceed 45°.

If the above conditions cannot be met, the designer should consider using a safety end treatment with flared wings. For further information, refer to the TxDOT "Roadway Design Manual".

(3) Miter = Slope of Mitered Pipe Culvert End

(4) Riprap placed beyond the limits shown will be paid as Concrete Riprap in accordance with Item 432, "Riprap".

(5) Quantities shown are for one end of one reinforced Concrete Pipe Culvert. For multiple Pipe Culverts or for Corrugated Metal Pipe Culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

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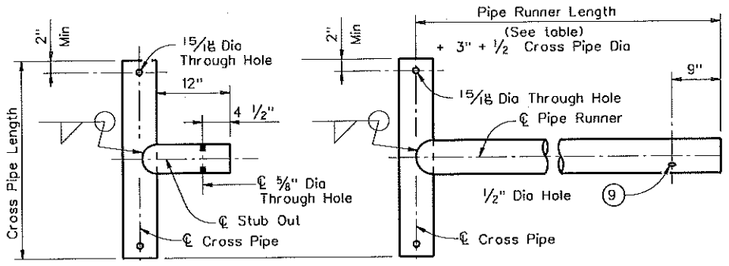
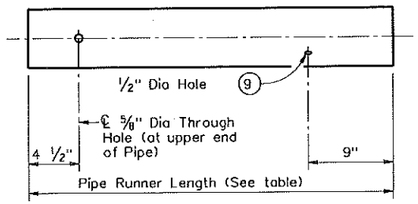


OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS

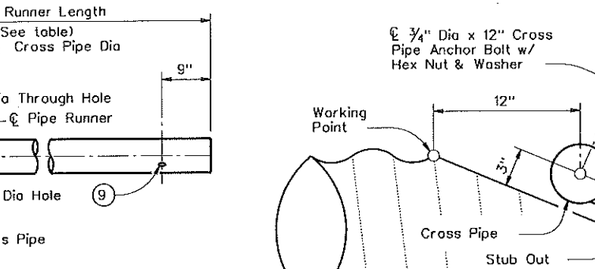


NOTE: The separate Pipe Runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

OPTION B1 OPTION B2

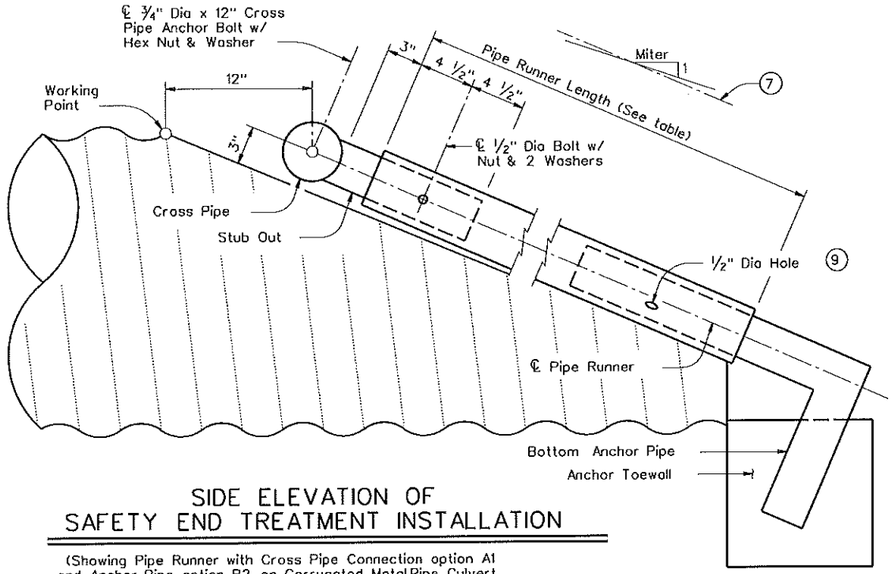
BOTTOM ANCHOR PIPE DETAILS (10)



OPTION B1 OPTION B2

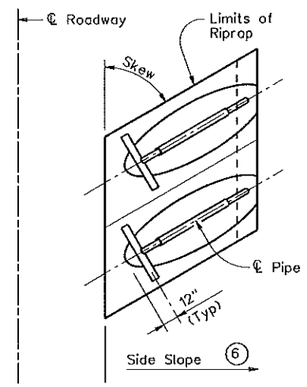
BOTTOM ANCHOR TOEWALL DETAILS

(Culvert & Riprap not shown for clarity)

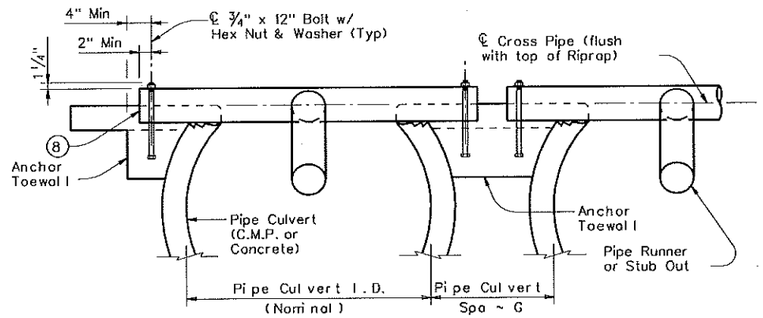


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

(Showing Pipe Runner with Cross Pipe Connection option A1 and Anchor Pipe option B2 on Corrugated Metal Pipe Culvert. Concrete Pipe Culvert details are similar. Riprap not shown for clarity)

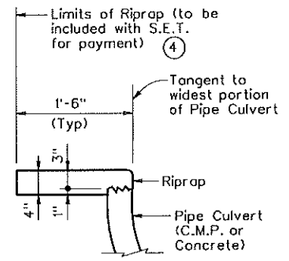


PLAN OF SKEWED INSTALLATION



SHOWING CROSS PIPE & ANCHOR TOEWALL

SECTION A-A



SHOWING TYPICAL PIPE CULVERT & RIPRAP

(4) Riprap placed beyond the limits shown will be paid as Concrete Riprap in accordance with Item 432, "Riprap".

(6) Recommended values of side slope are 3:1, 4:1, & 6:1. All quantities, calculations, and dimensions shown herein are based on these recommended values. Slope of 3:1 or flatter is required for vehicle safety.

(7) Note that actual slope of Pipe Runner may vary slightly from Side Slope of Riprap and trimmed Culvert Pipe edge.

(8) Care shall be taken to ensure that Riprap concrete does not flow into the Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(9) After installation, the 1/2" hole shall be inspected to ensure that the lap of the Pipe Runner with the Bottom Anchor Pipe is adequate.

(10) At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the Runner) may be substituted for the mitered and welded joint in the Bottom Anchor Pipe.

GENERAL NOTES:

Pipe Runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

The Safety End Treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Pipe Runners.

Riprap and all necessary inverts shall be Concrete Riprap conforming to the requirements of Item 432, "Riprap".

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

Pipe Runners, Cross Pipes, and Anchor Pipes shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Bolts and nuts shall conform to ASTM A307.

All steel components, except concrete reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

DATE:
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SHEET 2 OF 2

Texas Department of Transportation

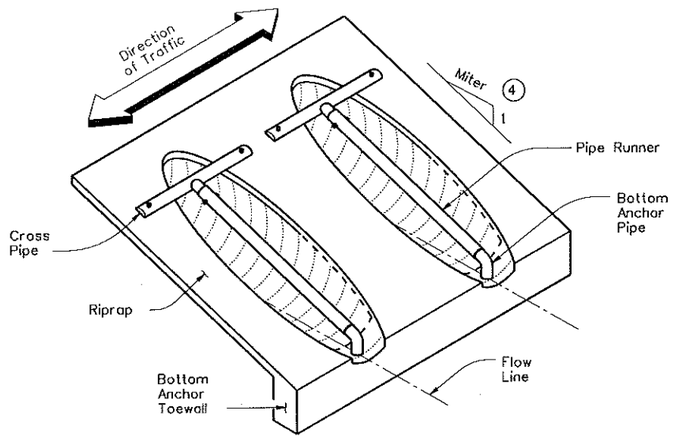
Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

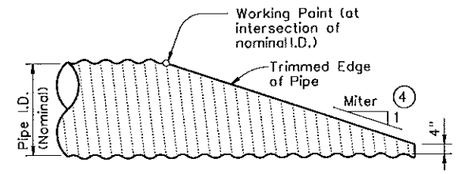
SETP-CD

FILE: setpcdse.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS				
11-10: Add note for synthetic fibers.	DIST	COUNTY		SHEET NO.
				110



ISOMETRIC VIEW OF TYPICAL INSTALLATION

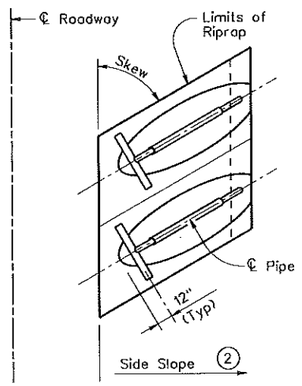
(Showing installation with no skew.)



NOTE: All Pipe Runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing Corrugated Metal Pipe Culvert. Details of Concrete Pipe Culvert are similar.)



PLAN OF SKEWED INSTALLATION

(1) (3)

CROSS PIPE LENGTHS, PIPE RUNNER LENGTHS, & REQUIRED PIPE SIZES

CORRUGATED METAL PIPE CULVERTS

Design	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length											
					3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
					0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
1	17"	13"	1'- 0"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	21"	15"	1'- 2"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	28"	20"	1'- 5"	3'- 9"	N/A	N/A	3'- 5"	4'- 7"	N/A	N/A	4'-11"	6'- 5"	N/A	N/A	7'-11"	10'- 2"
4	35"	24"	1'- 8"	4'- 4"	3'-10"	4'- 0"	4'- 7"	6'- 0"	5'- 5"	5'- 8"	6'- 6"	8'- 4"	8'- 8"	9'- 1"	10'- 3"	12'-11"
5	42"	29"	1'-11"	4'-11"	5'- 1"	5'- 4"	6'- 1"	7'-10"	7'- 2"	7'- 5"	8'- 6"	10'- 9"	11'- 2"	11'- 8"	13'- 2"	16'- 6"
6	49"	33"	2'- 2"	5'- 6"	6'- 2"	6'- 5"	7'- 4"	N/A	8'- 6"	8'-10"	10'- 0"	N/A	13'- 3"	13'- 9"	15'- 6"	N/A
7	57"	38"	2'- 5"	6'- 2"	7'- 6"	7'- 9"	N/A	N/A	10'- 2"	10'- 7"	N/A	N/A	15'- 9"	16'- 4"	N/A	N/A

CONCRETE PIPE CULVERTS

Design	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length											
					3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
					0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
1	22"	13 1/2"	1'- 0"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	26"	15 1/2"	1'- 2"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	28 1/2"	18"	1'- 5"	3'-9 1/2"	N/A	N/A	2'-10"	3'-10"	N/A	N/A	4'- 2"	5'- 5"	N/A	N/A	6'- 9"	8'- 9"
4	36 1/4"	22 1/2"	1'- 8"	4'-5 1/4"	3'- 5"	3'- 7"	4'- 2"	5'- 6"	4'-11"	5'- 1"	5'-11"	7'- 7"	7'-11"	8'- 3"	9'- 5"	11'-11"
5	43 3/4"	26 5/8"	1'-11"	5'-0 3/4"	4'- 6"	4'- 8"	5'- 5"	6'-11"	6'- 4"	6'- 7"	7'- 6"	9'- 7"	10'- 0"	10'- 5"	11'- 9"	14'-10"
6	51 1/8"	31 5/16"	2'- 2"	5'- 8"	5'- 9"	6'- 0"	6'-10"	N/A	7'-11"	8'- 3"	9'- 4"	N/A	12'- 4"	12'-10"	14'- 6"	N/A
7	58 1/2"	36"	2'- 5"	6'-3 1/2"	6'-11"	7'- 3"	N/A	N/A	9'- 6"	9'-11"	N/A	N/A	14'- 9"	15'- 4"	N/A	N/A

TYPICAL PIPE CULVERT MITERS (4)

Side Slope	0° Skew	15° Skew	30° Skew	45° Skew
3:1	3:1	3.106:1	3.464:1	4.243:1
4:1	4:1	4.141:1	4.619:1	5.657:1
6:1	6:1	6.212:1	6.928:1	8.485:1

STANDARD PIPE SIZES & MAX PIPE RUNNER LENGTHS (1)

Pipe Size	Pipe O.D.	Pipe I.D.	Max Pipe Runner Length
2" STD	2.375"	2.067"	N/A
3" STD	3.500"	3.068"	10'- 0"
4" STD	4.500"	4.026"	19'- 8"
5" STD	5.563"	5.047"	34'- 2"

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (3)

Design	Single Pipe Culvert	Multiple Pipe Culverts
1 & 2	Skews thru 45°	Skews thru 45°
3	Skews thru 30°	Skews thru 15°
4	Normal(No Skew)	Always required
5 thru 7	Always required	Always required

(1) Size of Pipe Runner shall be as shown in the tables. Cross Pipe shall be the same size as the Pipe Runner. Cross Pipe Stub Out and Bottom Anchor Pipe shall be the next smaller size pipe as shown in the STANDARD PIPE SIZES table.

(2) Recommended values of slope are 3:1, 4:1, & 6:1. All quantities, calculations, and dimensions shown herein are based on these recommended values. Slope of 3:1 or flatter is required for vehicle safety.

(3) This standard allows for the placement of only one pipe runner across each culvert pipe opening. In order to limit the clear opening to be traversed by an errant vehicle, the following conditions must be met:

For Design 1 through 5 culvert pipe sizes, the skew must not exceed 45°.
For Design 6 culvert pipes, the skew must not exceed 30°.
For Design 7 culvert pipes, the skew must not exceed 15°.

If the above conditions cannot be met, the designer should consider using a safety end treatment with flared wings. For further information, refer to the TxDOT "Roadway Design Manual".

(4) Miter - Slope of Mitered Pipe Culvert End

GENERAL NOTES:

Pipe Runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

The Safety End Treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Pipe Runners.

Riprap and all necessary inverts shall be Concrete Riprap conforming to the requirements of Item 432, "Riprap".

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

Pipe Runners, Cross Pipes, and Anchor Pipes shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Bolts and nuts shall conform to ASTM A307.

All steel components, except concrete reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

DATE:
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SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR DESIGN 1 TO 7
ARCH PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD-A

FILE: setpcase.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
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REVISIONS				
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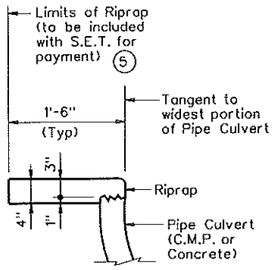
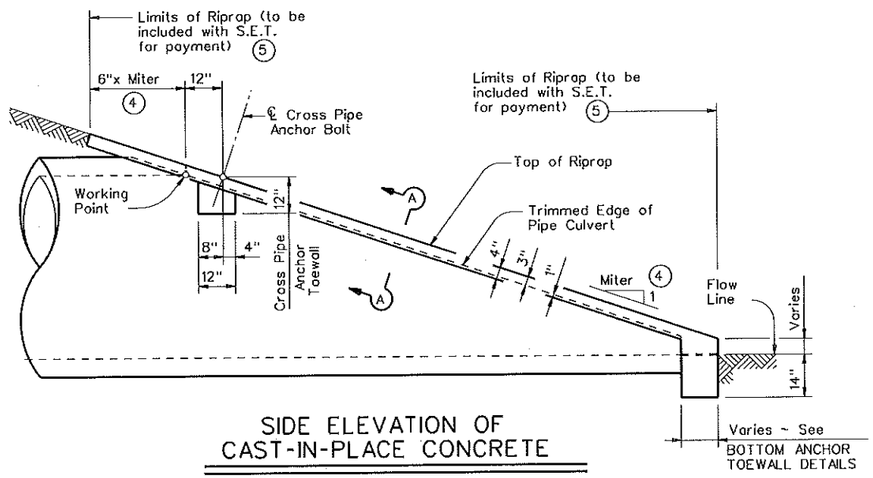


SHOWING TYPICAL PIPE CULVERT & RIPRAP

SECTION A-A



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing Concrete Pipe Culvert.
Details of Corrugated Metal Pipe Culvert are similar.
Pipe Runners not shown for clarity)

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (6)
BOTH CORRUGATED METAL PIPE CULVERTS AND CONCRETE PIPE CULVERTS

Design	3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
1	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9
2	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8	1.0
3	0.6	0.6	0.7	0.8	0.7	0.7	0.8	0.9	0.9	1.0	1.0	1.2
4	0.7	0.7	0.8	0.9	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.4
5	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.2	1.3	1.3	1.4	1.7
6	0.9	1.0	1.0	N/A	1.1	1.1	1.2	N/A	1.4	1.5	1.6	N/A
7	1.0	1.1	N/A	N/A	1.3	1.3	N/A	N/A	1.7	1.7	N/A	N/A

(4) Miter = Slope of Mitered Pipe Culvert End

(5) Riprap placed beyond the limits shown will be paid as Concrete Riprap in accordance with Item 432, "Riprap".

(6) Quantities shown are for one end of one Pipe Culvert. For multiple Pipe Culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

Texas Department of Transportation | Bridge Division Standard

SAFETY END TREATMENT

FOR DESIGN 1 TO 7
ARCH PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD-A

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©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS				
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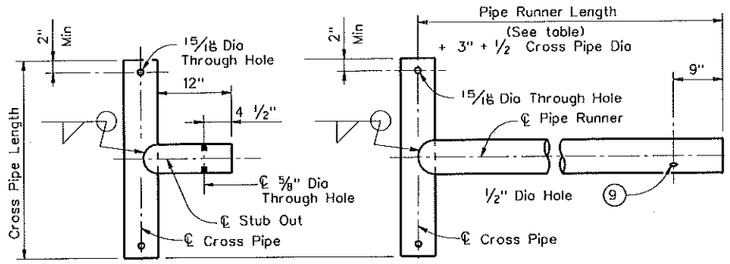
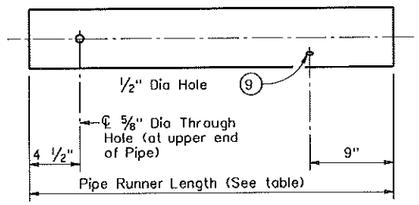


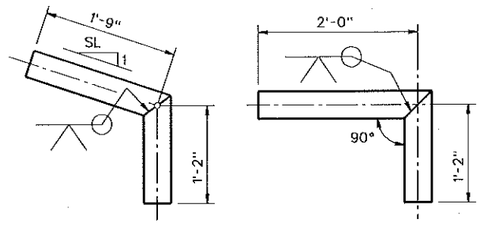
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



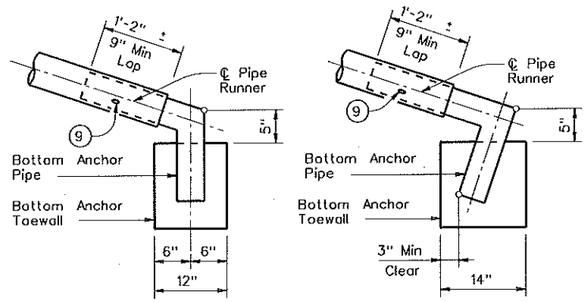
NOTE: The separate Pipe Runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS



OPTION B1 OPTION B2

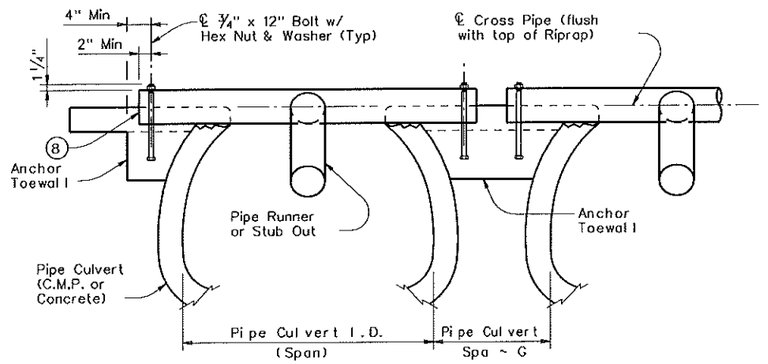
BOTTOM ANCHOR PIPE DETAILS (10)



OPTION B1 OPTION B2

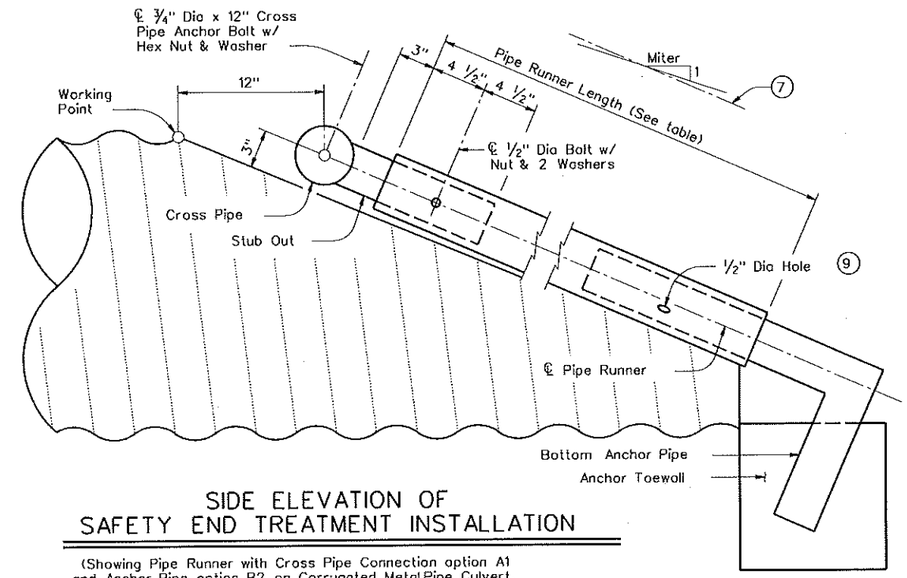
BOTTOM ANCHOR TOEWALL DETAILS

(Culvert & Riprap not shown for clarity)



SHOWING CROSS PIPE & ANCHOR TOEWALL

SECTION A-A



SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

(Showing Pipe Runner with Cross Pipe Connection option A1 and Anchor Pipe option B2 on Corrugated Metal Pipe Culvert. Concrete Pipe Culvert details are similar. Riprap not shown for clarity)

(7) Note that actual slope of Pipe Runner may vary slightly from Side Slope of Riprap and trimmed Culvert Pipe edge.

(8) Care shall be taken to ensure that Riprap concrete does not flow into the Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(9) After installation, the 1/2" hole shall be inspected to ensure that the lap of the Pipe Runner with the Bottom Anchor Pipe is adequate.

(10) At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the Runner) may be substituted for the mitered and welded joint in the Bottom Anchor Pipe.

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR DESIGN 1 TO 7
ARCH PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD-A

FILE:	setpcase.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
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REVISIONS					
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					113

DATE:
FILE:

TYPE OF WORK — ITEMS AND REQUIREMENTS FOR EACH TYPE OF WORK

SODDING	PERMANENT SEEDING	TEMPORARY SEEDING	Reference Item 161, 162, 164, 166, 168 of the Texas Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges 2014 for specifications, dimensions, volumes and measurements that are not shown. Use latest Houston District, Special Provisions for those items indicated.		
	✓		161-6017 COMPOST MANUF TOPSOIL (BIP)(4") SY	APPLICATION RATE Item 161.2.1. Compost Manufactured Topsoil (CMT)	Item 161.2. Materials. Submit quality control (QC) documentation to the Engineer. Compost producer's STA certification must be dated to meet STA requirements (certification must be within 30 or 90 days per STA requirements). Lab analysis performed by an STA-certified lab must be dated within 30 days before delivery of the compost.
✓			162-6002 BLOCK SODDING SY	GRASS SPECIES Item 162.2. Materials. Common Bermuda (Cynodon Dactylon)	Item 162.2.1. Block Sod. Use block palletized or roll type sod. **REMOVE PLASTIC BACKING FROM ROLL TYPE SOD.** Place sod within 48 hours of delivery to site. No exceptions. Place sod with joints alternating on each row to prevent continuous joint lines. Peg sod as needed with wood pegs to hold sod in place. Pegging sod is subsidiary to Item 162.
	✓		164-6066 DRILL SEEDING(PERM)(WARM OR COOL) SY Item 164.1. Description Provide and install seeding as shown on District Standard	PLANTING MONTH / SEED MIX March, April, May, June, July, August, September, October: Hulled - Bermudagrass (Cynodon dactylon) - 40.0 lbs PLS/acre; Foxtail Millet (Setaria italica) - 34.0 lbs PLS/acre; Green Sprangletop (Leptochloa dubia) - 4.0 lbs PLS/acre; Sideoats Grama (Bouteloua curtipendula) - 3.2 lbs PLS/acre; Little Bluestem (Schizachyrium scoparium) - 1.4 lbs PLS/acre November, December, January, February: Unhulled - Bermudagrass (Cynodon dactylon)- 40.0 lbs PLS/acre; Oats (Avena sativa) - 72.0 lbs PLS/acre; Green Sprangletop (Leptochloa dubia) - 4.0 lbs PLS/acre; Sideoats Grama (Bouteloua curtipendula) - 3.2 lbs PLS/acre; Little Bluestem (Schizachyrium scoparium) - 1.4 lbs PLS/acre	PLS (Pure Live Seed) Provide documentation of PLS requirements per Item 164.2.1. CONSTRUCTION. Cultivate the area to a depth of 4 inches before placing the seed unless otherwise directed. When performing permanent seeding after an established temporary seeding, cultivate the seedbed to a depth of 4 inches or mow the area before placement of the permanent seed. Plant the seed and place the straw or hay mulch after the area has been completed to lines and grades as shown on the plans. Drill Seeding. Plant seed or seed mixture uniformly over the area shown on the plans at a depth of 1/4 to 1/3 inch using a cultipacker(turfgrass) type seeder. Plant seed along the contour of the slopes. Use broadcast seeding method where site conditions prevent drill seeding method. Broadcast Seeding. Distribute the dry seed or dry seed mixture uniformly over the areas shown on the plans using hand or mechanical distribution on top of soil.
	✓		164-6052 BROADCAST SEED(PERM)(SPECIAL MIX) SY Item 164.1. Description Provide and install seeding as shown on District Standard		
		✓	164-6051 DRILL SEED(TEMP)(WARM OR COOL) SY Item 164.1. Description Provide and install seeding as shown on District Standard	PLANTING MONTH / SEED MIX March, April, May, June, July, August, September, October: Foxtail Millet (Setaria italica) - 34.0 lbs PLS/acre November, December, January, February: Oats (Avena sativa - 72.0 lbs PLS/acre	
		✓	164-6009 BROADCAST SEED(TEMP)(WARM) SY Item 164.1. Description Provide and install seeding as shown on District Standard		
	✓	✓	162-6003 STRAW OR HAY MULCH SY	APPLICATION RATE Immediately after planting the seed or seed mixture, apply straw or hay mulch uniformly over the seeded area. Apply straw or hay mulch at 2 tons per acre. Use tacking agent with straw or hay mulch as described on this sheet.	Use straw or hay mulch in conformance with Article 162.2.5, "Mulch." Use biodegradable tacking agents only applied at a rate in accordance with manufacturer's recommendations. Use the following products or an approved equal(see note this sheet): Conweb/Contac Guar Gum, Profile Products Corporation, (307) 655-9565, Ramtec/Procol/Viscol Guar Gum, Ramtec Corporation, (800) 366-1180
✓	✓	✓	166-6001 FERTILIZER AC Item 166.2. Materials Use fertilizer as shown on District Standard	APPLICATION RATE Deliver and evenly distribute fertilizer at a rate of 4000 lbs/acre.	Use a NON-CHEMICAL fertilizer which meets all the following criteria: (1) BRAND NAME must be registered with the Texas State Chemist as a commercial fertilizer. (2) Meets USEPA guidelines for unrestricted use. (3) Derived from biological sources such as, but not limited to: sewage sludge, manures, vegetation, etc. (4) In granular form and essentially dust free. Submit proof of registration and nutrient source to Engineer. Use the following products or an approved equal(see note this sheet): Sigma, SIGMA AgriScience, 281-851-6749 Sustanite-standard grade, Automation Nation, Inc., 713-675-4999 Milorganite, MMSD, 800-287-9645 Agricultural Organic P/L, Ag Org, INC., 713-523-4396
✓	✓	✓	168-6001 VEGETATIVE WATERING MG	APPLICATION RATE Item 168.3 Construction. 6000 gallons/acre per working day x 20 consecutive working days = 120,000 gallons total/acre	Begin watering immediately after installation of seed or sod. Replace, fertilize, and water any seed or sod in poor condition due to the failure to apply the specified amount of water within the time allowed at no expense to the Department.

SEQUENCE OF WORK

BLOCK SOD	PERMANENT SEEDING	TEMPORARY SEEDING
1.FERTILIZER 2.CULTIVATE SOIL (ITEM 162.3) 3.SOD 4.VEGETATIVE WATERING	1.FERTILIZER 2.COMPOST MANUFACTURED TOPSOIL 3.CULTIVATE SOIL (ITEMS 164.3 AND 161.3.1) 4.PERMANENT SEEDING 5.STRAW OR HAY MULCH 6.VEGETATIVE WATERING	1.FERTILIZER 2.CULTIVATE SOIL (PER ITEM 164.3) 3.TEMPORARY SEEDING 4.STRAW OR HAY MULCH 5.VEGETATIVE WATERING

Texas Department of Transportation

HOUSTON DISTRICT

FERTILIZER, SEED, SOD, STRAW, COMPOST, AND WATER

SHEET 1 OF 1

REVISIONS							
10/2014 UPDATED TO 2014 SPECS 3/2015 MINOR CORRECTIONS	FILE: OCT 2014	FED DIV	STATE	PROJECT NUMBER			SHEET
		6	TEXAS				114
	ORIGINAL:	DIST	COUNTY	CONTROL	SECT	JOB	HIGHWAY
		12					

STD K-1

DATE
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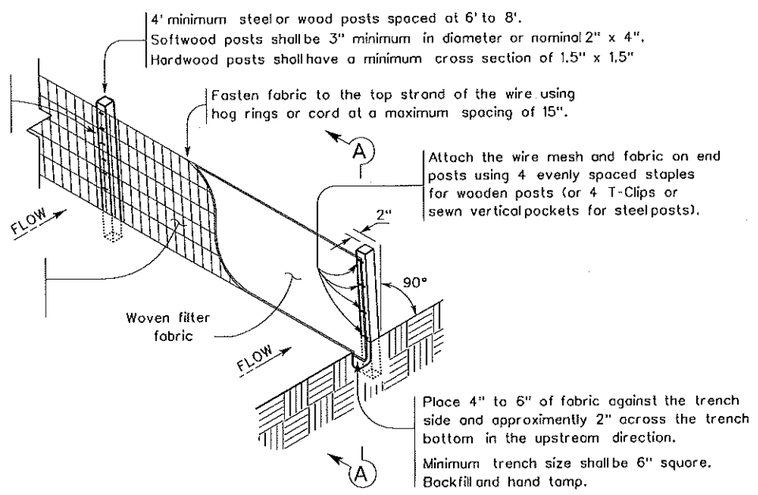

TEMPORARY SEDIMENT CONTROL FENCE

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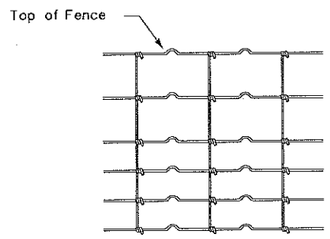
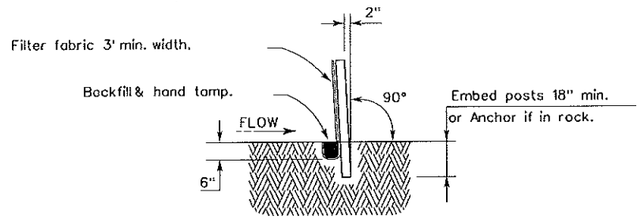




SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

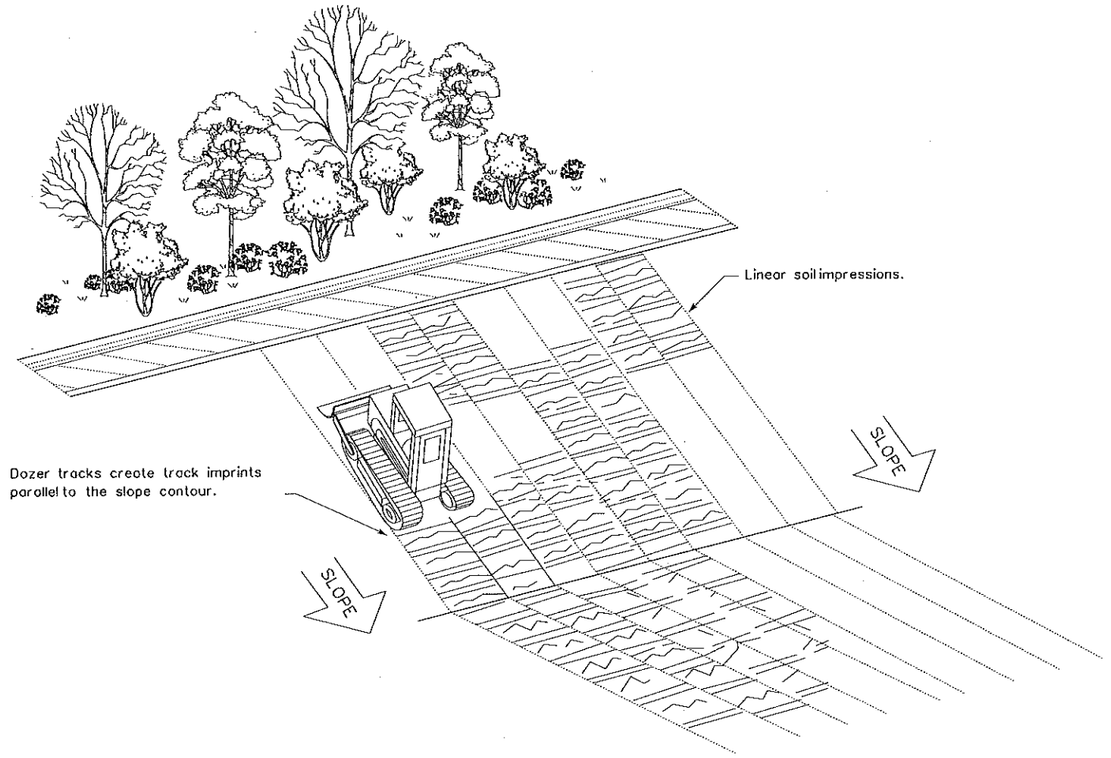
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DI/CK: LS	
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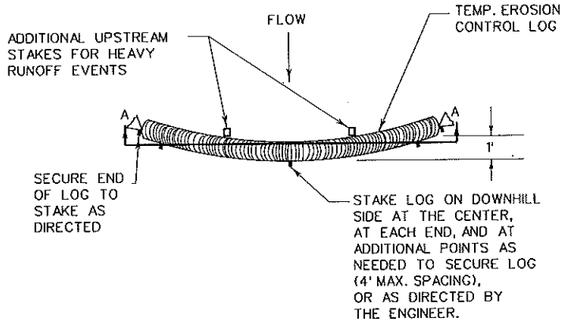
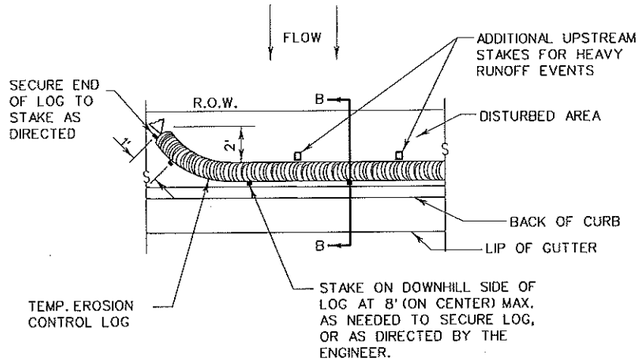
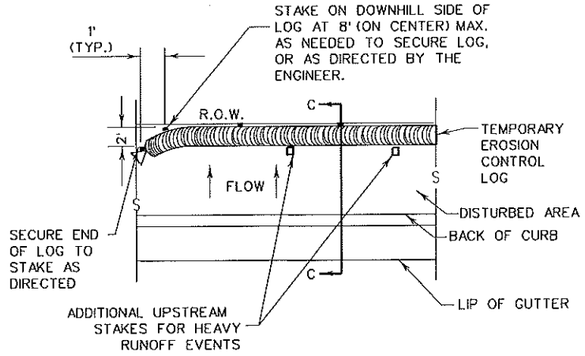


PLAN VIEW



PLAN VIEW



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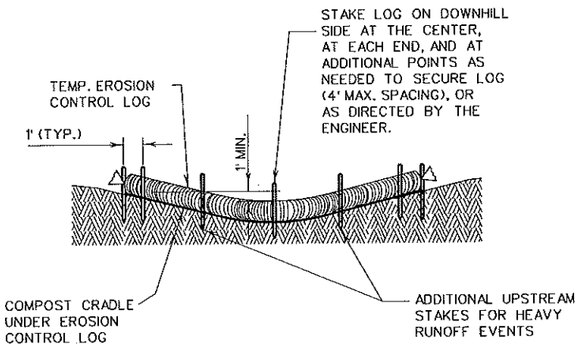
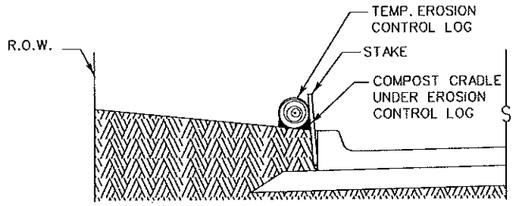


SECTION A-A

EROSION CONTROL LOG DAM

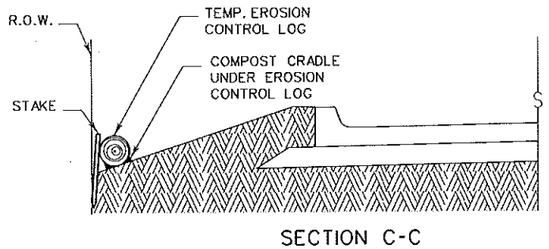
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

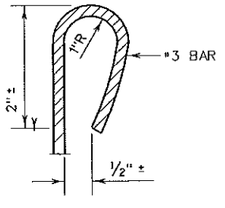
CL-BOC



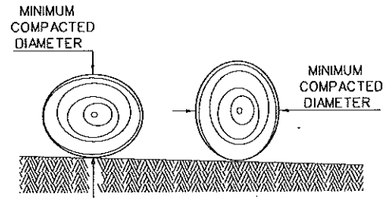
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

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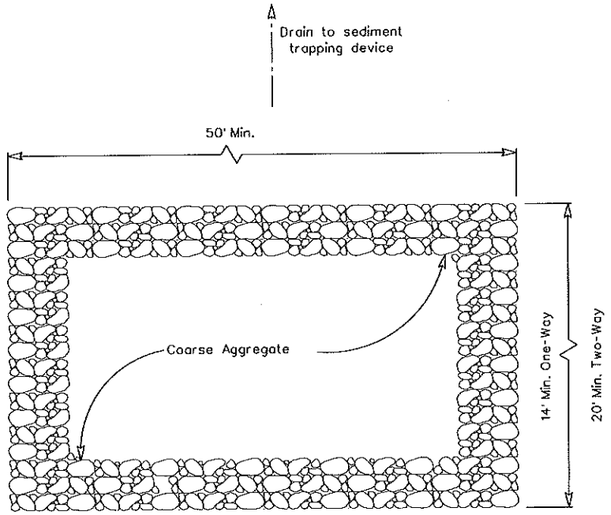
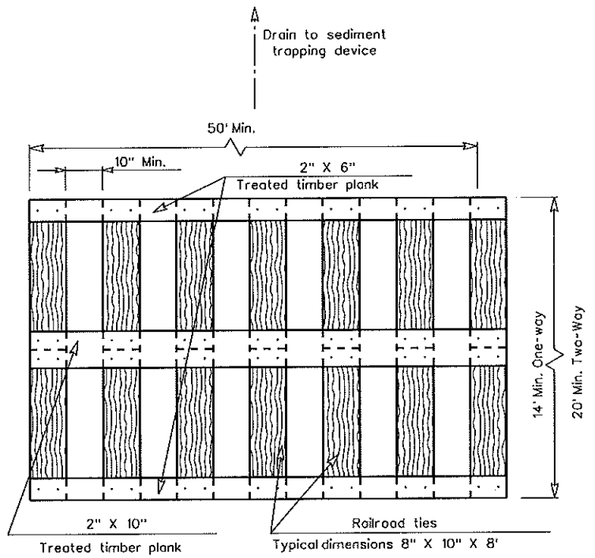
DATE: 7/20/2017
FILE: K:\05523\05523-0005-00 North Kansas Avenue Street Reconstruction\2 Design Phase\CAD\Standards\SW3P\CONSTRUCTION EXITS - ec316.dgn



PLAN VIEW



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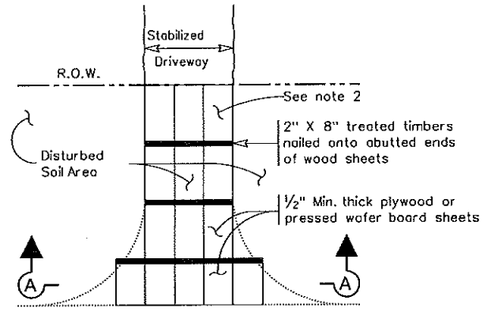

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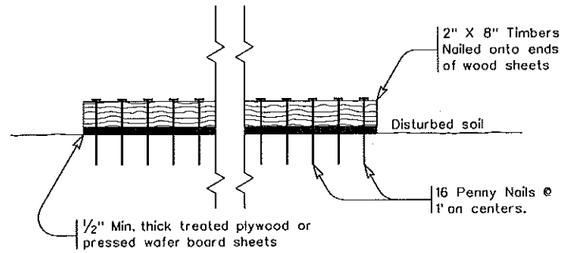
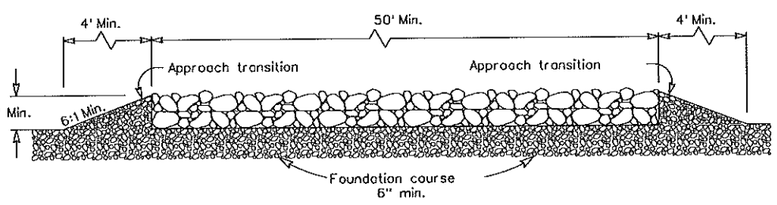


SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

SHORT TERM



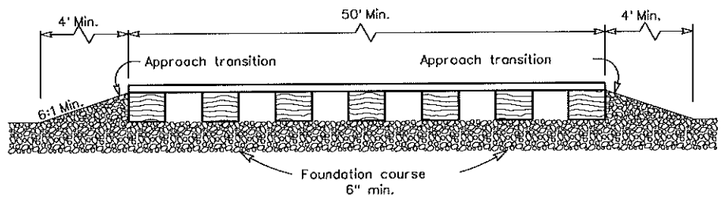
ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materials approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

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Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

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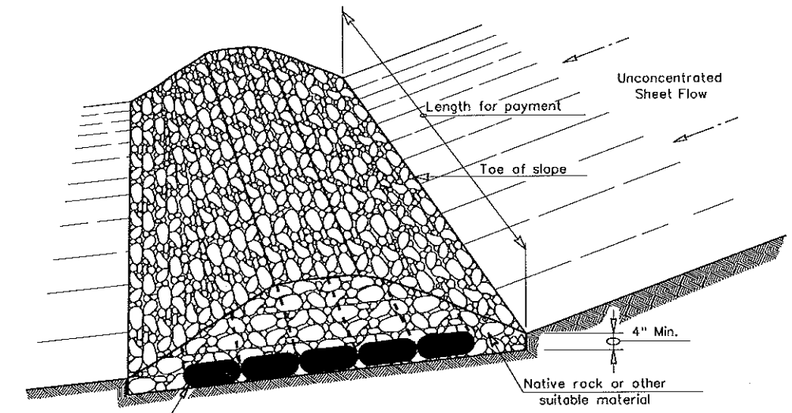
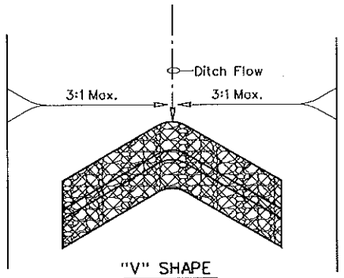
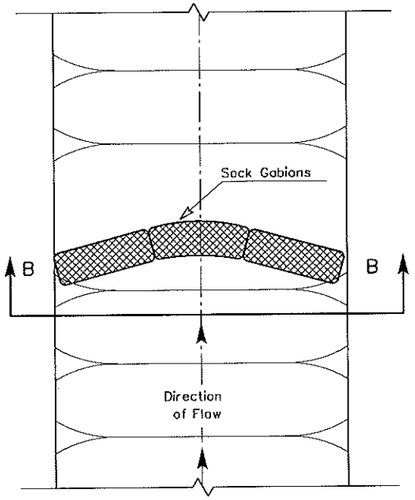


FILTER DAM AT TOE OF SLOPE

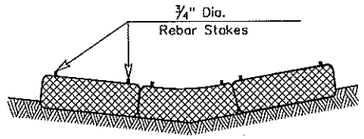
RFD1



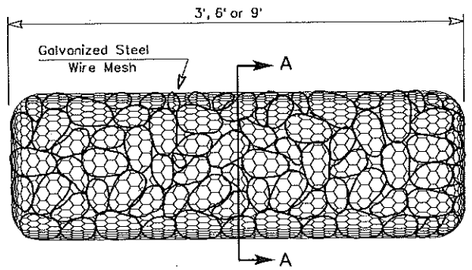
"V" SHAPE
PLAN VIEW



PLAN VIEW

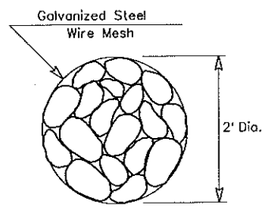


SECTION B-B

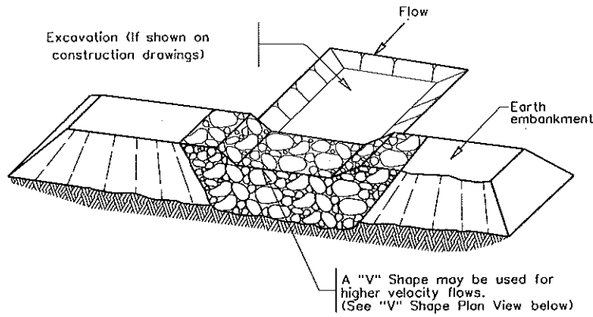


TYPE 4 (SACK GABIONS)

RFD4

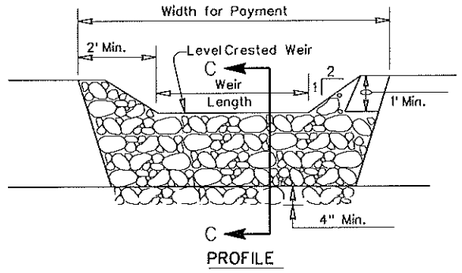


SECTION A-A

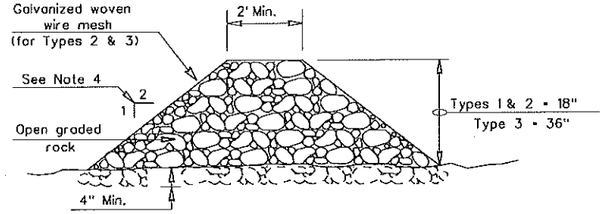


FILTER DAM AT SEDIMENT TRAP

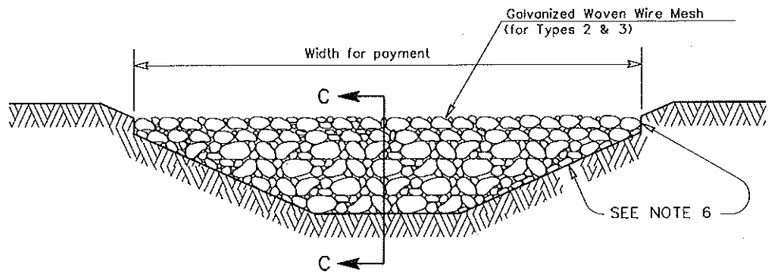
RFD1 OR RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with 3/4" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 1/2" x 3 1/4"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

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