

# CITY OF LUCAS, TEXAS

CONSTRUCTION PLANS FOR:

## WINNINGKOFF ROAD-REVERSE CURVE PAVING & DRAINAGE IMPROVEMENTS

DESIGN SPEED: 35 M.P.H.

**60% REVIEW SET**

### CITY COUNCIL

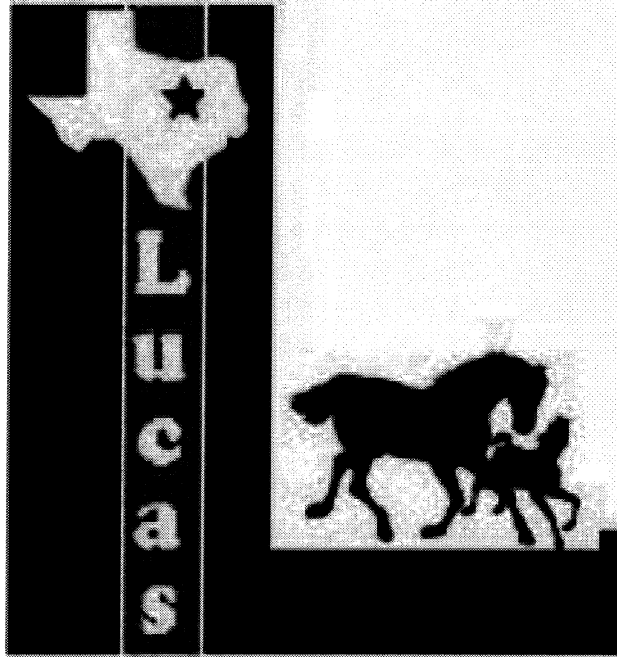
JIM OLK, MAYOR  
KATHLEEN PEELE, MAYOR PRO-TEM  
WAYNE MILLSAP  
TIM BANEY  
STEVE DUKE  
PHILIP LAWRENCE  
DEBBIE FISHER

### CITY MANAGER

JONI CLARKE

### PUBLIC WORKS DIRECTOR/CITY ENGINEER

STANTON FOERSTER, P.E.

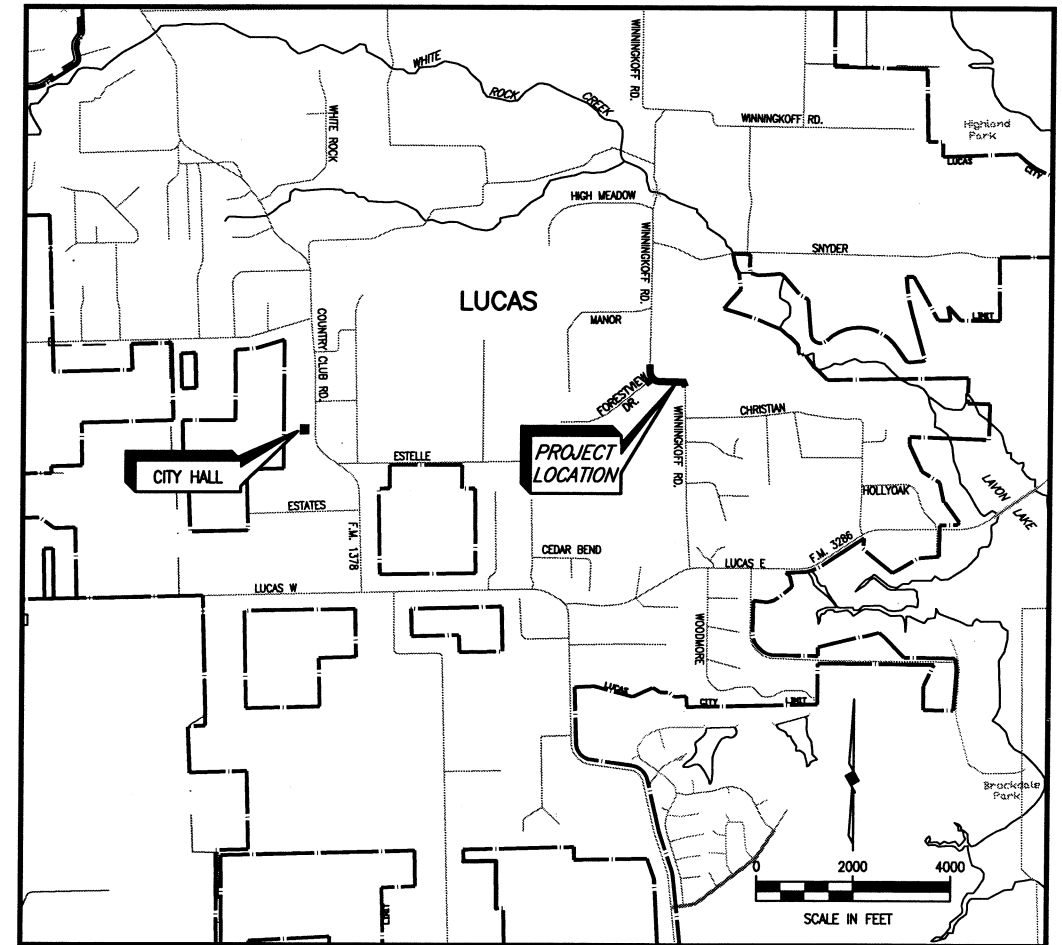


PREPARED BY

**BIRKHOFF, HENDRICKS & CARTER, L.L.P.**  
PROFESSIONAL ENGINEERS  
TBPE Firm No. 526; TBPLS Firm No. 10031800  
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Dallas, Texas 75243 (214) 361-7900

September 2016

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LOCATION MAP

### SHEET INDEX

1	COVER SHEET, LOCATION MAP AND SHEET INDEX
2	GENERAL NOTES / TYPICAL SECTION
3	REMOVAL SHEET
4	SURVEY CONTROL POINTS
5-7	WINNINGKOFF ROAD PAVING E-W PLAN & PROFILES
8	WINNINGKOFF ROAD PAVING N PLAN & PROFILE
9-10	WINNINGKOFF ROAD PROPOSED & EXISTING CONTOURS
11	DRAINAGE AREA MAP W/ CALCULATION TABLE
12	EXISTING 2-24" CULVERT EXTENSION PLAN & PROFILE
13	EXISTING 36" CULVERT EXTENSION PLAN & PROFILE
14	EXISTING 24" & 18" CULVERT EXTENSION PLAN & PROFILE
15-16	CONSTRUCTION DETAILS
17-19	TXDOT DETAILS
20-22	CROSS SECTIONS

THESE DOCUMENTS ARE FOR INTERIM REVIEW AND ARE NOT INTENDED FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES.

JOSEPH T. CRAJEWSKI, III  
TEXAS P.E. NO. 104984  
September, 2016

**GENERAL NOTES:**

1. THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE MANNER ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR HIS REPRESENTATIVE (ENGINEER). THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK AND SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE WHICH MIGHT OCCUR DUE TO THE CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
2. THE NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS (NCTCOG) STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 4TH EDITION, OCTOBER 2004, ARE HEREAFTER, COLLECTIVELY REFERRED TO AS "THE STANDARD SPECIFICATIONS".
3. IN THE EVENT AN ITEM IS NOT COVERED WITHIN THESE PLANS AND SPECIFICATIONS, THE NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS (NCTCOG) STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION SHALL APPLY.
4. THE CONTRACTOR SHALL CONTACT THE ENGINEER SHOULD ANY DISCREPANCIES BE FOUND IN THE CONSTRUCTION PLANS AND/OR THE SPECIAL PROVISIONS. THE CONTRACTOR WILL NOT BE COMPENSATED FOR ANY WORK NOT AUTHORIZED BY THE CITY.
5. CONSTRUCTION OBSERVATION AND MATERIALS TESTING WILL BE PERFORMED BY REPRESENTATIVES OF THE OWNER, ENGINEER AND REVIEW AUTHORITIES AND AGENCIES. UNRESTRICTED ACCESS SHALL BE PROVIDED TO THESE REPRESENTATIVES AT ALL TIMES. THE CONTRACTOR IS RESPONSIBLE FOR UNDERSTANDING THE REQUIRED INSPECTIONS AND ALLOWING FOR THEM IN HIS SCHEDULE OF OPERATIONS. CONTRACTOR WILL NOT BE ALLOWED ANY ADDITIONAL CONTRACT DAYS OR COMPENSATION AS A RESULT OF HIS FAILURE TO ADEQUATELY PROVIDE FOR AUTHORIZED INSPECTIONS.
6. THE CONTRACTOR SHALL NOT PLACE FILL OR WASTE MATERIAL ON ANY PRIVATE PROPERTY WITHOUT A WRITTEN AGREEMENT WITH THE PROPERTY OWNER AND APPROVAL BY CITY. A COPY OF THIS AGREEMENT SHALL BE PROVIDED TO THE CITY.
7. TRENCH SAFETY DESIGN SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL SUBMIT A TRENCH SAFETY DESIGN PLAN, SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF TEXAS, FOR REVIEW PRIOR TO THE START OF CONSTRUCTION.
8. THE CONTRACTOR SHALL PROTECT THE EXISTING TREES, BUSHES, LANDSCAPING PLANTS, SPRINKLERS, AND LAWNS UNLESS SHOWN OTHERWISE ON THE CONSTRUCTION DRAWINGS. ANY DAMAGE TO THE EXISTING TREES, BUSHES, LANDSCAPING PLANTS, SPRINKLERS, AND LAWNS CAUSED BY THE CONSTRUCTION SHALL BE REPLACED TO THE SATISFACTION OF THE PROPERTY OWNER AND THE CITY AT THE CONTRACTOR'S SOLE EXPENSE.
9. THE CONTRACTOR SHALL PROTECT ALL UNDERGROUND IRRIGATION SYSTEMS. ADJUSTMENT OR RELOCATION OF IRRIGATION SYSTEM SHALL BE INSTALLED BY AN IRRIGATOR LICENSED IN THE STATE OF TEXAS AND, IF REQUIRED, SHALL BE INCIDENTAL TO RIGHT OF WAY PREPARATION.
10. THE CONTRACTOR SHALL RESTORE ALL AREAS DISTURBED BY THE CONSTRUCTION TO THE ORIGINAL CONDITION OR BETTER. RESTORED AREAS INCLUDE BUT NOT LIMITED TO TRENCH BACKFILL, SIDE SLOPES, FENCES, IRRIGATION SYSTEMS, DRIVEWAYS, PRIVATE YARDS, SIGNS AND ROADWAYS. DISTURBED ROADWAY CLEAR ZONES SHALL BE HYDRO MULCHED, WATERED & ESTABLISHED. DISTURBED CHANNEL SIDE SLOPES SHALL BE RESTORED WITH SOLID BLOCK SOD, WATERED, FERTILIZED & ESTABLISHED. THE ESTABLISHMENT OF GRASS IN DISTURBED AREAS SHALL BE DETERMINED BY THE CITY OF PARKER.

**PAVING NOTES**

1. THE CONTRACTOR SHALL KEEP STREETS ADJACENT TO THE PROJECT FREE OF MUD AND DEBRIS FROM THE CONSTRUCTION.
2. CONCRETE FOR ALL STREETS SHALL BE IN ACCORDANCE WITH NCTCOG CLASS "C" CONCRETE (3,600 P.S.I. COMPRESSIVE @ 28 DAYS MINIMUM 6 SACK MIX).
3. THE CONTRACTOR SHALL PROVIDE ACCESS TO PRIVATE PROPERTY AT ALL TIMES. DRIVEWAYS WILL BE REPLACED AS DIRECTED BY THE ENGINEER. TEMPORARY DRIVEWAYS SHALL BE CONSTRUCTED IMMEDIATELY AFTER THE CONTRACTOR HAS DISTURBED OR ALTERED THE ADJACENT PROPERTY OWNERS ACCESS TO HIS PROPERTY.
4. DRIVEWAY LOCATIONS IF ANY SHOWN ARE SUBJECT TO CHANGE TO SUIT ACTUAL FIELD CONDITIONS AT THE TIME OF CONSTRUCTION AND MAY BE SHIFTED AS DIRECTED BY THE ENGINEER.
5. DRIVEWAYS CONSTRUCTED OFF RIGHT-OF-WAY SHALL MATCH THE EXISTING DRIVE CONSTRUCTION MATERIALS, OR AS DIRECTED BY THE ENGINEER, WHERE APPLIES.
6. WHEN EXCAVATION IS REQUIRED NEXT TO A PAVEMENT LANE CARRYING TRAFFIC AND WIDENING IS NOT COMPLETED WITHIN FORTY EIGHT (48) HOURS, SUFFICIENT BACKFILL SHALL BE PLACED AGAINST THE EDGE OF PAVEMENT TO PROVIDE A USUAL 3:1 SLOPE.
7. WHERE THE CONTRACTOR DESIRES TO MOVE ANY EQUIPMENT NOT LICENSED FOR OPERATION ON PUBLIC ROADWAYS ON OR ACROSS PAVEMENT, HE SHALL PROTECT THE PAVEMENT FROM DAMAGE. ANY DAMAGE TO PAVEMENT SHALL BE REPLACED AT THE CONTRACTOR'S SOLE EXPENSE.
8. THE CONTRACTOR SHALL NOT COMMENCE WORK ON THE ROADWAY BEFORE 7:00 AM AND SHALL ARRANGE HIS WORK SO THAT NO MACHINERY OR EQUIPMENT SHALL BE CLOSER THAN 30 FEET TO THE TRAVELED ROADWAY AFTER SUNSET EXCEPT AS APPROVED BY THE ENGINEER. UNLESS OTHERWISE APPROVED BY THE CITY, WORKING HOURS SHALL BE 7AM-7PM MON.-FRI. AND 8AM-7PM ON SATURDAYS. NO WORK SHALL BE DONE ON CITY HOLIDAYS OR SUNDAYS.
9. WHERE PROPOSED REINFORCED CONCRETE PAVEMENT CONNECT TO EXISTING REINFORCED CONCRETE PAVEMENT, THE CONTRACTOR SHALL MATCH AT SAME TOP CONCRETE ELEVATION WITH A SMOOTH TRANSITION INCLUDING AT CONCRETE CURB CONNECTIONS. SEE LONGITUDINAL BUTT JOINT DETAIL FOR TYPICAL CONNECTION.
10. THIS PROJECT WILL NOT BE CONSIDERED COMPLETE UNTIL THE ENGINEER DETERMINES THAT ALL CURBS, PAVEMENT AND SIDEWALKS HAVE BEEN SWEEPED CLEAN OF ALL DIRT AND DEBRIS.
11. ALL BARRIER FREE RAMPS SHALL COMPLY WITH THE CURRENT A.D.A. AND T.D.L.R. REGULATIONS.

**PAVEMENT MARKINGS AND SIGNS**

1. ALL PAVEMENT MARKINGS, SIGN MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE LATEST ADDITIONS OF THE STANDARD HIGHWAY DEPARTMENT SIGN DESIGN FOR TEXAS, THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD) UNLESS NOTED OTHERWISE.
2. SIGN LOCATIONS SHOWN ON THE PLANS ARE DIAGRAMMATIC.
3. PAYMENT FOR EACH SIGN SHALL INCLUDE ALL MOUNTING HARDWARE, THE SIGN POLE AND TRIANGULAR SLIP BASE SYSTEM. (TXDOT SMD (SLIP-1)-08).
4. SIGNS SHALL BE PLACED IN CONFORMANCE WITH THE LATEST EDITION OF TMUTCD.
5. REFLECTORIZED PAVEMENT MARKINGS SHALL BE THERMOPLASTIC, PER TXDOT STANDARD SPECIFICATIONS, ITEM 666. PAVEMENT MARKERS SHALL COMPLY WITH TXDOT STANDARD SPECIFICATIONS, ITEM 672.
6. ALL EXISTING SIGNS TEMPORARILY REMOVED BY THE CONTRACTOR SHALL BE PROTECTED FOR REINSTALLATION BY THE CONTRACTOR. ALL EXISTING SIGNS PERMANENTLY REMOVED SHALL BE SALVAGED FOR RETURN TO THE OWNER.

**TRAFFIC CONTROL**

1. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE TRAFFIC CONTROL DURING THE PROJECT. ALL TRAFFIC CONTROL WORK SHALL BE IN ACCORDANCE WITH THE LATEST VERSION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).
2. ALL TRAFFIC CONTROL PLANS MUST BE SUBMITTED BY THE CONTRACTOR FOR REVIEW A MINIMUM OF SEVEN WORKING DAYS PRIOR TO ANTICIPATED LANE CLOSURES. THE TRAFFIC CONTROL PLAN MUST BE APPROVED BY THE CITY PRIOR TO BEGINNING CONSTRUCTION ACTIVITY. TRAFFIC CONTROL PLANS MAY BE REQUIRED ON OTHER ROADWAYS AS DETERMINED BY THE CITY OR THE ENGINEER. ALL TRAFFIC CONTROL PLANS MUST BE PREPARED BY AN INDIVIDUAL CERTIFIED IN THEIR PREPARATION IN THE STATE OF TEXAS.
3. BARRICADES AND SIGNS SHALL BE PLACED IN SUCH A MANNER AS NOT TO INTERFERE WITH SIGHT DISTANCE OF DRIVERS ENTERING THE ROADWAY OR SIDE STREETS.
4. ALL TEMPORARY TRAFFIC CONTROL DEVICES SHALL BE REMOVED AS SOON AS PRACTICAL WHEN THEY ARE NO LONGER NEEDED.

**UTILITY NOTES**

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING PUBLIC AND PRIVATE UTILITIES THROUGHOUT THE CONSTRUCTION ON THIS PROJECT. THE CONTRACTOR SHALL CONTACT THE APPROPRIATE UTILITY COMPANY FOR LINE RESPONSIBILITY AND IS LIABLE TO THESE COMPANIES FOR ANY DAMAGE CAUSED TO THEIR FACILITIES.
2. THE CONTRACTOR SHALL TAKE EXTREME CARE WHEN EXCAVATING IN THE VICINITY OF UTILITIES. THE CONTRACTOR MAY BE REQUIRED TO PROBE OR EXPOSE THESE FACILITIES. THE CONTRACTOR WILL BE RESPONSIBLE FOR DAMAGE TO THESE UTILITIES CAUSED BY THE CONTRACTOR.
3. ERECTION OF POLES AND STRUCTURES LOCATED NEAR ANY OVERHEAD OR UNDERGROUND UTILITIES SHALL BE ACCOMPLISHED USING ESTABLISHED INDUSTRY SAFETY AND UTILITY SAFETY PRACTICES.

**STORM WATER POLLUTION PREVENTION NOTES**

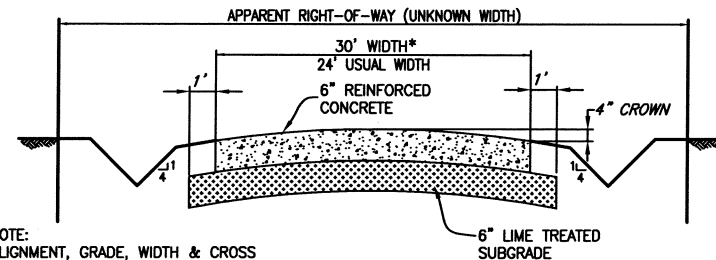
1. PRIOR TO COMMENCING ANY CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL PROVIDE A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) TO THE CITY.
2. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR IMPLEMENTING ALL THE VARIOUS STORM WATER POLLUTION PREVENTION MEASURES AND SHALL BE REQUIRED TO COMPLY WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL EROSION, CONSERVATION, AND SANITATION ORDINANCES.
3. IF THESE STORM WATER POLLUTION PREVENTION SYSTEMS, AS APPROVED, CANNOT CONTROL EROSION, THE SWPPP WILL BE REQUIRED TO BE REVISED AND/OR ADDITIONAL EROSION CONTROL DEVICES WILL BE REQUIRED ON SITE AT NO ADDITIONAL COST TO THE CITY.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PAYMENT OF ALL ASSOCIATED FEES, INCLUDING BUT NOT LIMITED TO THE N.O.I. (NOTICE OF INTENT) APPLICATION FEE AND WATER QUALITY FEE.
5. PERIMETER CONTROLS SUCH AS SILT CONTROL FENCE OR HAY BALES SHALL BE INSTALLED AT ALL DOWN SLOPE BOUNDARIES AND AS REQUIRED WHERE PAVEMENT REMOVAL, UTILITY CONSTRUCTION, GRADING, OR OTHER CONSTRUCTION ACTIVITIES ARE TO BE PERFORMED. THE CONTRACTOR SHALL TAKE SUCH MEASURES AT ALL TIMES TO MINIMIZE SITE TRACKING OR TRANSPORT OF SEDIMENT AND DEBRIS OFF-SITE.
6. DAMAGES TO ADJACENT PROPERTY OR TO RECEIVING WATERS CAUSED BY IMPROPERLY INSTALLED OR POORLY MAINTAINED EROSION CONTROL MEASURES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
7. THE CONTRACTOR SHALL REMOVE AND PROPERLY DISPOSE OF SILT AND SEDIMENT FROM EROSION CONTROL DEVICES WHEN THE EFFECTIVENESS OF THESE MEASURES IS REDUCED, OR AS DIRECTED BY THE ENGINEER.
8. THE CONTRACTOR SHALL PROVIDE ADEQUATE PROTECTION FOR THE EXISTING AND PROPOSED STORM DRAINAGE INLETS AND PREVENT THE ENTRY OF ANY SEDIMENT OR OTHER MATERIALS INTO THE DRAINAGE SYSTEM.
9. THE CONTRACTOR SHALL NOT ALLOW ANY CONSTRUCTION DEBRIS OUTSIDE THE PROJECT BOUNDARIES. ANY DEBRIS (MUD, GRAVEL, ORGANIC MATERIAL, ETC.) THAT FALLS ONTO ADJACENT PROPERTY OR EXISTING PAVEMENT SHALL BE REMOVED IMMEDIATELY.
10. THE CONTRACTOR SHALL REMOVE ALL TEMPORARY EROSION CONTROL DEVICES UPON COMPLETION OF CONSTRUCTION ACTIVITIES.

**DRAINAGE NOTES**

1. ALL DRAINAGE PIPES SHALL INTERSECT STRUCTURES AT THE CENTERLINE OF THE STRUCTURE INSIDE WALL FACE, UNLESS NOTED OTHERWISE.
2. ALL R.C.P. AND R.C.B. BEND AND INTERSECTIONS SHALL BE CONSTRUCTED UTILIZING PRECAST 45' OR 60' BENDS, WYES, UNLESS NOTED OTHERWISE AND SHALL BE SUBSIDIARY TO R.C.P. OR R.C.B. INSTALLATION.
3. ALL STORM SEWER SHALL BE ASTM C-76, CLASS III REINFORCED CONCRETE PIPE, UNLESS NOTED OTHERWISE.
4. ALL STORM SEWER INLETS, MANHOLES & EMBEDMENT SHALL BE AS PER THE DETAILS.

**UTILITY CONTACTS**

- |            |        |         |         |
|------------|--------|---------|---------|
| 1. ONCOR   | (NAME) | (EMAIL) | (PHONE) |
| 2. AT&T    |        |         |         |
| 3. ATMOS   |        |         |         |
| 4. CHARTER |        |         |         |
| 5. GATEWAY |        |         |         |



NOTE: ALIGNMENT, GRADE, WIDTH & CROSS SECTION TO MATCH EXISTING PAVEMENT SURFACE UNLESS DIRECTED IN THE FIELD BY THE OWNER  
\* FROM STA. 7+22.65 TO STA. 8+92.49

**TYPICAL REINFORCED CONCRETE SECTION**

**SCOPE OF WORK**

1. REMOVE EXISTING ASPHALT PAVEMENT. EXISTING ASPHALT IS 4-INCHES TO 6-INCHES IN DEPTH. EXCAVATE BENEATH THE EXISTING ROADWAY UP TO ANOTHER 2-INCHES FOR A TOTAL EXCAVATION CUT OF 6-INCHES FROM THE EXISTING ROADWAY SURFACE.
2. PREPARE 6-INCH LIME TREATED SUBGRADE IN ACCORDANCE WITH NCTCOG ITEM 301.2 USING A MINIMUM OF 6% HYDRATED LIME AND COMPACT TO A MINIMUM OF 95% STANDARD PROCTOR AT OPTIMUM MOISTURE TO OPTIMUM PLUS 2%.
3. FURNISH AND INSTALL 6-INCH CLASS 'P1' 4000 PSI CONCRETE REINFORCED WITH NO. 3 DEFORMED BARS ON 24-INCH CENTERS.

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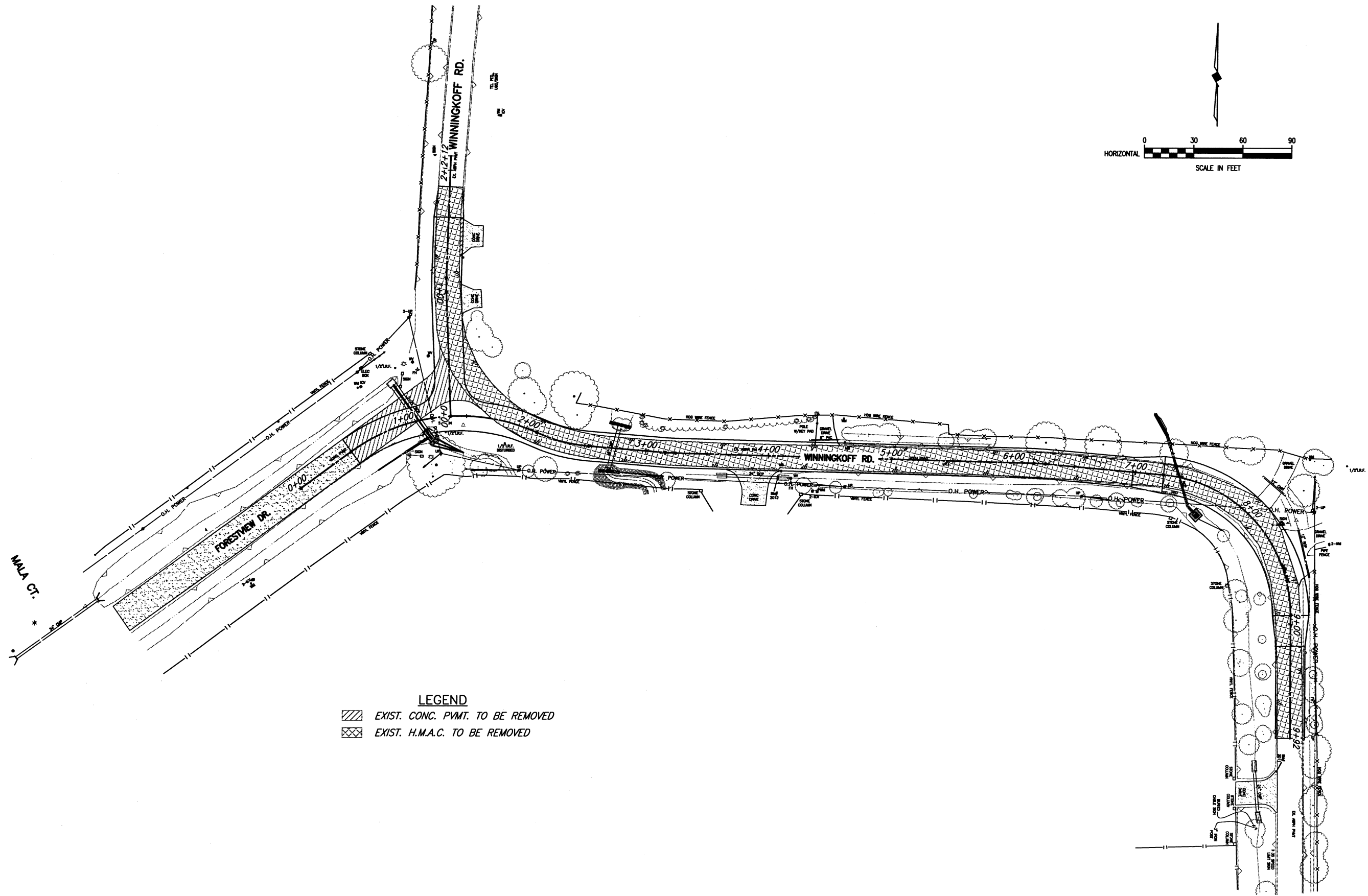
**BIRKHOFF, HENDRICKS & CARTER, L.L.P.**  
PROFESSIONAL ENGINEERS  
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TEXAS P.E. NO. 104984  
September, 2016

**CITY LUCAS, TEXAS**  
WINNINGKOFF ROAD  
REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS  
GENERAL NOTES & TYPICAL SECTION

BHC  
PROJECT NO.  
2016-108  
September, 2016

SHEET NO.  
**2**



**LEGEND**  
 ▨ EXIST. CONC. PVMT. TO BE REMOVED  
 ▩ EXIST. H.M.A.C. TO BE REMOVED

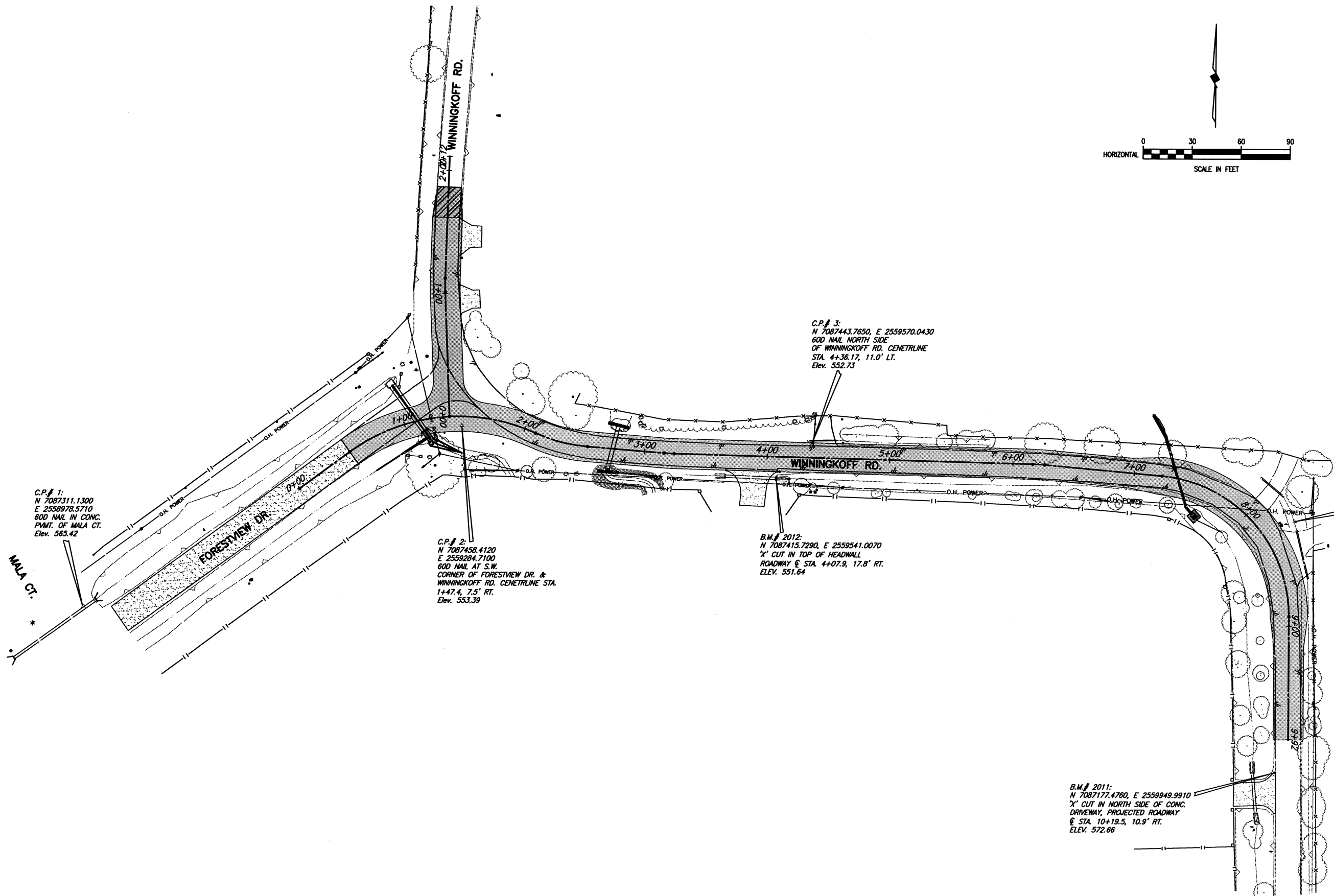
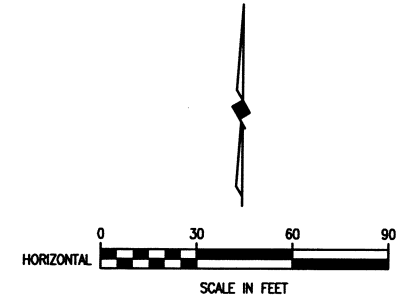
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 TEXAS P.E. NO. 104984  
 September, 2016

**CITY LUCAS, TEXAS**  
**WINNINGKOFF ROAD**  
**REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS**  
**REMOVAL PLAN**

BHC  
 PROJECT NO.  
 2016-108  
 SHEET NO.  
**3**  
 September, 2016



C.P. # 1:  
N 7087311.1300  
E 2558978.5710  
600 NAIL IN CONC.  
PNT. OF MALA CT.  
Elev. 565.42

C.P. # 2:  
N 7087458.4120  
E 2559284.7100  
600 NAIL AT S.W.  
CORNER OF FORESTVIEW DR. &  
WINNINGKOFF RD. CENETRLINE STA.  
1+47.4, 7.5' RT.  
Elev. 553.39

C.P. # 3:  
N 7087443.7650, E 2559570.0430  
600 NAIL NORTH SIDE  
OF WINNINGKOFF RD. CENETRLINE  
STA. 4+36.17, 11.0' LT.  
Elev. 552.73

B.M. # 2012:  
N 7087415.7290, E 2559541.0070  
'X' CUT IN TOP OF HEADWALL  
ROADWAY @ STA. 4+07.9, 17.8' RT.  
ELEV. 551.64

C.P. # 4:  
N 7087381.9410  
E 2559964.5470  
600 NAIL NORTHEAST SIDE  
OF WINNINGKOFF RD. CENETRLINE  
STA. 8+26.4, 27.3' LT.  
Elev. 567.28

B.M. # 2011:  
N 7087177.4760, E 2559949.9910  
'X' CUT IN NORTH SIDE OF CONC.  
DRIVEWAY, PROJECTED ROADWAY  
@ STA. 10+19.5, 10.9' RT.  
ELEV. 572.66

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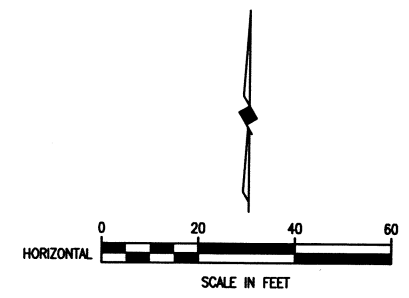
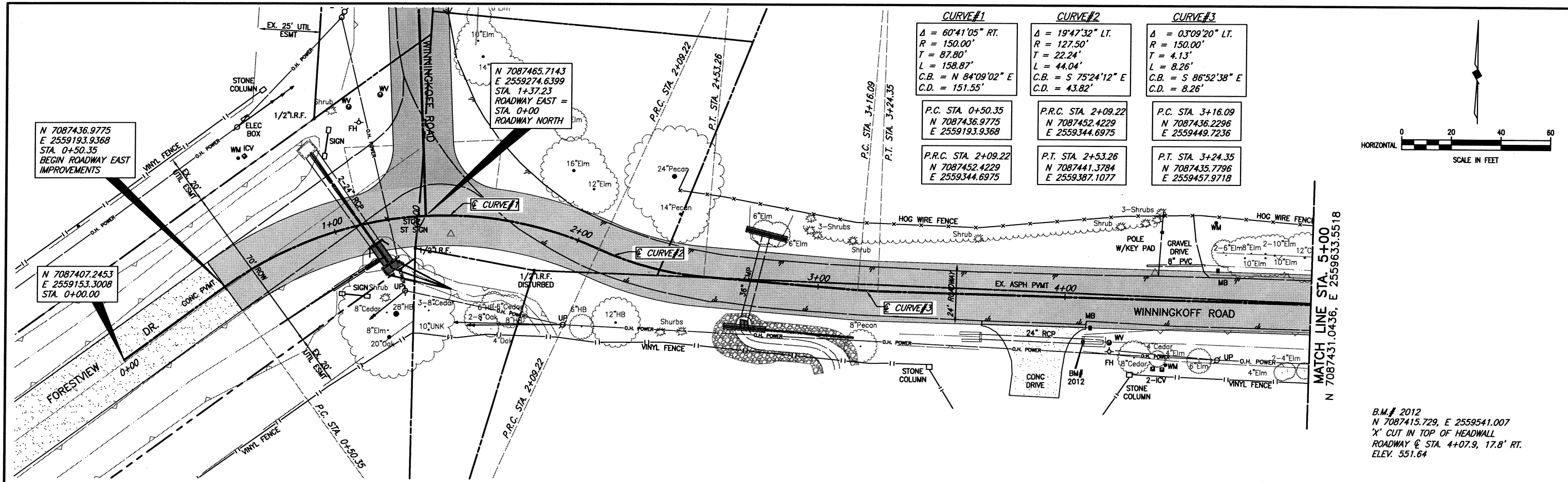
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**CITY LUCAS, TEXAS**  
WINNINGKOFF ROAD  
REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS  
SURVEY CONTROL POINTS

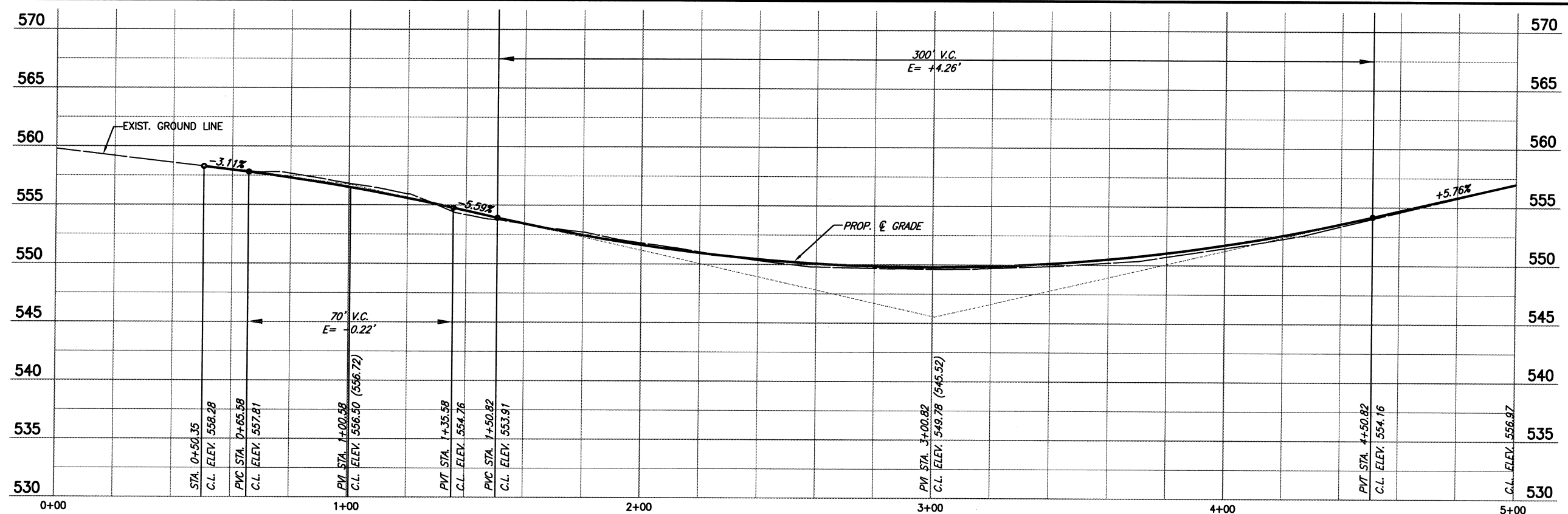
BHC  
PROJECT NO.  
2016-108  
September, 2016

SHEET NO.  
**4**





B.M.# 2012  
N 7087415.729, E 2559541.007  
'X' CUT IN TOP OF HEADWALL  
ROADWAY @ STA. 4+07.9, 17.8' RT.  
ELEV. 551.64



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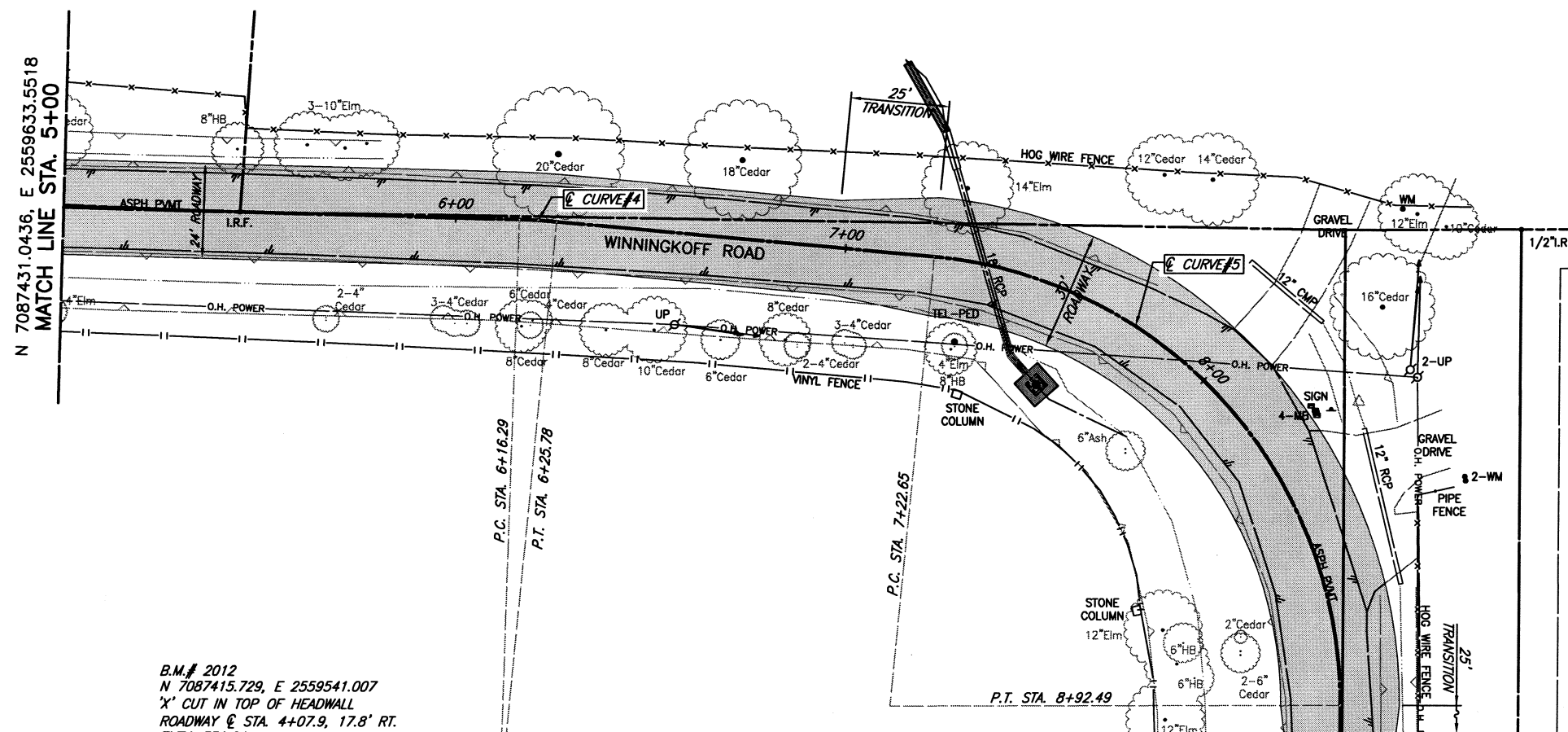
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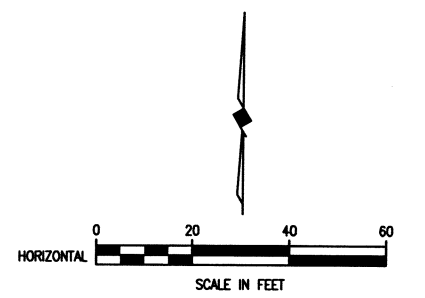
**CITY LUCAS, TEXAS**  
WINNINGKOFF ROAD  
REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS  
PLAN/PROFILE STA. 0+00 TO STA. 5+00

BHC  
PROJECT NO.  
2016-108  
SHEET NO.  
**5**  
September, 2016

N 7087431.0436, E 2559633.5518  
MATCH LINE STA. 5+00

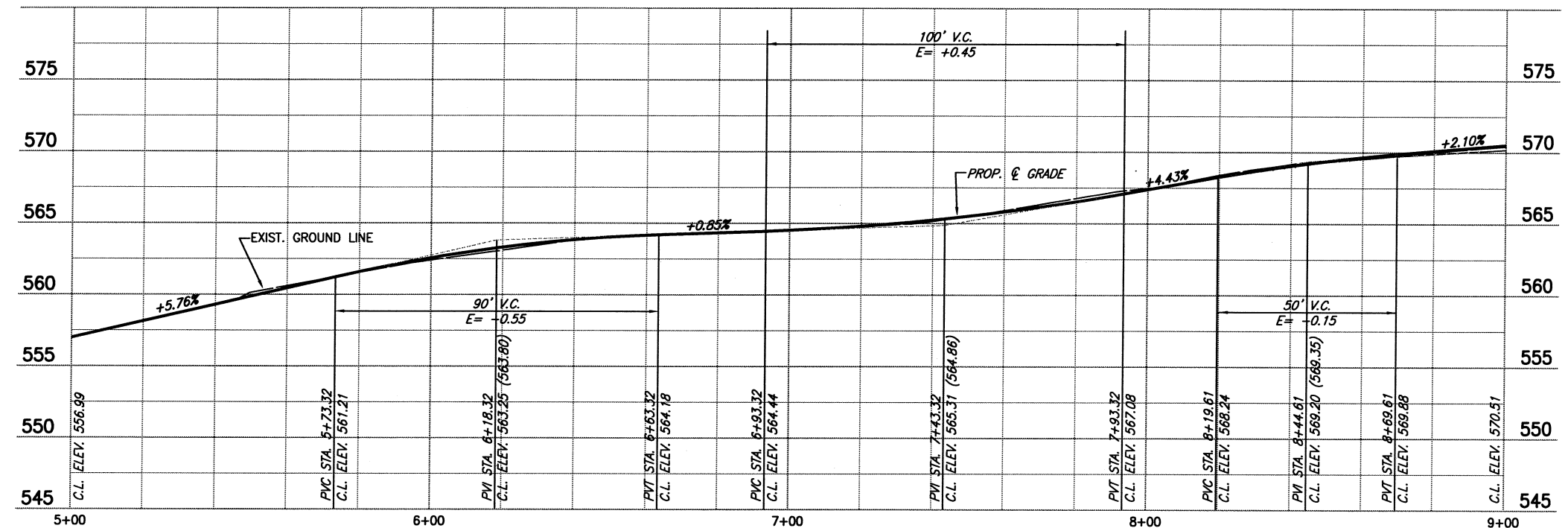


CURVE#4	CURVE#5
$\Delta = 03^{\circ}37'29''$ RT.	$\Delta = 84^{\circ}37'00''$ RT.
$R = 150.00'$	$R = 115.00'$
$T = 4.75'$	$T = 104.67'$
$L = 9.49'$	$L = 169.84'$
$C.B. = S 86^{\circ}38'33'' E$	$C.B. = E 42^{\circ}31'19'' E$
$C.D. = 9.49'$	$C.D. = 154.82'$
P.C. STA. 6+16.29 N 7087427.9079 E 2559749.8024	P.C. STA. 7+22.65 N 7087418.6242 E 2559855.7441
P.T. STA. 6+25.78 N 7087427.3523 E 2559759.2738	P.T. STA. 8+92.49 N 7087304.5206 E 2559960.3811



B.M.# 2012  
N 7087415.729, E 2559541.007  
'X' CUT IN TOP OF HEADWALL  
ROADWAY @ STA. 4+07.9, 17.8' RT.  
ELEV. 551.64

MATCH LINE STA. 9+00  
N 7087297.0038, E 2559960.4091



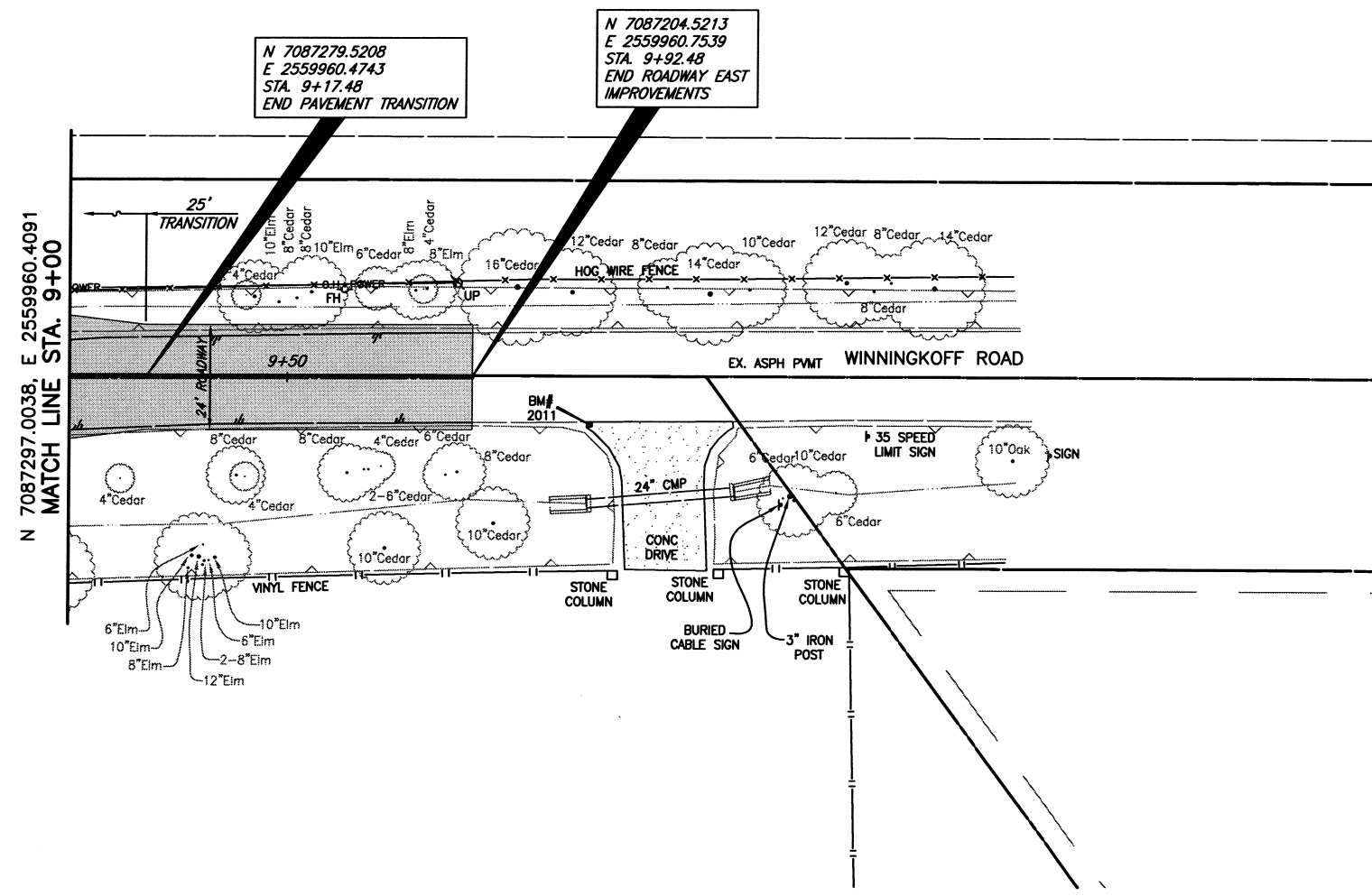
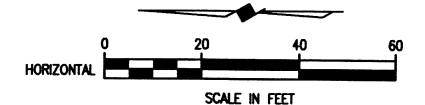
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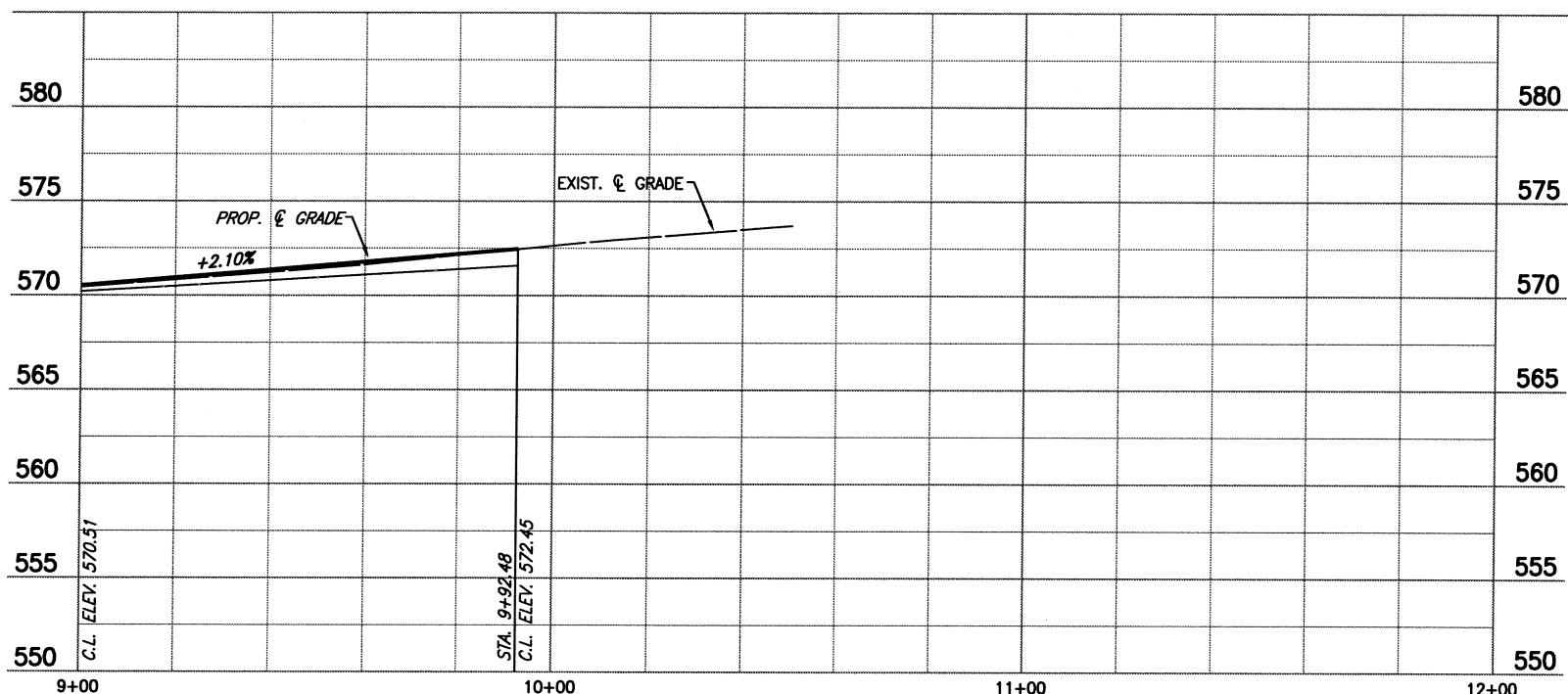
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TEXAS P.E. NO. 104984  
September, 2016

**CITY LUCAS, TEXAS**  
WINNINGKOFF ROAD  
REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS  
PLAN/PROFILE STA. 5+00 TO STA. 9+00

BHC  
PROJECT NO.  
2016-108  
September, 2016  
SHEET NO.  
**6**



B.M. # 2011  
 N 7087177.476, E 2559949.991  
 'X' CUT IN NORTH SIDE OF CONC.  
 DRIVEWAY, PROJECTED ROADWAY  
 @ STA. 10+19.5, 10.9' RT.  
 ELEV. 572.66



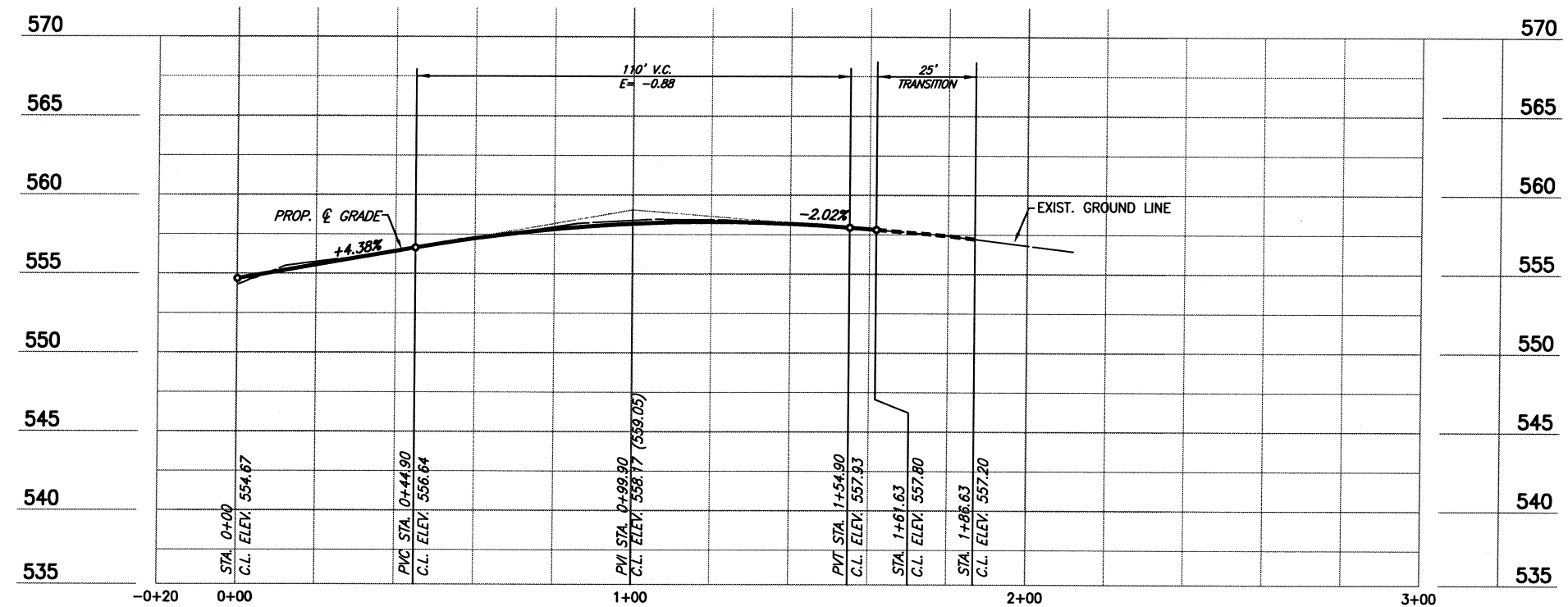
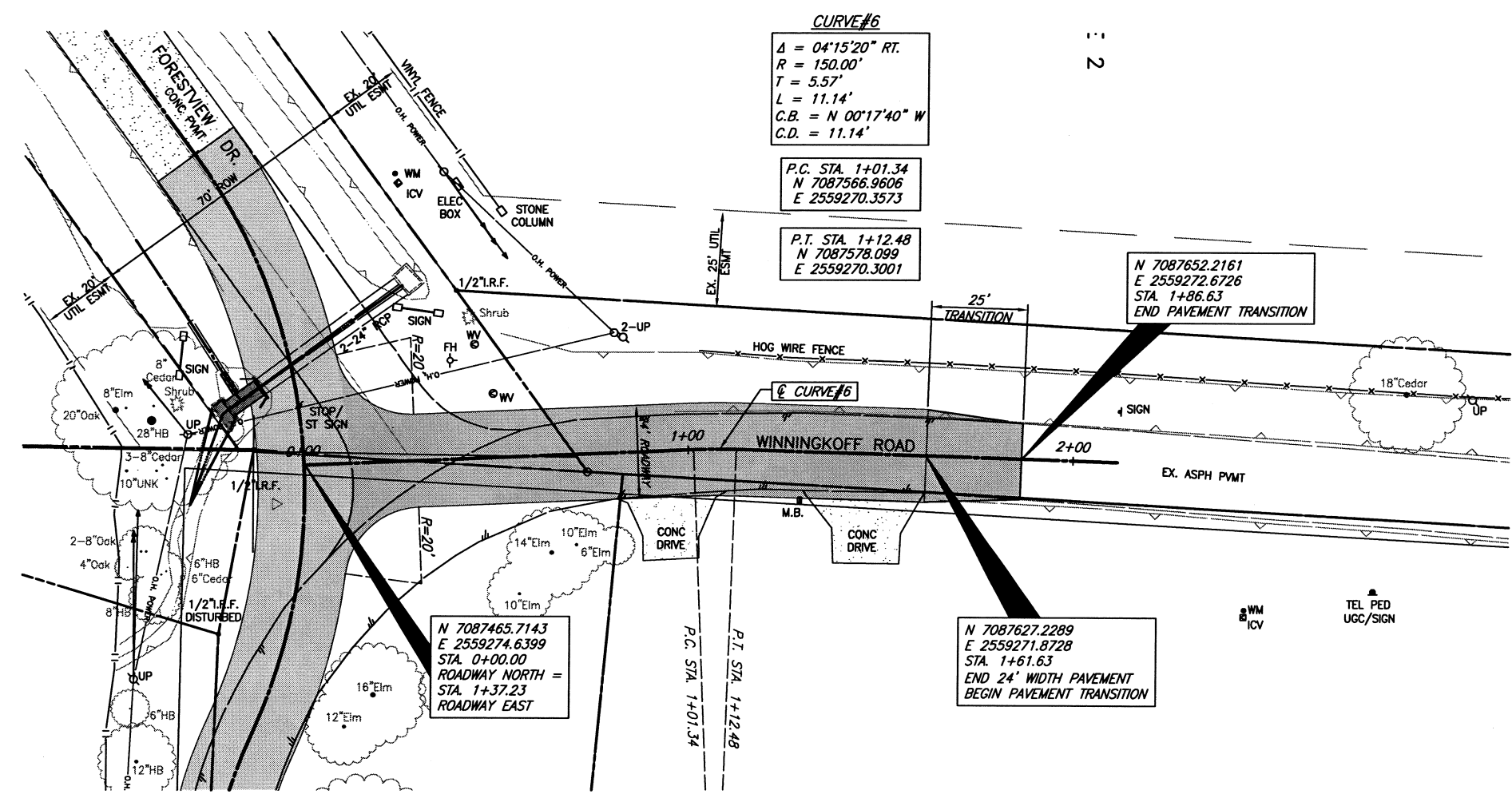
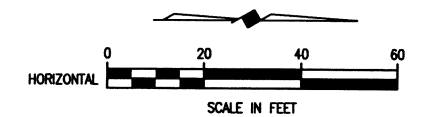
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 REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS  
 PLAN/PROFILE STA. 9+00 TO STA. 9+92.48

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 PROJECT NO.  
 2016-108  
 September, 2016  
 SHEET NO.  
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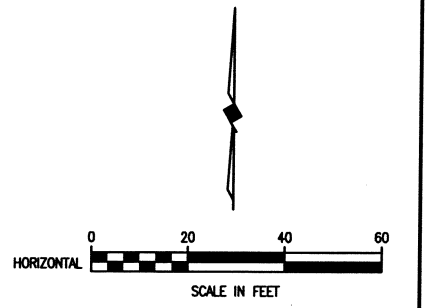
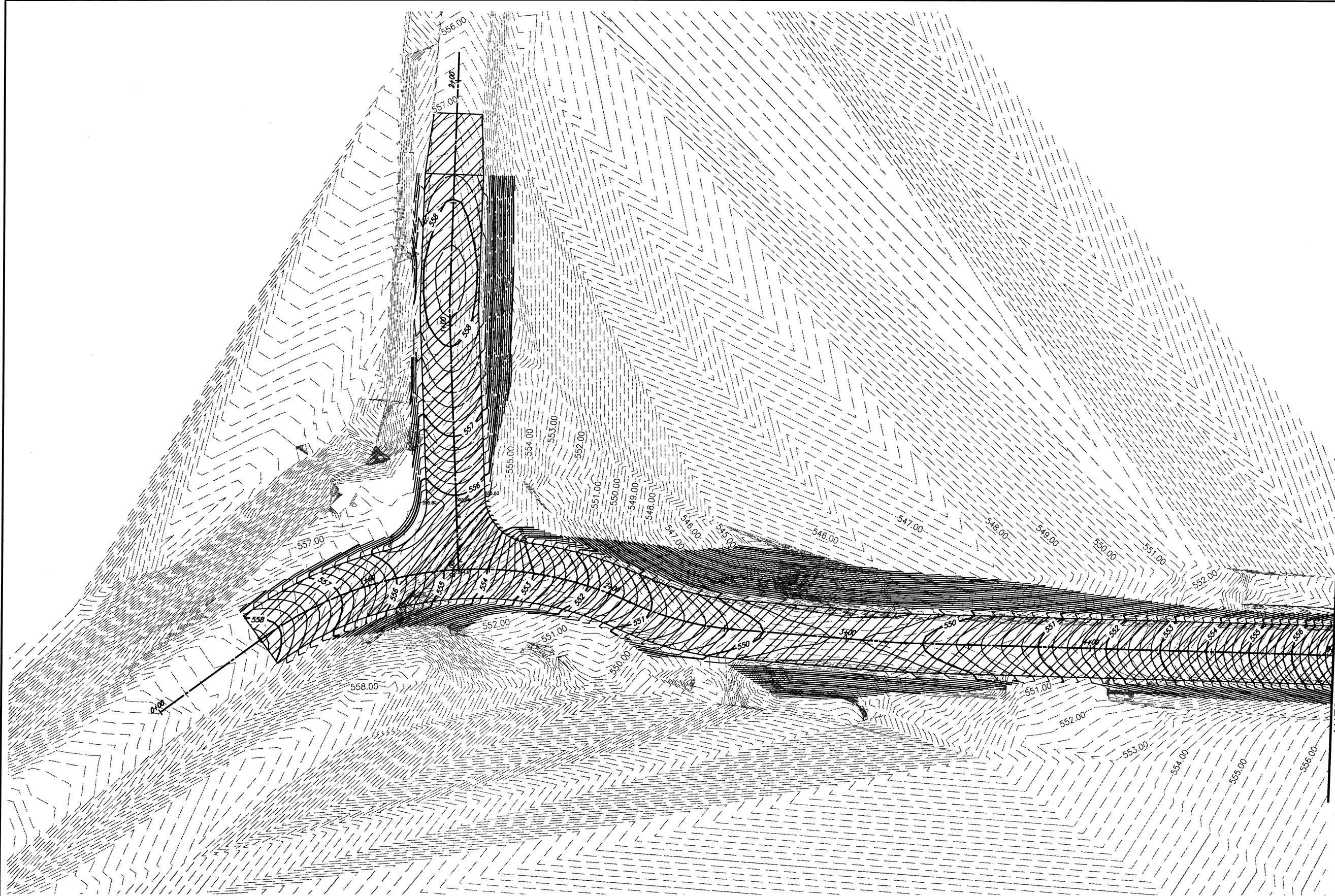
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 WINNINGKOFF ROAD  
 REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS  
 PLAN/PROFILE STA. 0+00 TO STA. 1+86.63

BHC  
 PROJECT NO.  
 2016-108  
 September, 2016

SHEET NO.  
**8**





LEGEND	
PROPOSED CONTOURS	
—————	555
—————	555.2
EXISTING CONTOURS	
—————	557
—————	557.2

MATCH LINE STA 5+00  
N 7087431.0436, E 2559633.5518


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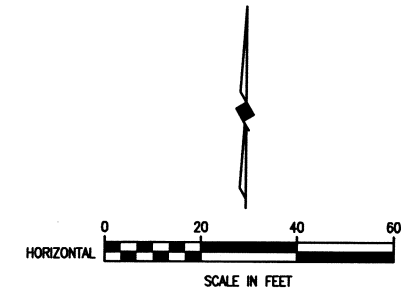
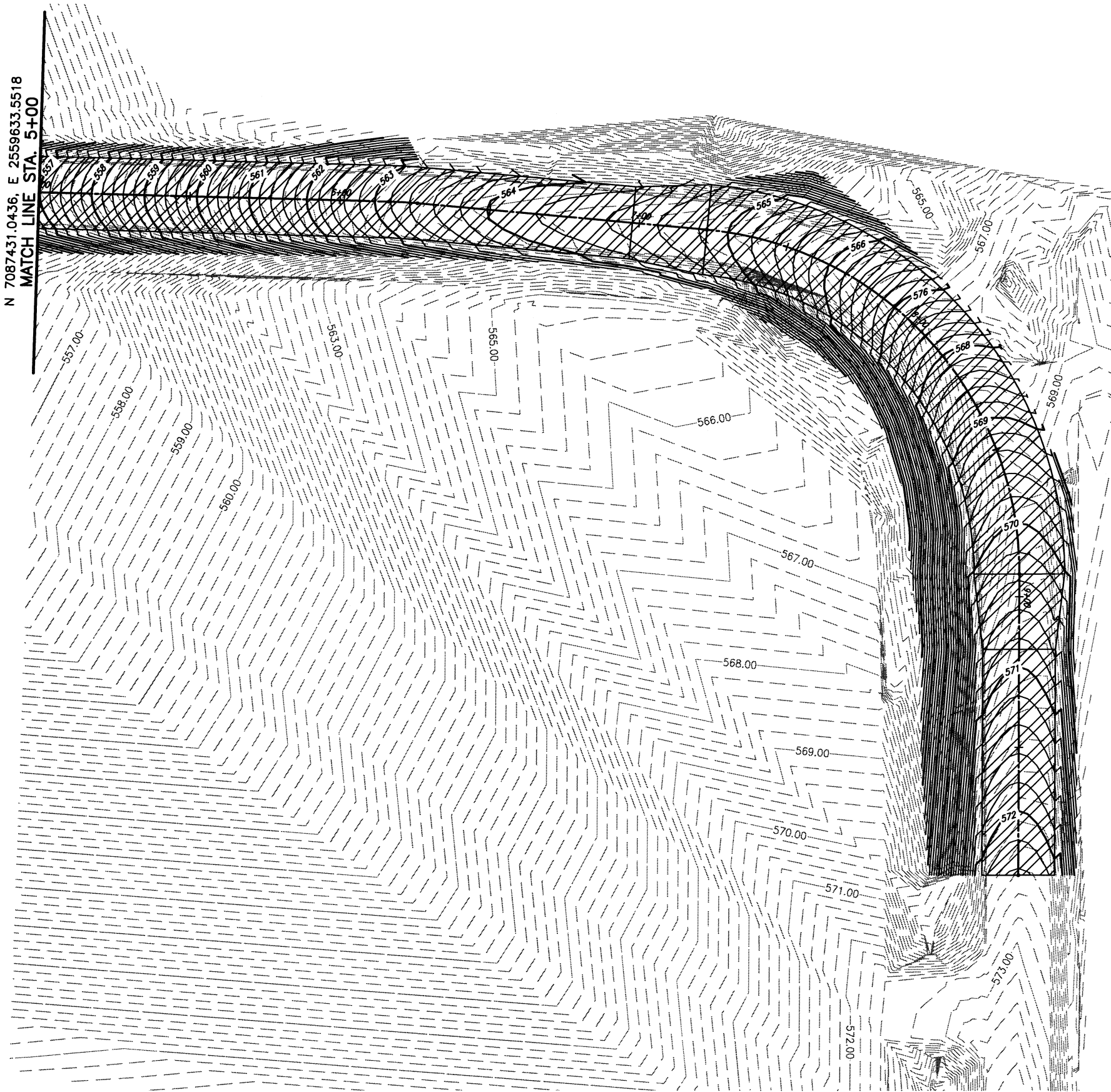
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**CITY LUCAS, TEXAS**  
**WINNINGKOFF ROAD**  
 REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS  
 PROPOSED & EXISTING CONTOURS

BHC  
 PROJECT NO.  
 2016-108  
 September, 2016

SHEET NO.  
**9**

N 7087431.0436, E 2559633.5518  
MATCH LINE STA. 5+00



LEGEND	
PROPOSED CONTOURS	555
EXISTING CONTOURS	557
	557.2


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September, 2016

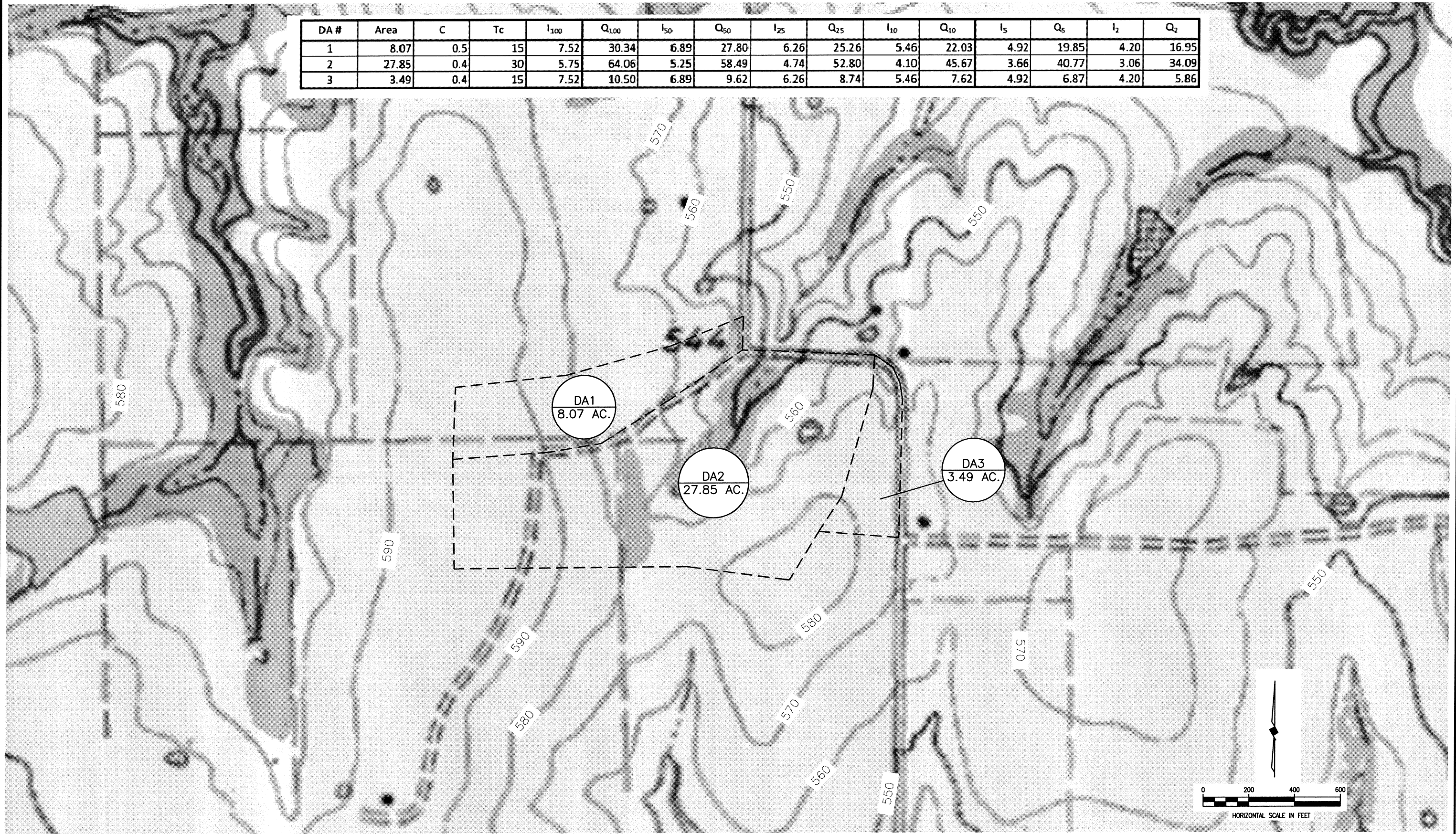
**CITY LUCAS, TEXAS**  
**WINNINGKOFF ROAD**  
**REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS**  
**PROPOSED & EXISTING CONTOURS**

BHC  
PROJECT NO.  
2016-108  
September, 2016

SHEET NO.  
**10**



DA #	Area	C	Tc	I <sub>100</sub>	Q <sub>100</sub>	I <sub>50</sub>	Q <sub>50</sub>	I <sub>25</sub>	Q <sub>25</sub>	I <sub>10</sub>	Q <sub>10</sub>	I <sub>5</sub>	Q <sub>5</sub>	I <sub>2</sub>	Q <sub>2</sub>
1	8.07	0.5	15	7.52	30.34	6.89	27.80	6.26	25.26	5.46	22.03	4.92	19.85	4.20	16.95
2	27.85	0.4	30	5.75	64.06	5.25	58.49	4.74	52.80	4.10	45.67	3.66	40.77	3.06	34.09
3	3.49	0.4	15	7.52	10.50	6.89	9.62	6.26	8.74	5.46	7.62	4.92	6.87	4.20	5.86



REVISIONS:


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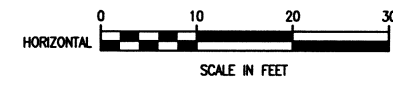
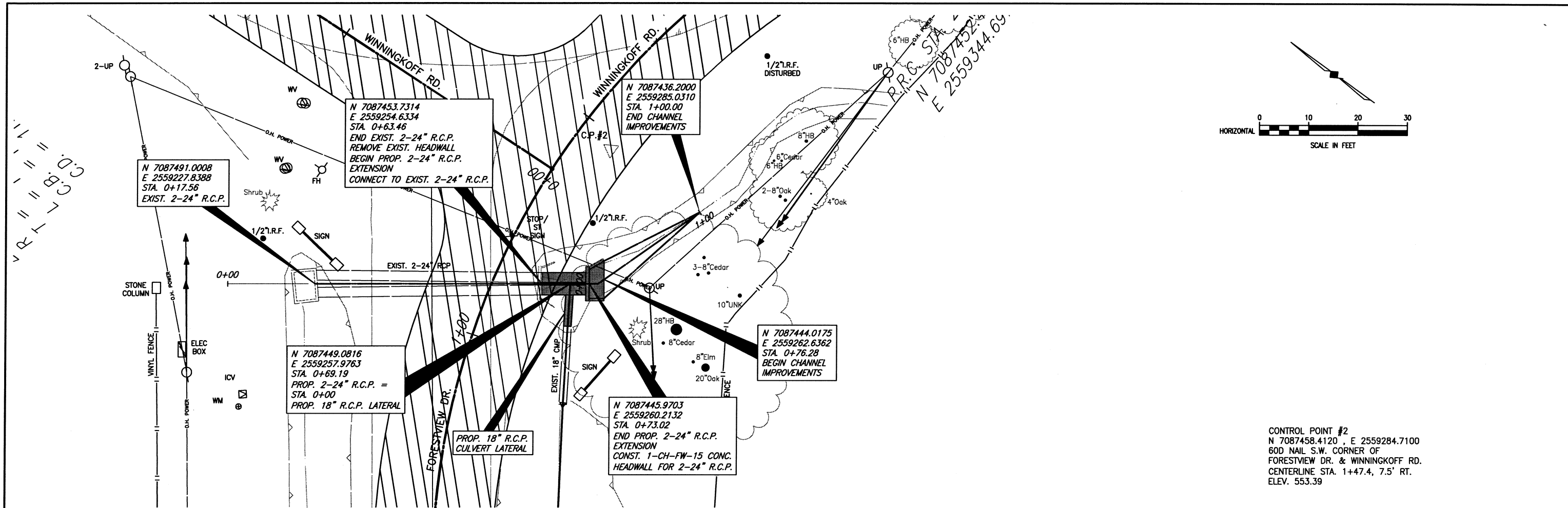
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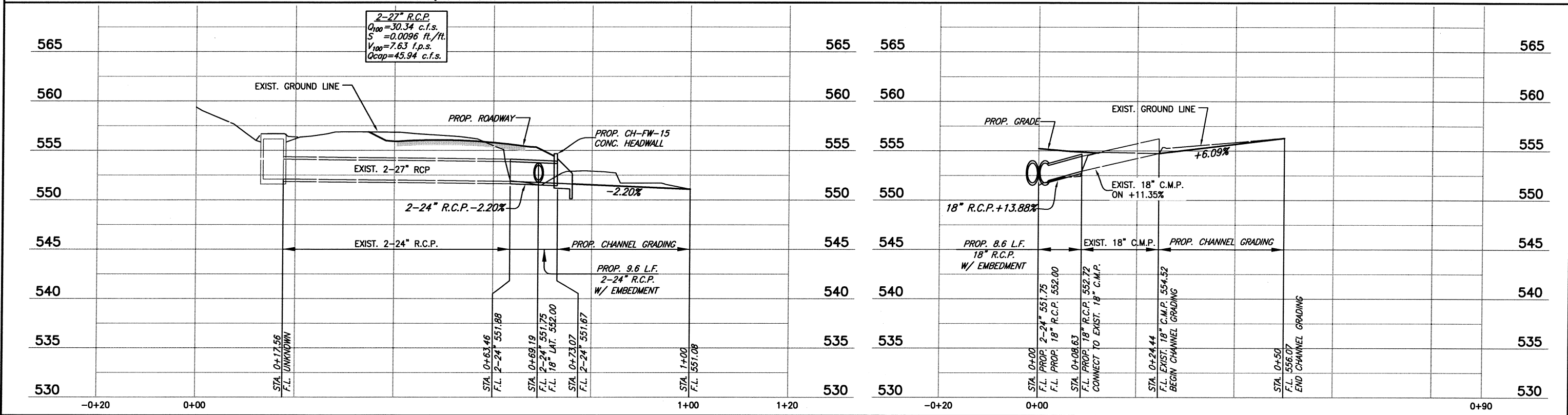
**CITY LUCAS, TEXAS**  
**WINNINGKOFF ROAD**  
**REVERSE CURVE PAVING & DRAINAGE IMPROVEMENTS**  
**DRAINAGE AREA MAP**

BHC  
 PROJECT NO.  
 2016-108  
 September, 2016

SHEET NO.  
**11**



CONTROL POINT #2  
 N 7087458.4120 , E 2559284.7100  
 60D NAIL S.W. CORNER OF  
 FORESTVIEW DR. & WINNINGKOFF RD.  
 CENTERLINE STA. 1+47.4, 7.5' RT.  
 ELEV. 553.39



CHANGE ORDER NO. X
FIELD CHANGE
ADDENDUM

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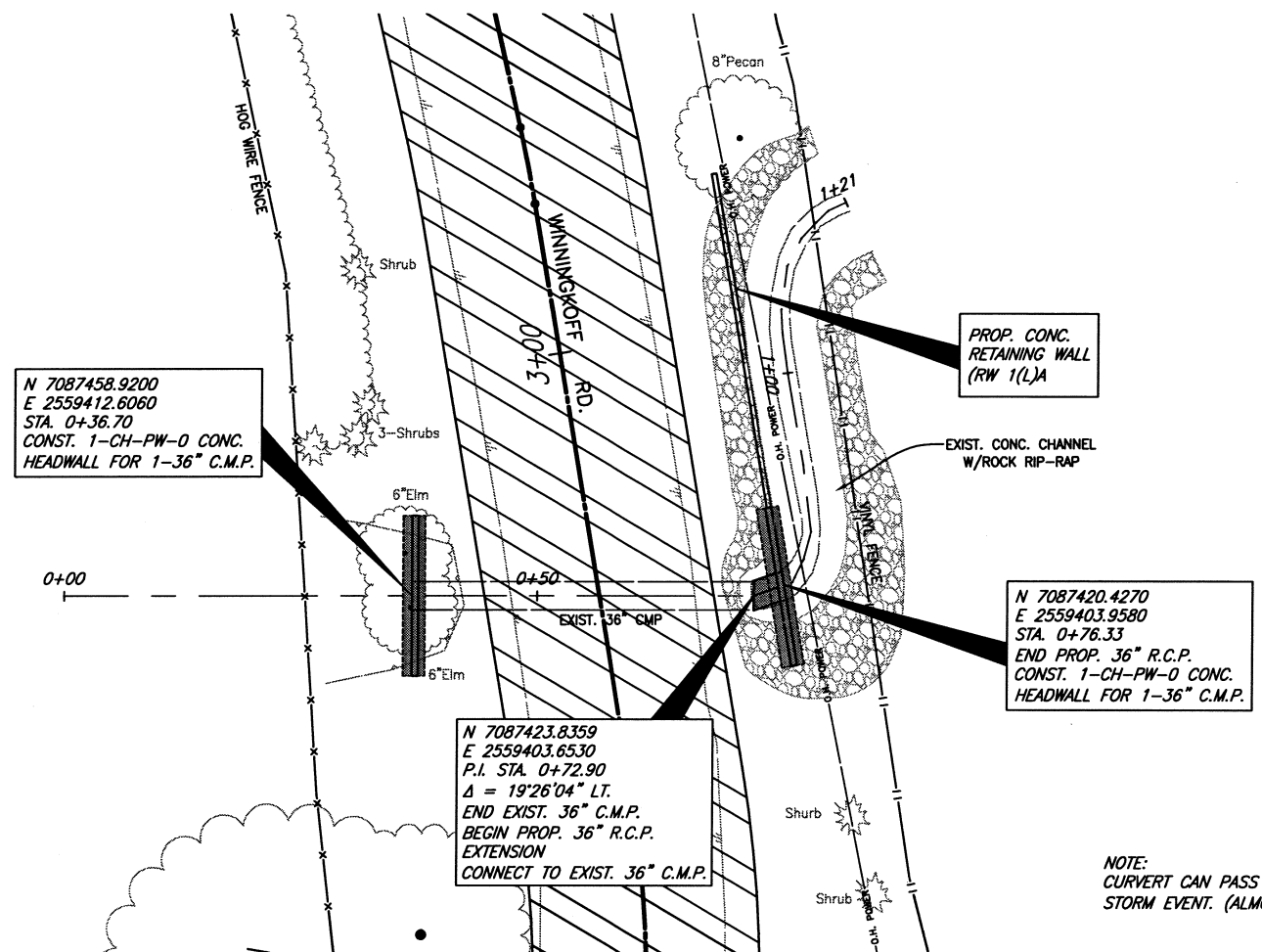
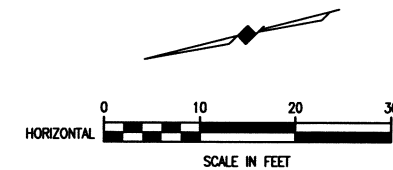
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 September, 2016

**CITY LUCAS, TEXAS**  
**WINNINGKOFF ROAD**  
**REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS**  
**EXISTING 2-24" CULVERT EXTENSION - PLAN/PROFILES**

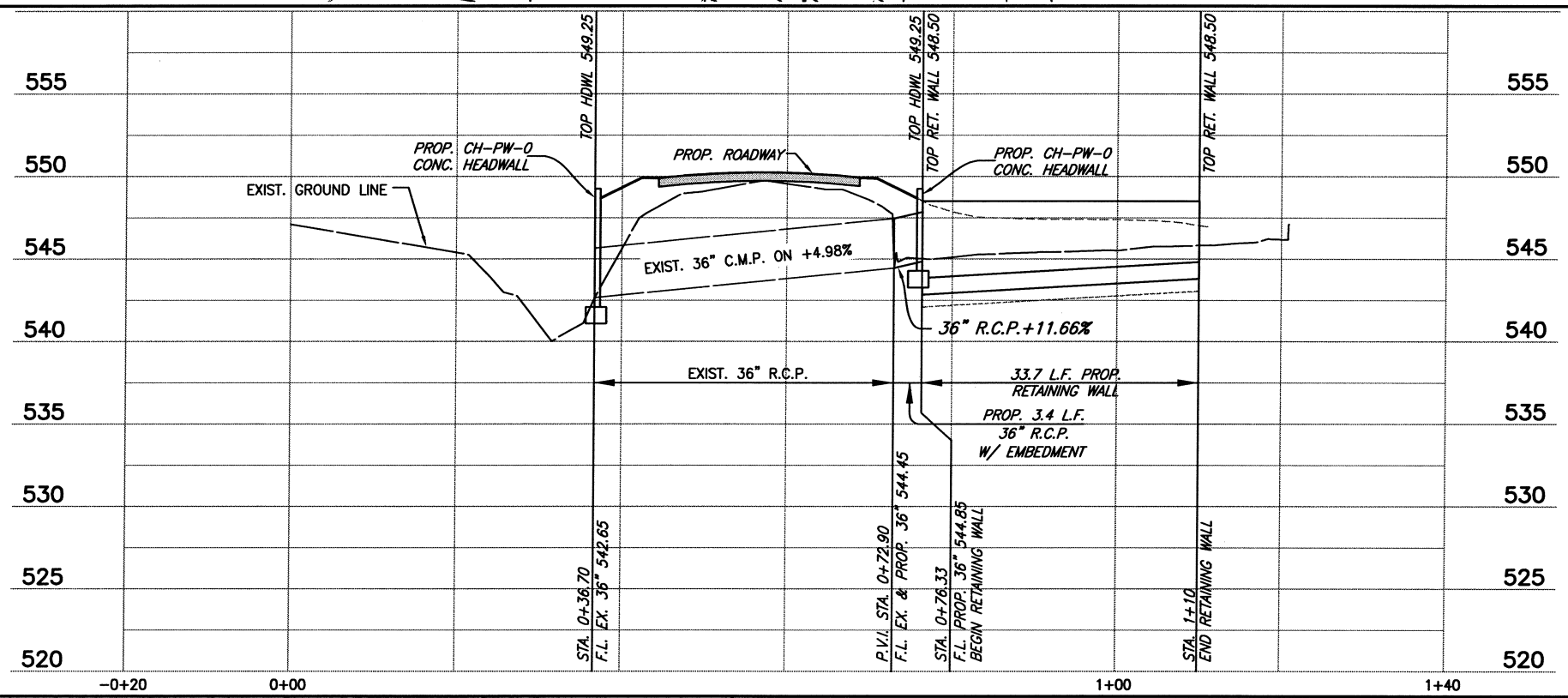
BHC PROJECT NO. 2016-108  
 September, 2016  
 SHEET NO. 12





NOTE:  
 CURVERT CAN PASS THE 5 YEAR  
 STORM EVENT. (ALMOST 10 YEAR)

CONTROL POINT #2  
 N 7087458.4120 , E 2559284.7100  
 60D NAIL S.W. CORNER OF  
 FORESTVIEW DR. & WINNINGKOFF RD.  
 CENTERLINE STA. 1+47.4, 7.5' RT.  
 ELEV. 553.39



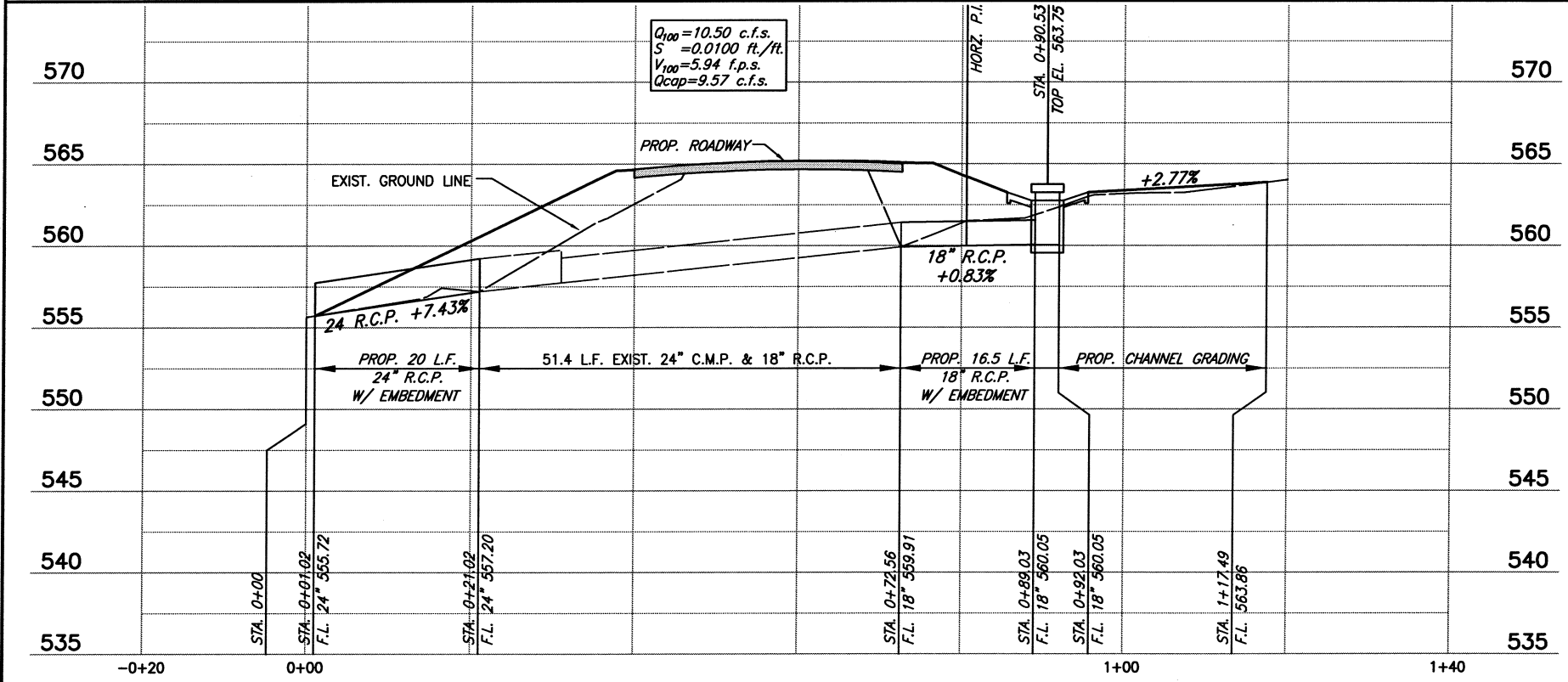
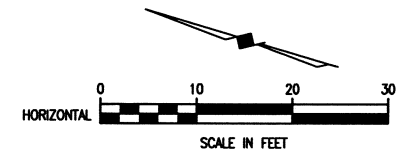
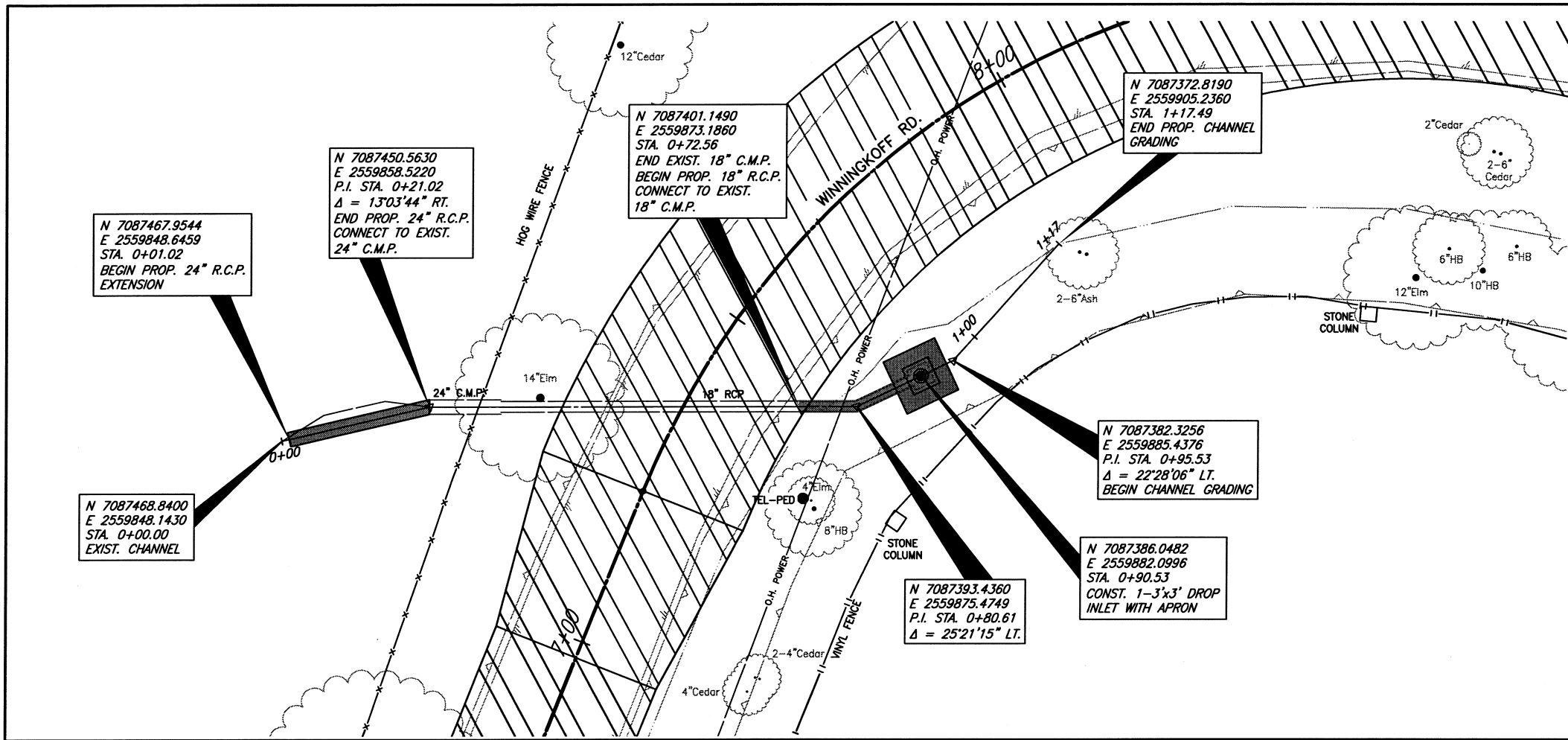
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**CITY LUCAS, TEXAS**  
 WINNINGKOFF ROAD  
 REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS  
 EXISTING 36" CULVERT EXTENSION - PLAN/PROFILES

BHC  
 PROJECT NO. 2016-108  
 SHEET NO. 13  
 September, 2016



$Q_{100} = 10.50 \text{ c.f.s.}$   
 $S = 0.0100 \text{ ft./ft.}$   
 $V_{100} = 5.94 \text{ f.p.s.}$   
 $Q_{cap} = 9.57 \text{ c.f.s.}$

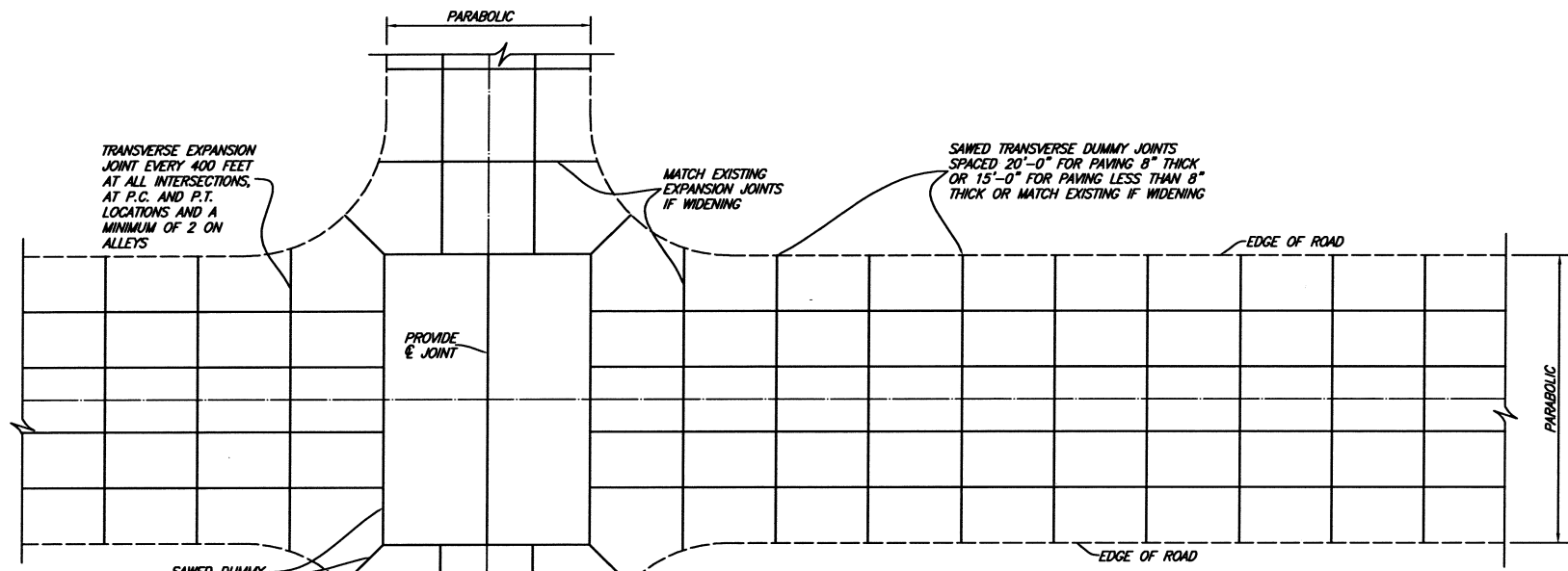

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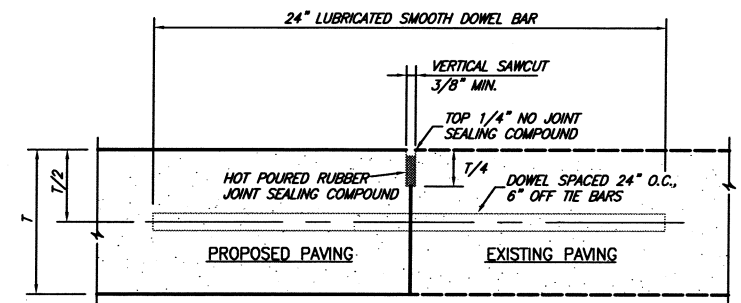
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**CITY LUCAS, TEXAS**  
**WINNINGKOFF ROAD**  
**REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS**  
**EXISTING 24" & 18" CULVERT EXTENSION - PLAN/PROFILES**

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 PROJECT NO.  
 2016-108  
  
 SHEET NO.  
**14**  
  
 September, 2016

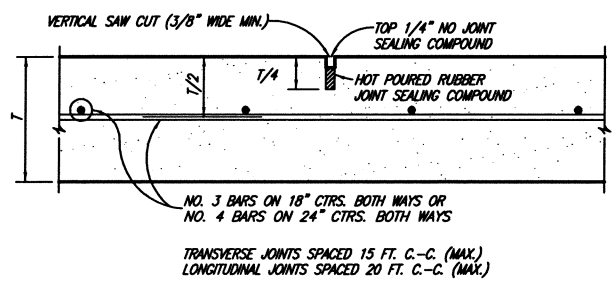


**SPACING DIAGRAM FOR TRANSVERSE JOINTS**  
(ROADWAYS AND ALLEYS)

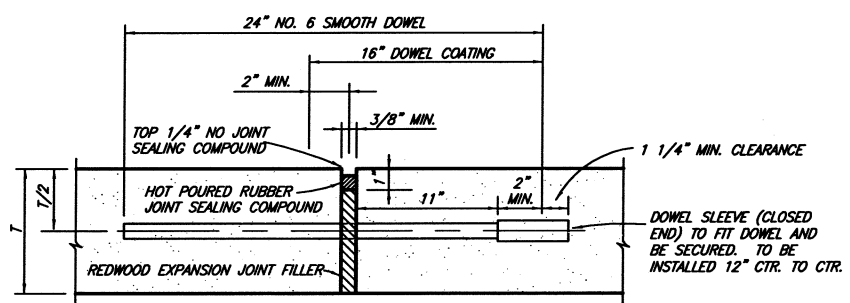


- NOTE:
1. T-8" AND GREATER NO. 6 BAR, T-6" AND LESS NO. 5 BAR.
  2. LONGITUDINAL BUTT CONSTRUCTION MAY BE UTILIZED IN PLACE OF LONGITUDINAL HINGED (KEYWAY) JOINT AT CONTRACTORS OPTION.
  3. DOWEL BARS SHALL BE DRILLED INTO PAVEMENT HORIZONTALLY BY USE OF A MECHANICAL FIG. HAND DRILLING IS NOT ACCEPTABLE. PUSHING DOWEL BARS INTO GREEN CONCRETE IS NOT ACCEPTABLE. DAMAGE TO EXISTING PAVEMENT SHALL BE REMOVED BY CONTRACTOR AND JOINT CONSTRUCTED AT CONTRACTORS EXPENSE.
  4. DOWEL BAR SHOWN IS IN ADDITION TO TIE BARS (12" O.C.-6" OFF DOWELS).
  5. TIE BARS SHALL BE NO. 5 BAR DEFORMED. TIE BAR SHALL HAVE A LENGTH OF 24 INCHES.

**LONGITUDINAL BUTT JOINT**

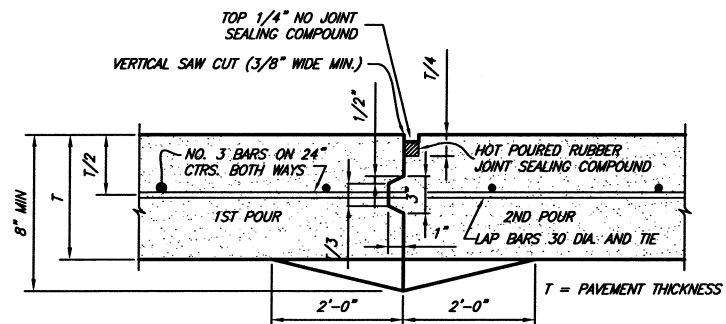


**SAWED DUMMY JOINT**



- TRANSVERSE EXPANSION JOINT NOTES:
1. DOWELS AND REINFORCING BARS SHALL BE SUPPORTED BY AN APPROVED DEVICE.
  2. TRANSVERSE EXPANSION JOINTS SHALL BE SPACED AT 400 FT. MAXIMUM AND AT ALL INTERSECTIONS.

**TRANSVERSE EXPANSION JOINT**



- CONSTRUCTION JOINT NOTES:
1. CONTRACTOR SHALL PROTECT KEYWAY PRIOR TO SECOND POUR. IF LONGITUDINAL KEYWAY IS DAMAGED, CONTRACTOR SHALL REPAIR WITH THE USE OF LONGITUDINAL BUTT JOINT (DRILL DOWELS INTO FIRST POUR).
  2. THICKENED EDGES ARE REQUIRED FOR FUTURE WIDENING ONLY.

**CONSTRUCTION JOINT**

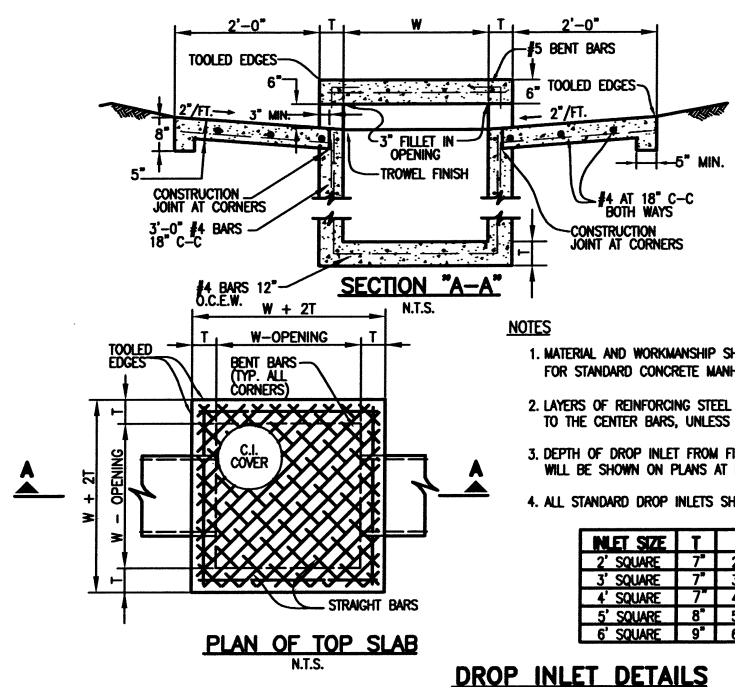
NO SCALE

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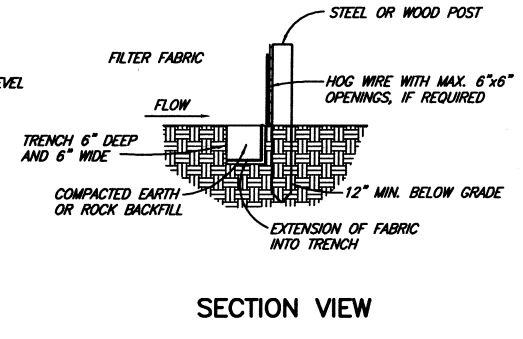
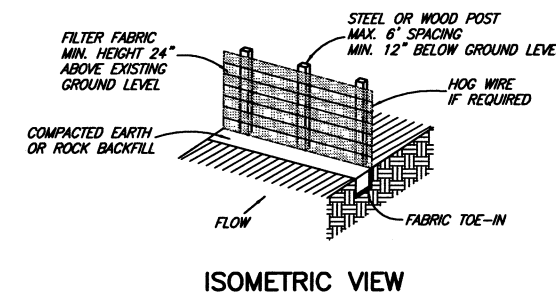
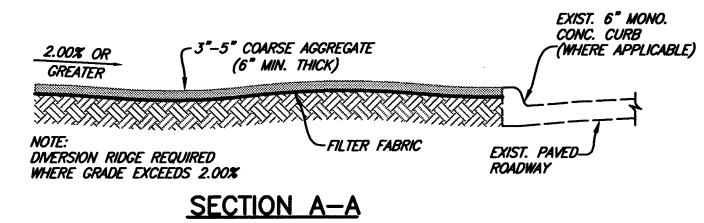
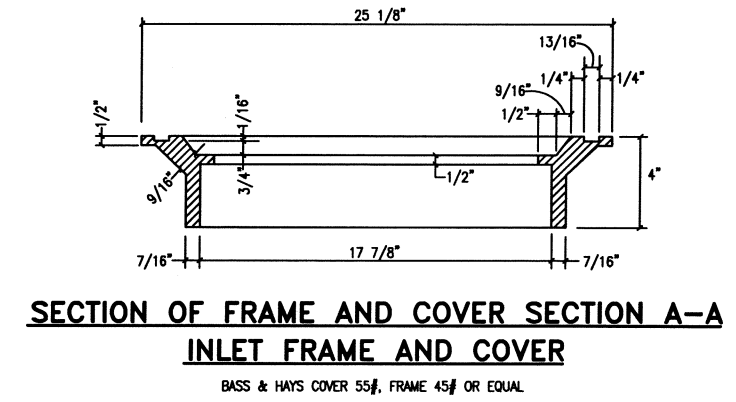
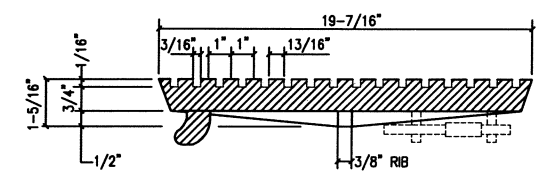
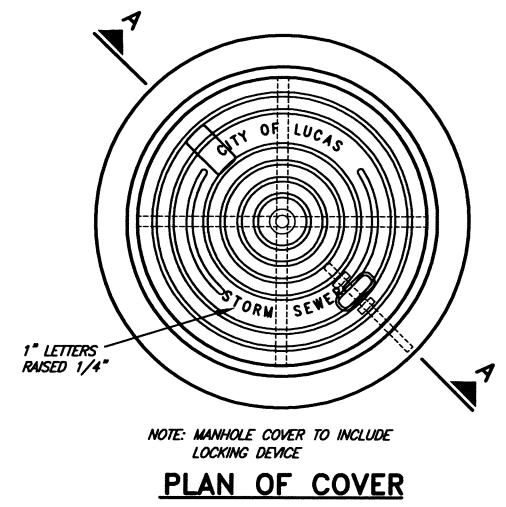
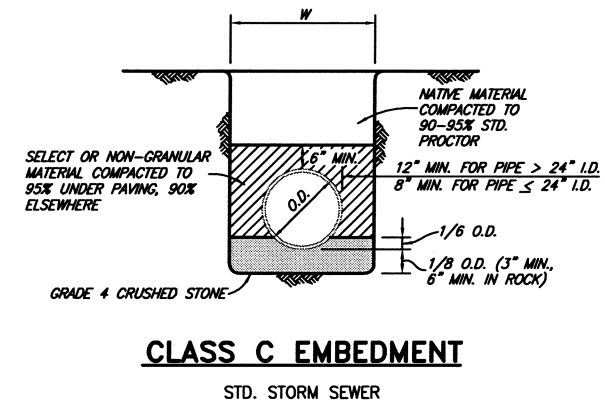
**CITY LUCAS, TEXAS**  
**WINNINGKOFF ROAD**  
**REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS**  
**CONSTRUCTION DETAILS**

BHC  
PROJECT NO.  
2016-108  
  
September, 2016  
  
SHEET NO.  
**15**

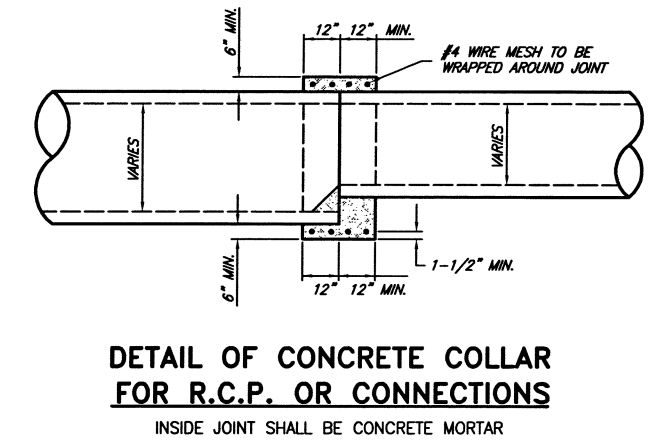
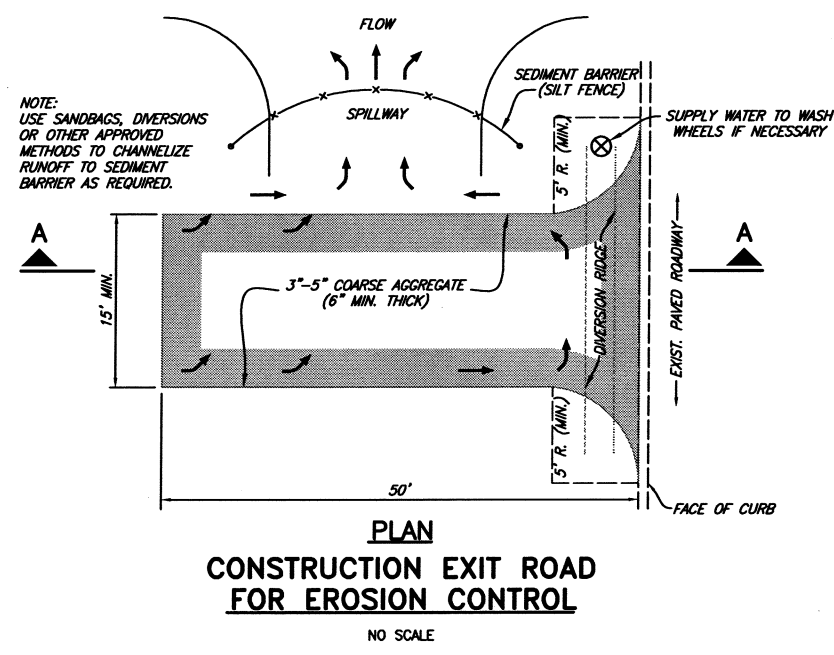
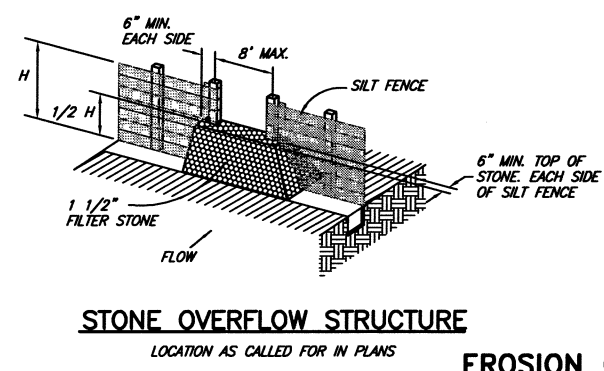


- NOTES**
- MATERIAL AND WORKMANSHIP SHALL CONFORM WITH THE REQUIREMENTS OF NCTCOG STANDARD SPECIFICATIONS FOR STANDARD CONCRETE MANHOLES, MINIMUM CLASS "A" CONCRETE.
  - LAYERS OF REINFORCING STEEL NEAREST THE INTERIOR AND EXTERIOR SURFACES SHALL HAVE A COVER OF 2" TO THE CENTER BARS, UNLESS OTHERWISE NOTED.
  - DEPTH OF DROP INLET FROM FINISHED GRADE TO FLOW LINE OF INLET IS VARIABLE. APPROXIMATE DEPTH WILL BE SHOWN ON PLANS AT LOCATION OF INLET.
  - ALL STANDARD DROP INLETS SHALL HAVE ONE OPENING ON EACH SIDE UNLESS OTHERWISE SHOWN ON PLANS.

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



- NOTES:**
- THE CONTRACTOR SHALL INSPECT SILT FENCE WEEKLY AND AFTER MAJOR RAIN EVENTS TO ENSURE THAT THE DEVICE IS FUNCTIONING PROPERLY AND MAINTAIN IN ACCORDANCE WITH NCTCOG.
  - THE CONTRACTOR SHALL REMOVE SEDIMENT FROM BEHIND FENCE WHEN THE DEPTH OF SEDIMENT HAS BUILT UP TO ONE-THIRD THE HEIGHT OF THE FENCE ABOVE GRADE.
  - THE CONTRACTOR SHALL INSPECT THE BASE OF THE FENCE TO ENSURE THAT NO GAPS HAVE DEVELOPED AND RE-TRENCH AS NECESSARY.
  - THE CONTRACTOR SHALL INSPECT FENCE POSTS TO ENSURE THAT THEY ARE PROPERLY SUPPORTING THE FENCE. IF NECESSARY, THE CONTRACTOR SHALL RESET AND ADD POSTS.
  - IF FILTER FABRIC IS RIPPED, DAMAGED OR DETERIORATED, THE CONTRACTOR SHALL REPLACE IT IN ACCORDANCE WITH THE ORIGINAL SPECIFICATIONS AND DETAILS. (MAINTENANCE OF THE SILT FENCE SHALL BE AT THE CONTRACTOR'S OWN EXPENSE)



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**BIRKHOFF, HENDRICKS & CARTER, L.L.P.**  
PROFESSIONAL ENGINEERS  
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JOSEPH T. GRAJEWSKI, III  
TEXAS P.E. NO. 104984  
September, 2016

**CITY LUCAS, TEXAS**  
WINNINGKOFF ROAD  
REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS  
CONSTRUCTION DETAILS

BHC  
PROJECT NO.  
2016-108  
September, 2016  
SHEET NO.  
**16**



**TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL** ④

SLOPE	DIA OF PIPE, D	Values for one Pipe			Values to be added for each add'l Pipe		
		W	Reinf (Lbs)	Conc (CY)	W	Reinf (Lbs)	Conc (CY)
2:1	12"	9'-0"	122	1.1	1'-9"	15	0.2
	15"	10'-3"	136	1.3	2'-2"	16	0.2
	18"	11'-6"	163	1.5	2'-8"	19	0.3
	21"	12'-9"	200	1.8	3'-1"	31	0.4
	24"	14'-0"	217	2.1	3'-7"	34	0.4
	27"	15'-3"	254	2.4	3'-11"	37	0.5
	30"	16'-6"	272	2.7	4'-4"	40	0.6
	33"	17'-9"	314	3.1	4'-8"	43	0.6
	36"	19'-0"	371	3.9	5'-1"	46	0.8
	42"	21'-6"	442	4.9	5'-10"	52	1.0
	48"	25'-0"	569	6.4	6'-7"	59	1.3
	54"	27'-6"	701	7.5	7'-6"	82	1.6
	60"	30'-0"	794	8.8	8'-3"	90	1.8
	66"	32'-6"	894	10.2	8'-9"	96	2.0
	72"	35'-0"	1055	11.7	9'-4"	103	2.3
3:1	12"	13'-0"	175	1.6	1'-9"	14	0.2
	15"	14'-9"	193	1.9	2'-2"	17	0.2
	18"	16'-6"	228	2.2	2'-8"	19	0.3
	21"	18'-3"	299	2.6	3'-1"	31	0.4
	24"	20'-0"	323	3.0	3'-7"	33	0.4
	27"	21'-9"	371	3.5	3'-11"	37	0.5
	30"	23'-6"	415	4.0	4'-4"	40	0.5
	33"	25'-3"	469	4.6	4'-8"	43	0.6
	36"	27'-0"	556	5.7	5'-1"	46	0.8
	42"	30'-6"	675	7.1	5'-10"	52	1.0
	48"	35'-6"	837	9.2	6'-7"	59	1.3
	54"	39'-0"	1015	11.0	7'-6"	84	1.6
	60"	42'-6"	1171	12.9	8'-3"	91	1.8
	66"	46'-0"	1298	14.9	8'-9"	98	2.0
	72"	49'-6"	1561	17.1	9'-4"	103	2.3
4:1	12"	17'-0"	229	2.0	1'-9"	15	0.2
	15"	19'-3"	266	2.4	2'-2"	17	0.2
	18"	21'-6"	308	2.9	2'-8"	19	0.3
	21"	23'-9"	382	3.5	3'-1"	31	0.3
	24"	26'-0"	430	3.9	3'-7"	34	0.4
	27"	28'-3"	486	4.7	3'-11"	37	0.5
	30"	30'-6"	539	5.2	4'-4"	40	0.6
	33"	32'-9"	603	6.0	4'-8"	42	0.6
	36"	35'-0"	738	7.5	5'-1"	47	0.8
	42"	39'-6"	881	9.3	5'-10"	52	1.0
	48"	46'-0"	1102	12.1	6'-7"	61	1.3
	54"	50'-6"	1364	14.4	7'-6"	84	1.6
	60"	55'-0"	1547	16.9	8'-3"	91	1.8
	66"	59'-6"	1741	19.5	8'-9"	98	2.0
	72"	64'-0"	2069	22.4	9'-4"	102	2.3
6:1	12"	25'-0"	336	3.0	1'-9"	14	0.2
	15"	28'-3"	384	3.6	2'-2"	17	0.2
	18"	31'-6"	452	4.2	2'-8"	19	0.3
	21"	34'-9"	581	5.1	3'-1"	31	0.4
	24"	38'-0"	644	5.8	3'-7"	34	0.4
	27"	41'-3"	737	6.9	3'-11"	37	0.5
	30"	44'-6"	807	7.7	4'-4"	39	0.6
	33"	47'-9"	912	8.9	4'-8"	44	0.6
	36"	51'-0"	1108	11.0	5'-1"	48	0.8
	42"	57'-6"	1318	13.7	5'-10"	54	1.0
	48"	67'-0"	1674	17.9	6'-7"	59	1.3
	54"	73'-6"	2064	21.3	7'-6"	83	1.6
	60"	80'-0"	2343	24.9	8'-3"	89	1.8
	66"	86'-6"	2635	28.9	8'-9"	96	2.0
	72"	93'-0"	3123	33.1	9'-4"	101	2.3

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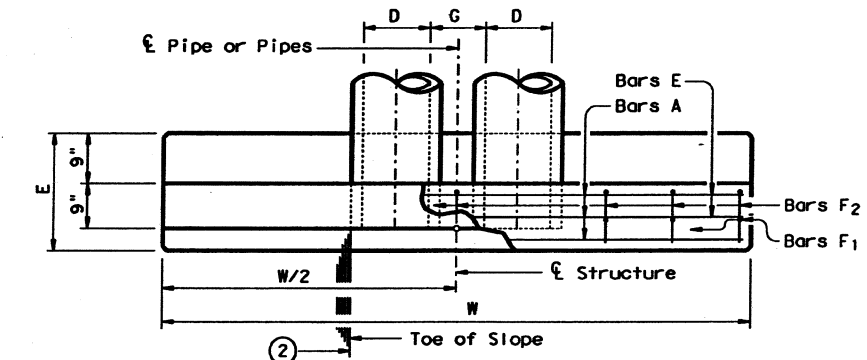
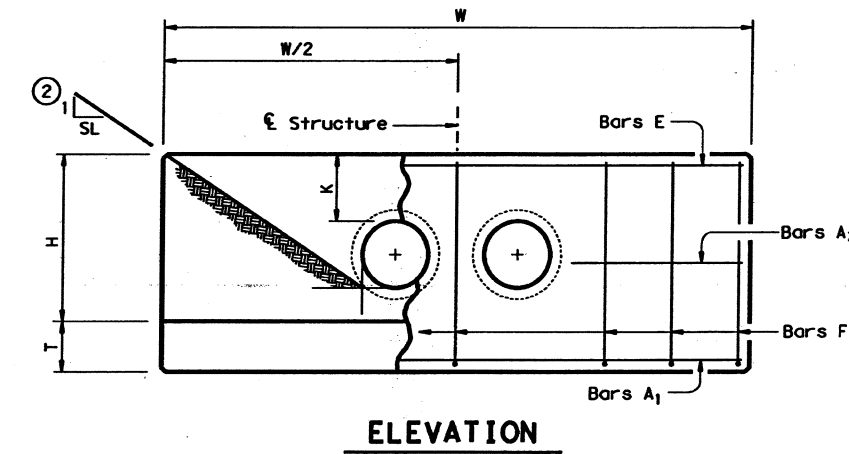
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**TABLE OF CONSTANT DIMENSIONS**

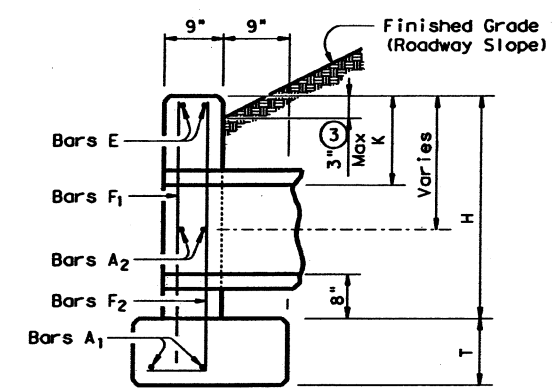
DIA OF PIPE, D	G	K	H	T	E
12"	9"	1'-0"	2'-8"	9"	1'-9"
15"	11"	1'-0"	2'-11"	9"	1'-9"
18"	1'-2"	1'-0"	3'-2"	9"	1'-9"
21"	1'-4"	1'-0"	3'-5"	9"	2'-0"
24"	1'-7"	1'-0"	3'-8"	9"	2'-0"
27"	1'-8"	1'-0"	3'-11"	9"	2'-3"
30"	1'-10"	1'-0"	4'-2"	9"	2'-3"
33"	1'-11"	1'-0"	4'-5"	9"	2'-6"
36"	2'-1"	1'-0"	4'-8"	1'-0"	2'-6"
42"	2'-4"	1'-0"	5'-2"	1'-0"	2'-9"
48"	2'-7"	1'-3"	5'-11"	1'-0"	3'-0"
54"	3'-0"	1'-3"	6'-5"	1'-0"	3'-3"
60"	3'-3"	1'-3"	6'-11"	1'-0"	3'-6"
66"	3'-3"	1'-3"	7'-5"	1'-0"	3'-9"
72"	3'-4"	1'-3"	7'-11"	1'-0"	4'-0"

**TABLE OF REINFORCING STEEL** ④

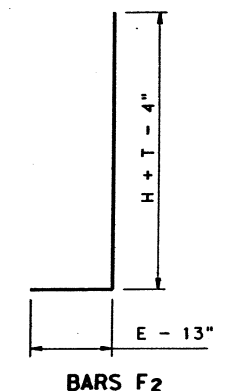
Bar	Size	Spa	No.
A1	# 5	-	2
A2	# 5	1'-6"	-
E	# 5	-	2
F	# 5	1'-0"	-



**PLAN OF NON-SKEWED PIPES**



**SECTION**



**BARS F2**

**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Specifications.  
 Reinforcing steel shall be placed with the center of the outside layer of bars 2" from the surface of the concrete.  
 All reinforcing steel shall be Grade 60.  
 All concrete shall be Class "C" and shall have a minimum compressive strength of 3600 psi.  
 No bridge rails of any type may be mounted directly to these culvert headwalls.

- Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.
- Indicated slope is perpendicular to centerline Pipe or Pipes.
- For vehicle safety, curbs shall project no more than 3" above finished grade. Curb heights shall be reduced, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- Quantities shown are for one structure end only (one headwall).

**Texas Department of Transportation** Bridge Division Standard

**CONCRETE HEADWALLS WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS**

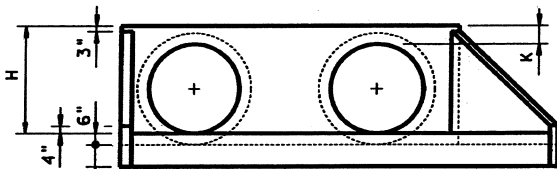
**CH-PW-0**

FILE: chpw0ste.dgn DW: TxDOT CK: TxDOT DW: TxDOT CK: GAF  
 February 2010 CONT SECT JOB HIGHWAY  
 REVISIONS DIST COUNTY SHEET NO.



**TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL** ④

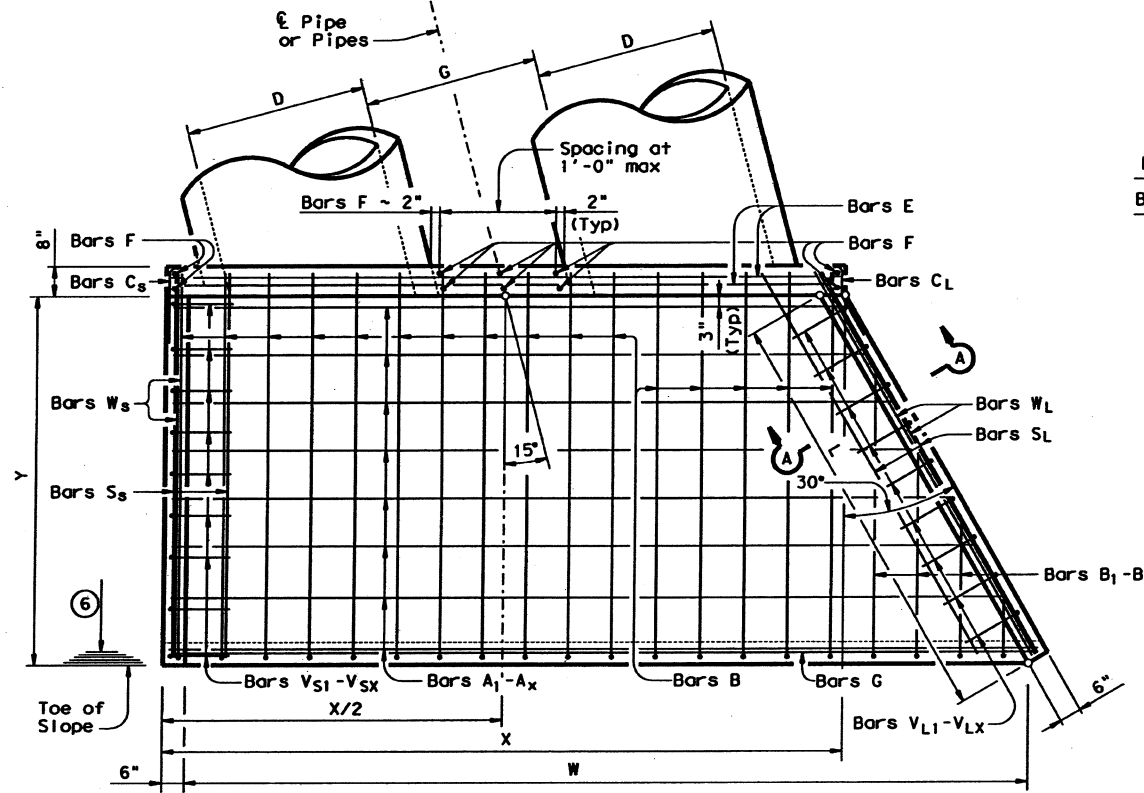
SLOPE	DIA OF PIPE/D	Values for one Pipe				Values to be added for each add'l Pipe				
		W	X	Y	L	Reinf (Lbs)	Conc (CY)	X and W	Reinf (Lbs)	Conc (CY)
2:1	12"	3'-3 1/2"	2'-8 3/4"	2'-10"	3'-3 1/4"	81	0.5	1'-9 3/4"	20	0.2
	15"	3'-10 1/2"	3'-0 1/4"	3'-4"	3'-10 1/4"	93	0.6	2'-3"	25	0.3
	18"	4'-5 1/2"	3'-4"	3'-10"	4'-5"	115	0.8	2'-9 1/4"	32	0.4
	21"	5'-0 3/4"	3'-7 1/2"	4'-4"	5'-0"	128	0.9	3'-2 1/4"	43	0.5
	24"	5'-9 1/4"	4'-0 3/4"	4'-10"	5'-7"	148	1.1	3'-8 1/2"	51	0.6
	27"	6'-4 1/2"	4'-4 1/2"	5'-4"	6'-2"	158	1.3	4'-0 3/4"	57	0.7
	30"	6'-11 1/2"	4'-8"	5'-10"	6'-8 3/4"	181	1.5	4'-5 3/4"	67	0.8
	33"	7'-6 1/2"	4'-11 3/4"	6'-4"	7'-3 3/4"	197	1.7	4'-10"	73	0.9
	36"	8'-1 3/4"	5'-3 1/4"	6'-10"	7'-10 3/4"	223	1.9	5'-3 1/4"	82	1.1
	42"	9'-3 3/4"	5'-10 1/2"	7'-10"	9'-0 1/2"	263	2.4	6'-0 1/2"	100	1.4
	48"	10'-9 1/2"	6'-5 3/4"	9'-4"	10'-9 1/4"	315	3.2	6'-9 3/4"	121	1.8
	54"	11'-11 3/4"	7'-1"	10'-4"	11'-11 1/4"	372	3.8	7'-9 1/4"	154	2.2
	60"	13'-1 3/4"	7'-8 1/4"	11'-4"	13'-1"	419	4.5	8'-6 1/2"	178	2.6
	66"	14'-4"	8'-3 1/2"	12'-4"	14'-3"	475	5.3	9'-0 3/4"	198	3.0
	72"	15'-6 1/4"	8'-10 3/4"	13'-4"	15'-4 3/4"	523	6.1	9'-8"	220	3.3
3:1	12"	4'-1 1/4"	2'-8 3/4"	4'-3"	4'-11"	104	0.7	1'-9 3/4"	23	0.2
	15"	4'-10"	3'-0 1/4"	5'-0"	5'-9 1/4"	123	0.9	2'-3"	29	0.3
	18"	5'-7"	3'-4"	5'-9"	6'-7 3/4"	152	1.1	2'-9 1/4"	37	0.5
	21"	6'-3 3/4"	3'-7 1/2"	6'-6"	7'-6"	171	1.3	3'-2 1/4"	49	0.6
	24"	7'-2"	4'-0 3/4"	7'-3"	8'-4 1/2"	198	1.6	3'-8 1/2"	59	0.7
	27"	7'-11"	4'-4 1/2"	8'-0"	9'-2 3/4"	219	1.9	4'-0 3/4"	68	0.9
	30"	8'-7 3/4"	4'-8"	8'-9"	10'-1 1/4"	254	2.2	4'-5 3/4"	79	1.0
	33"	9'-4 1/2"	4'-11 3/4"	9'-6"	10'-11 3/4"	274	2.5	4'-10"	86	1.2
	36"	10'-1 1/4"	5'-3 1/4"	10'-3"	11'-10"	305	2.9	5'-3 1/4"	97	1.4
	42"	11'-7"	5'-10 1/2"	11'-9"	13'-6 3/4"	371	3.7	6'-0 1/2"	122	1.8
	48"	13'-5 3/4"	6'-5 3/4"	14'-0"	16'-2"	455	4.9	6'-9 3/4"	152	2.4
	54"	14'-11 1/2"	7'-1"	15'-6"	17'-10 3/4"	532	5.9	7'-9 1/4"	190	3.0
	60"	16'-5"	7'-8 1/4"	17'-0"	19'-7 1/2"	604	7.0	8'-6 1/2"	224	3.5
	66"	17'-10 3/4"	8'-3 1/2"	18'-6"	21'-4 1/4"	687	8.1	9'-0 3/4"	248	4.0
	72"	19'-4 1/4"	8'-10 3/4"	20'-0"	23'-1 1/4"	772	9.4	9'-8"	281	4.6
4:1	12"	4'-11"	2'-8 3/4"	5'-8"	6'-6 1/2"	132	0.9	1'-9 3/4"	26	0.3
	15"	5'-9 1/2"	3'-0 1/4"	6'-8"	7'-8 1/2"	158	1.2	2'-3"	33	0.4
	18"	6'-8 1/4"	3'-4"	7'-8"	8'-10 1/4"	194	1.5	2'-9 1/4"	43	0.6
	21"	7'-6 3/4"	3'-7 1/2"	8'-8"	10'-0"	226	1.8	3'-2 1/4"	57	0.7
	24"	8'-6 3/4"	4'-0 3/4"	9'-8"	11'-2"	258	2.2	3'-8 1/2"	68	0.9
	27"	9'-5 1/4"	4'-4 1/2"	10'-8"	12'-3 3/4"	286	2.6	4'-0 3/4"	79	1.1
	30"	10'-4"	4'-8"	11'-8"	13'-5 3/4"	327	3.0	4'-5 3/4"	91	1.3
	33"	11'-2 1/2"	4'-11 3/4"	12'-8"	14'-7 1/2"	360	3.5	4'-10"	104	1.5
	36"	12'-1"	5'-3 1/4"	13'-8"	15'-9 1/4"	403	4.0	5'-3 1/4"	115	1.7
	42"	13'-10"	5'-10 1/2"	15'-8"	18'-1"	487	5.1	6'-0 1/2"	144	2.2
	48"	16'-2 1/4"	6'-5 3/4"	18'-8"	21'-6 3/4"	602	6.8	6'-9 3/4"	183	3.0
	54"	17'-11 1/4"	7'-1"	20'-8"	23'-10 1/4"	717	8.2	7'-9 1/4"	231	3.7
	60"	19'-8 1/4"	7'-8 1/4"	22'-8"	26'-2"	812	9.8	8'-6 1/2"	270	4.4
	66"	21'-5 1/2"	8'-3 1/2"	24'-8"	28'-5 3/4"	933	11.4	9'-0 3/4"	305	5.0
	72"	23'-2 1/2"	8'-10 3/4"	26'-8"	30'-9 1/2"	1046	13.2	9'-8"	342	5.7
6:1	12"	6'-6 3/4"	2'-8 3/4"	8'-6"	9'-9 3/4"	188	1.4	1'-9 3/4"	30	0.4
	15"	7'-8 3/4"	3'-0 1/4"	10'-0"	11'-6 1/2"	226	1.9	2'-3"	40	0.5
	18"	8'-10 3/4"	3'-4"	11'-6"	13'-3 1/4"	277	2.4	2'-9 1/4"	51	0.7
	21"	10'-0 3/4"	3'-7 1/2"	13'-0"	15'-0 1/4"	328	2.9	3'-2 1/4"	69	1.0
	24"	11'-4 1/4"	4'-0 3/4"	14'-6"	16'-9"	371	3.5	3'-8 1/2"	83	1.3
	27"	12'-6 1/4"	4'-4 1/2"	16'-0"	18'-5 3/4"	422	4.2	4'-0 3/4"	98	1.5
	30"	13'-8 1/4"	4'-8"	17'-6"	20'-2 1/2"	482	4.9	4'-5 3/4"	113	1.8
	33"	14'-10 1/4"	4'-11 3/4"	19'-0"	21'-11 1/4"	543	5.7	4'-10"	130	2.0
	36"	16'-0 1/4"	5'-3 1/4"	20'-6"	23'-8"	598	6.5	5'-3 1/4"	145	2.4
	42"	18'-4 1/2"	5'-10 1/2"	23'-6"	27'-1 1/2"	732	8.4	6'-0 1/2"	184	3.1
	48"	21'-6 3/4"	6'-5 3/4"	28'-0"	32'-4"	936	11.4	6'-9 3/4"	240	4.1
	54"	23'-10 3/4"	7'-1"	31'-0"	35'-9 1/2"	1112	13.8	7'-9 1/4"	303	5.2
	60"	26'-2 3/4"	7'-8 1/4"	34'-0"	39'-3"	1266	16.4	8'-6 1/2"	358	6.2



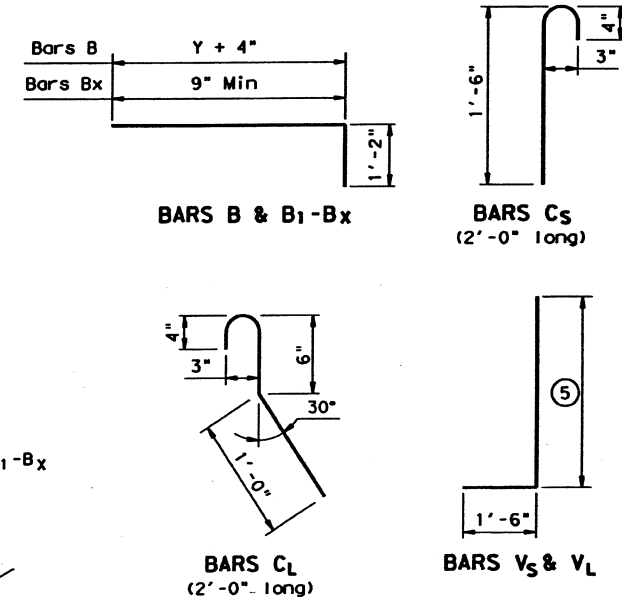
**ELEVATION**  
Showing dimensions

- ① Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.
- ② For vehicle safety, curbs shall project no more than 3" above finished grade. Curb heights shall be reduced, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- ③ Provide a 1'-0" footing as shown where required to maintain 4" Min cover for pipes.
- ④ Quantities shown are for one structure end only (one headwall).
- ⑤ Min Length = 6" + 3" x  $\left(\frac{12 \times H - 7}{12 \times L}\right)$   
Max Length = 12 x H - 3" x  $\left(\frac{12 \times H - 7}{12 \times L}\right) - 1"$
- ⑥ Lengths of wings based on SL:1 Slope along this line.

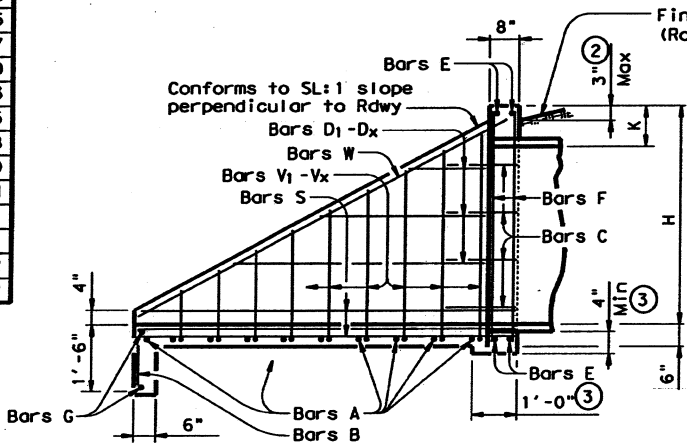
TABLE OF REINFORCING STEEL				TABLE OF CONSTANT DIMENSIONS			
Bar	Size	Spa	No.	DIA OF PIPE/D	G	K	H
A	# 4	1'-0"	-	12"	9"	1'-0"	2'-0"
B	# 3	1'-6"	-	15"	11"	1'-0"	2'-3"
CL	# 4	1'-0"	-	18"	1'-2"	1'-0"	2'-6"
CS	# 4	1'-0"	-	21"	1'-4"	1'-0"	2'-9"
D	# 3	1'-0"	-	24"	1'-7"	1'-0"	3'-0"
E	# 5	-	4	27"	1'-8"	1'-0"	3'-3"
F	# 5	-	-	30"	1'-10"	1'-0"	3'-6"
G	# 3	-	2	33"	1'-11"	1'-0"	3'-9"
SL	# 4	-	3	36"	2'-1"	1'-0"	4'-0"
SS	# 4	-	3	42"	2'-4"	1'-0"	4'-6"
V	# 4	1'-0"	-	48"	2'-7"	1'-3"	5'-3"
WL	# 5	-	2	54"	3'-0"	1'-3"	5'-9"
WS	# 5	-	2	60"	3'-3"	1'-3"	6'-3"
				66"	3'-3"	1'-3"	6'-9"
				72"	3'-4"	1'-3"	7'-3"



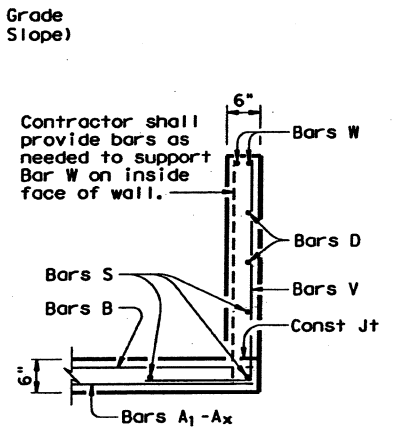
**PLAN**



**GENERAL NOTES:**  
Designed according to AASHTO LRFD Specifications.  
Reinforcing steel shall be placed with the center of the outside layer of bars 2" from the surface of the concrete.  
All reinforcing steel shall be Grade 60.  
All concrete shall be Class "C" and shall have a minimum compressive strength of 3600 psi.  
No bridge rails of any type may be mounted directly to these culvert headwalls.



**TYPICAL WING ELEVATION**



**SECTION A-A**

**Texas Department of Transportation** Bridge Division Standard

**CONCRETE HEADWALLS WITH FLARED WINGS FOR 15° SKEW PIPE CULVERTS**

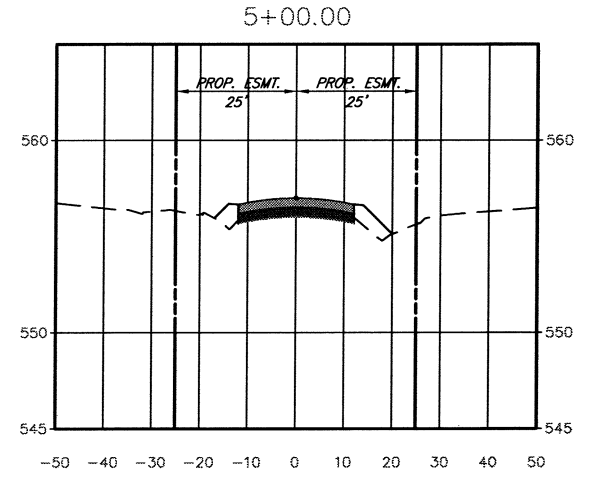
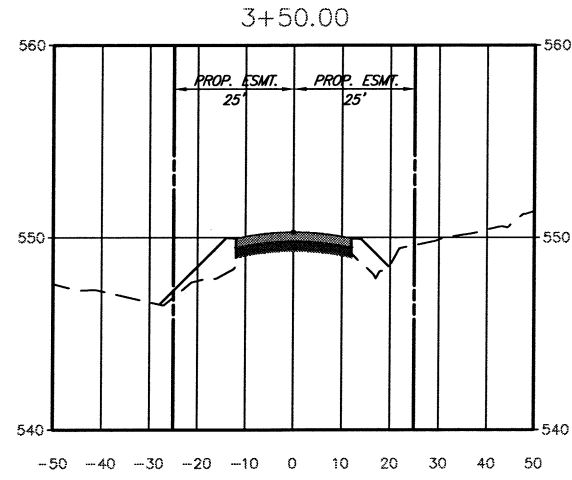
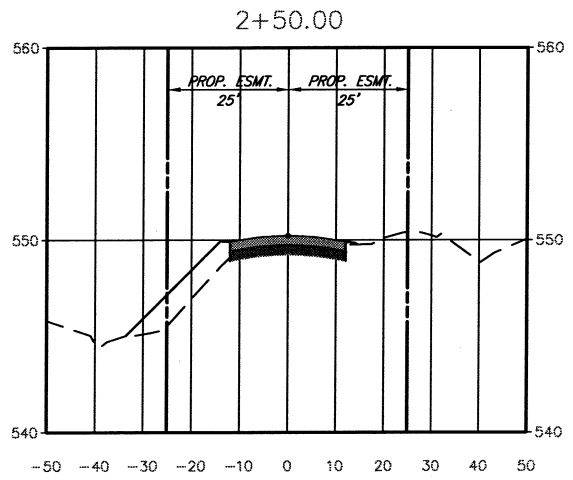
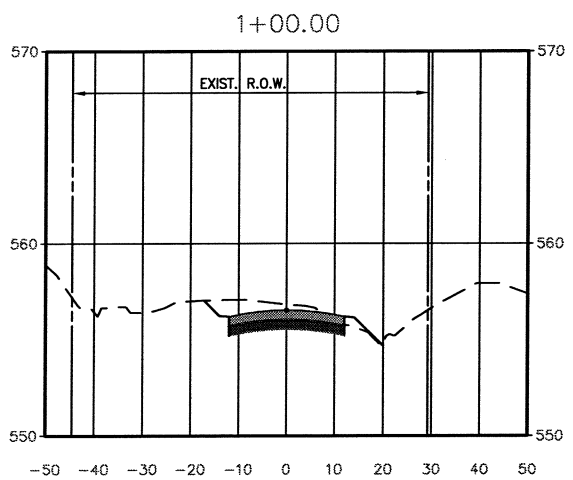
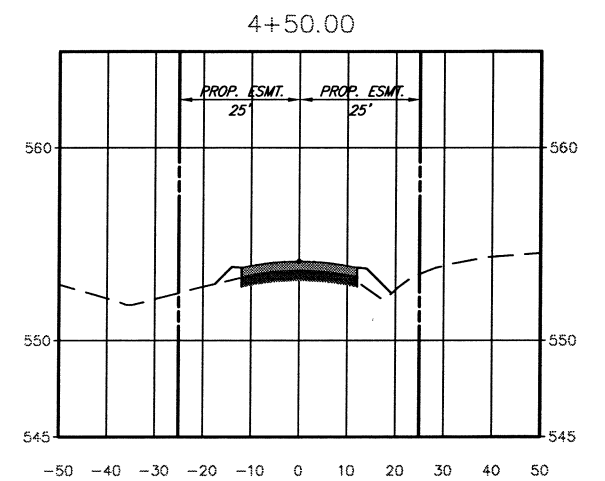
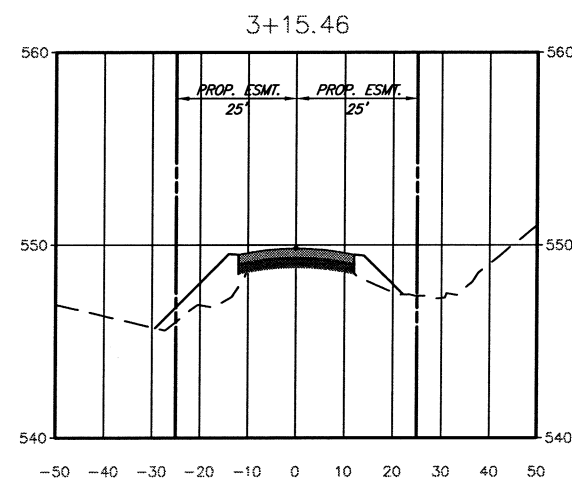
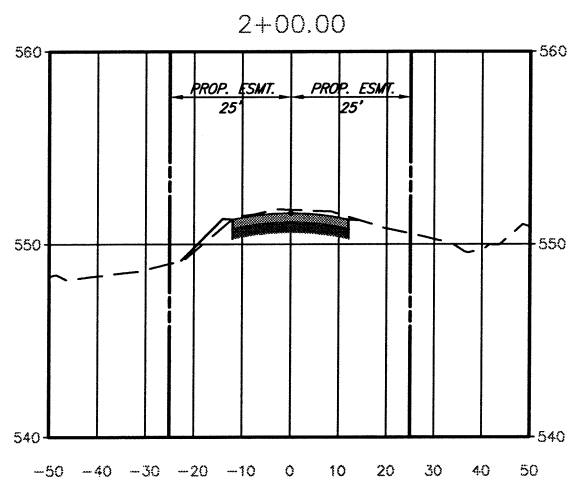
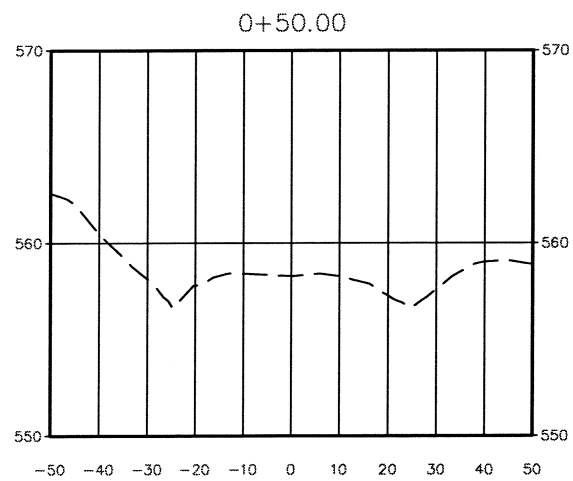
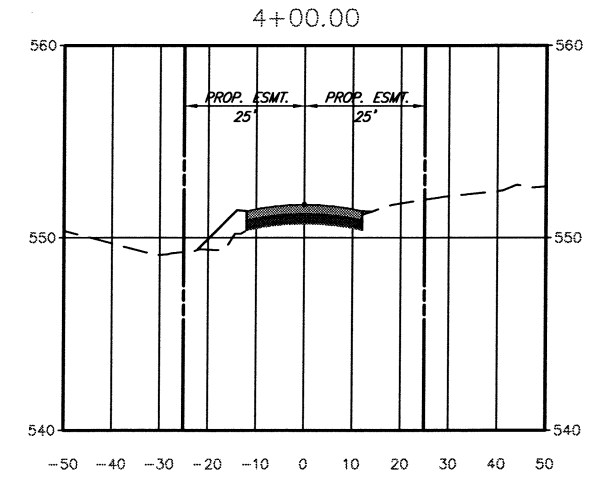
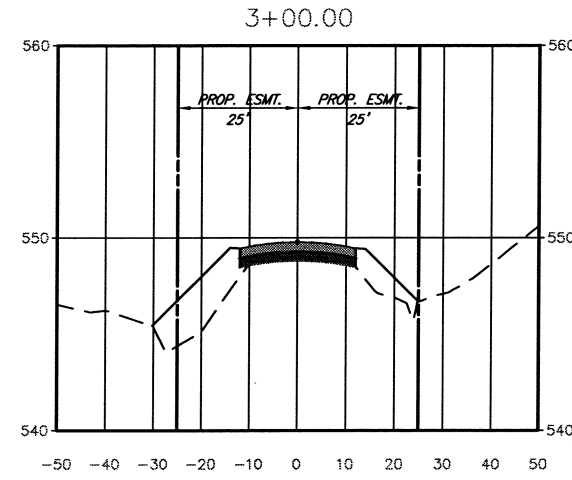
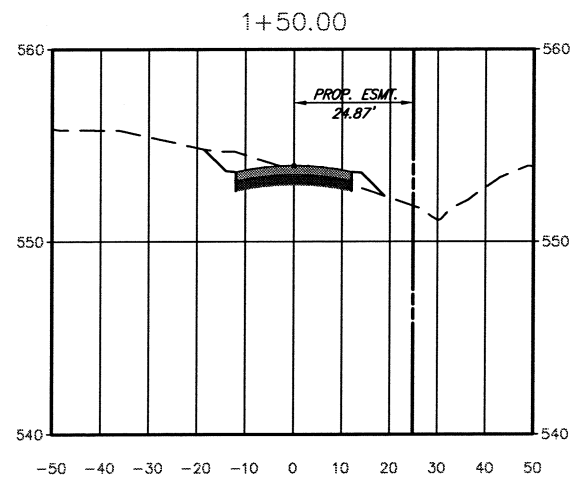
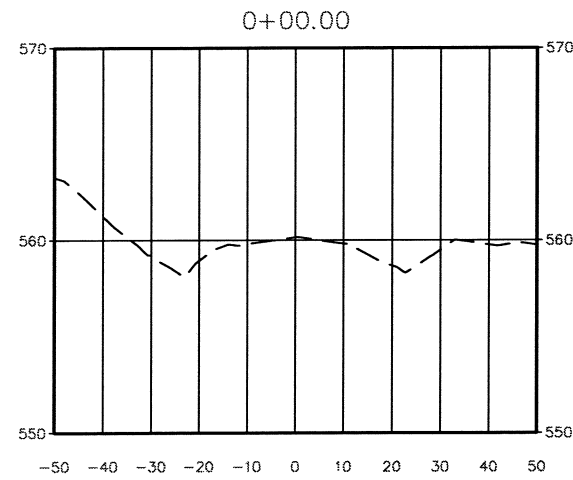
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 February 2010  
 REVISIONS

DIST	COUNTY	SHEET NO.
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 JOSEPH T. GRAJEWSKI, III  
 TEXAS P.E. NO. 104984  
 September, 2016

**CITY LUCAS, TEXAS**

WINNINGKOFF ROAD

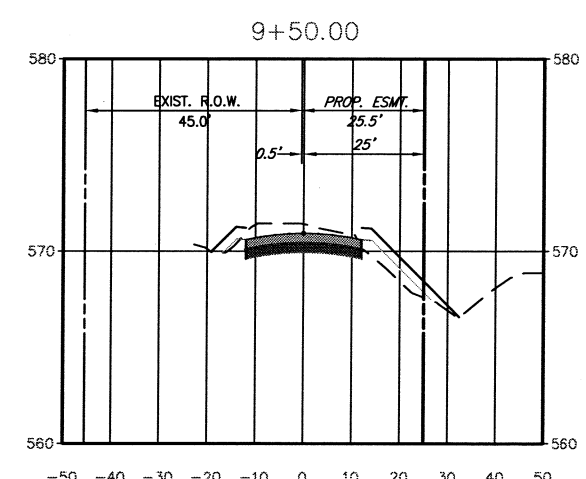
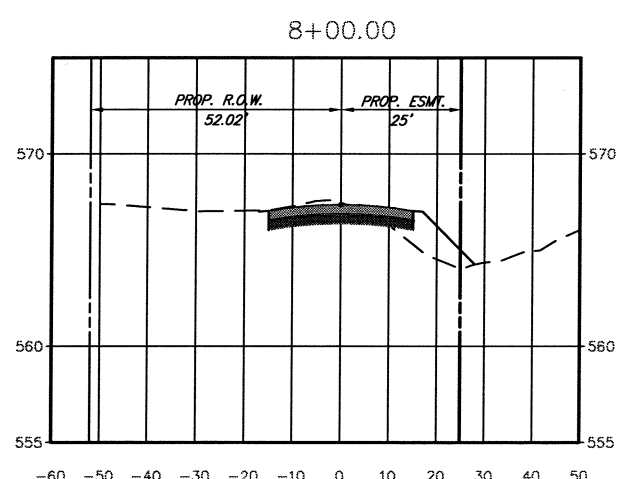
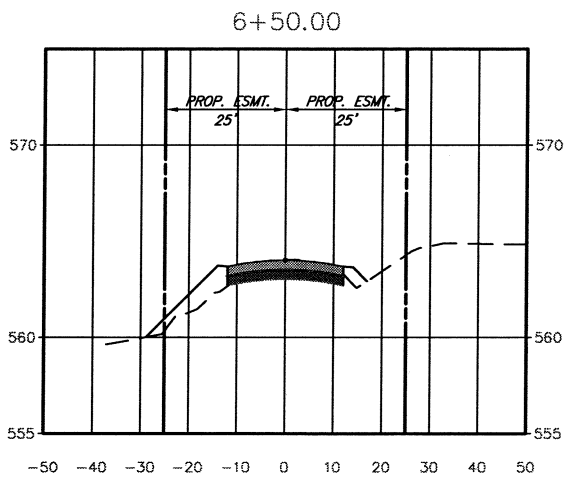
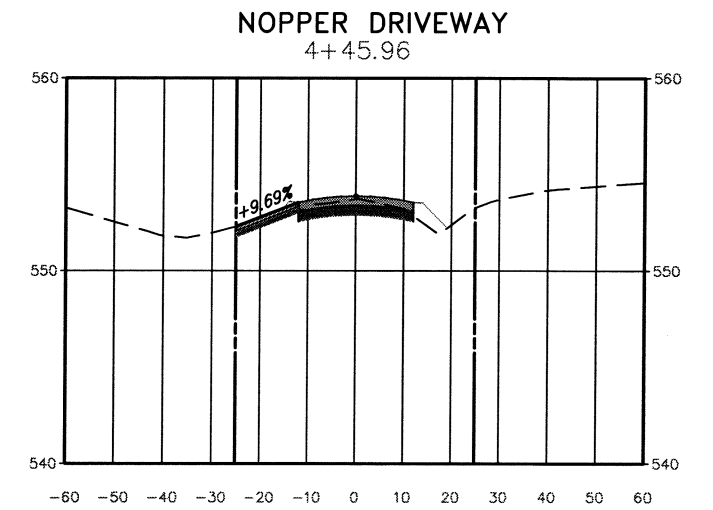
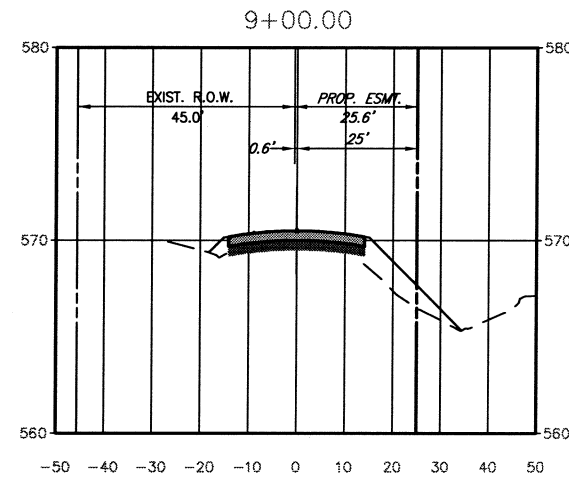
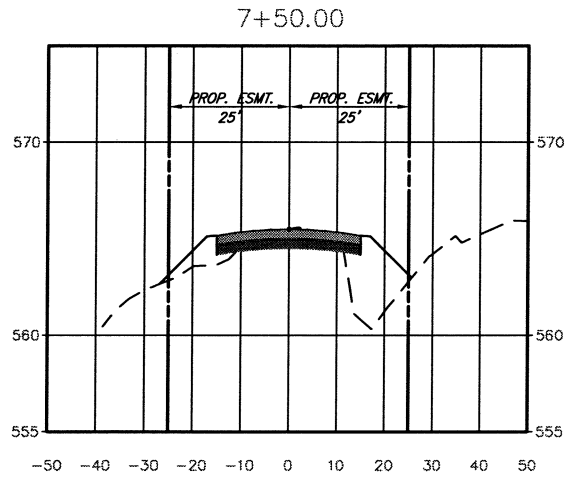
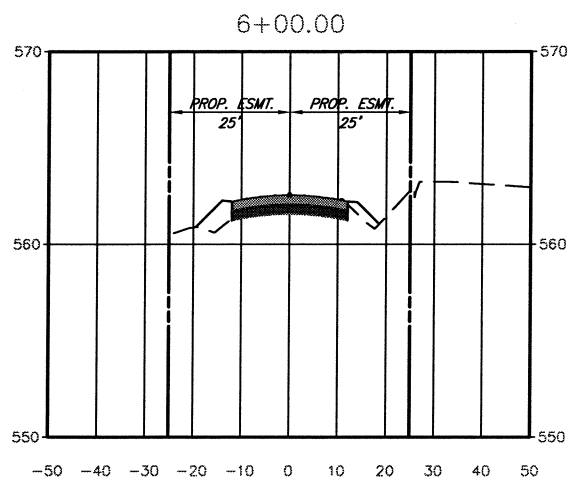
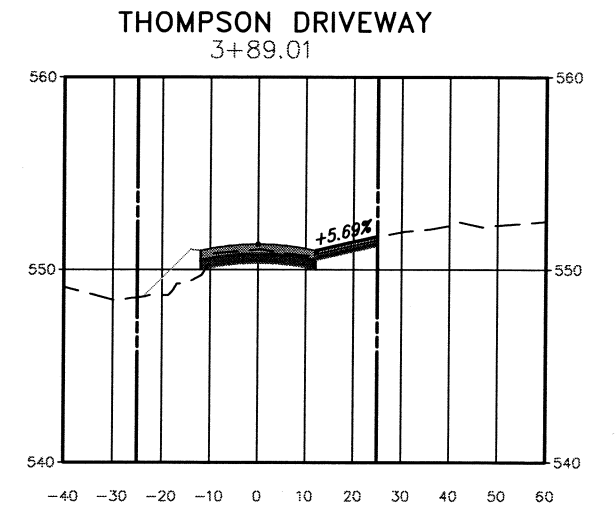
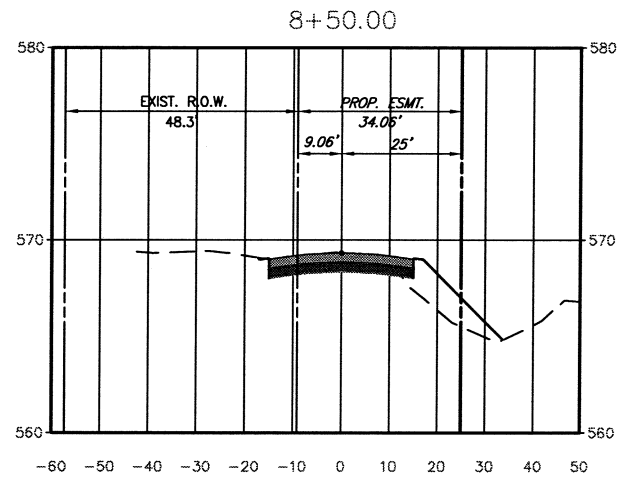
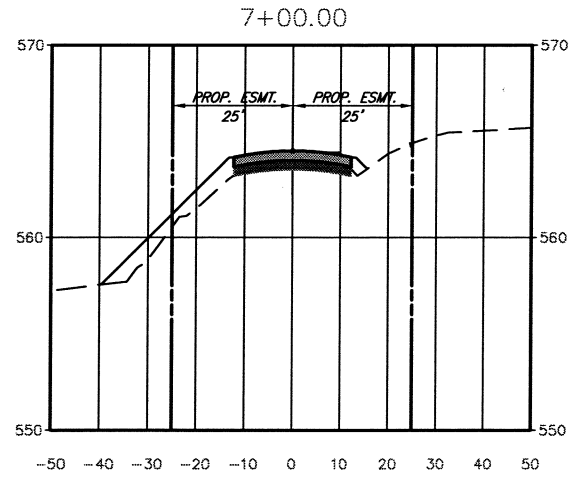
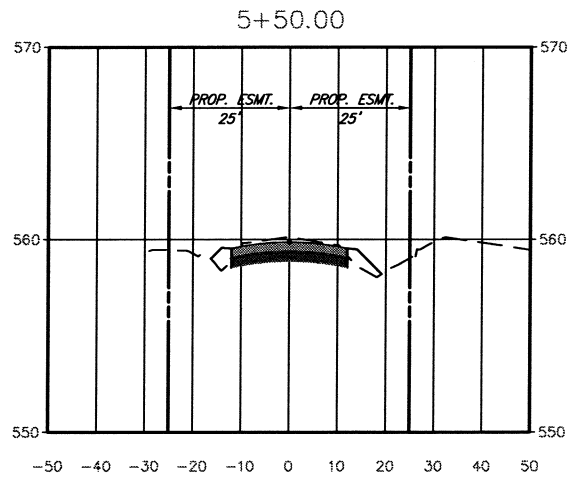
REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS  
 WINNINGKOFF ROAD E-W CROSS SECTIONS  
 STA. 0+00 TO STA. 5+00

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**CITY LUCAS, TEXAS**  
WINNINGKOFF ROAD

REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS  
WINNINGKOFF ROAD E-W CROSS SECTIONS  
STA. 5+50 TO STA. 9+50

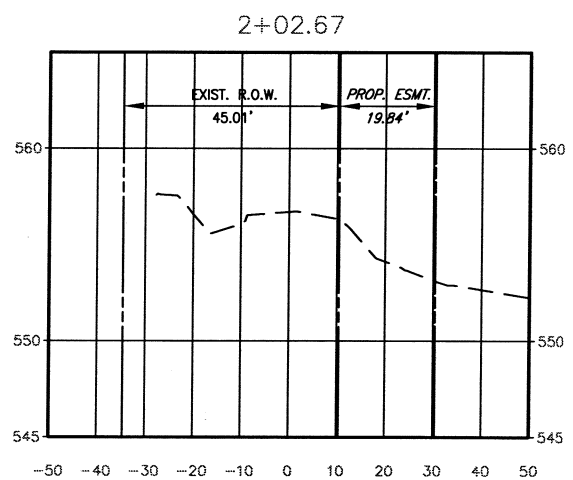
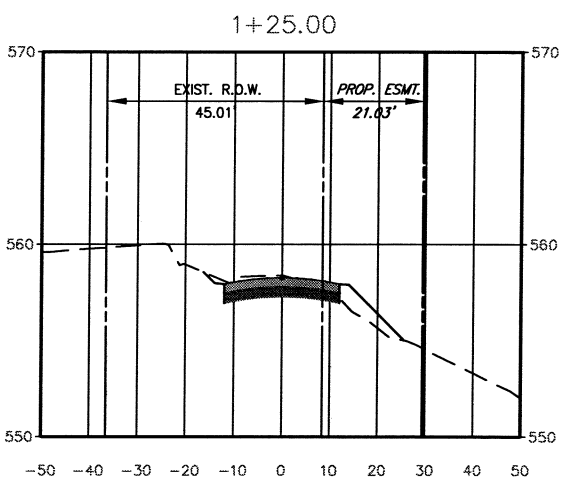
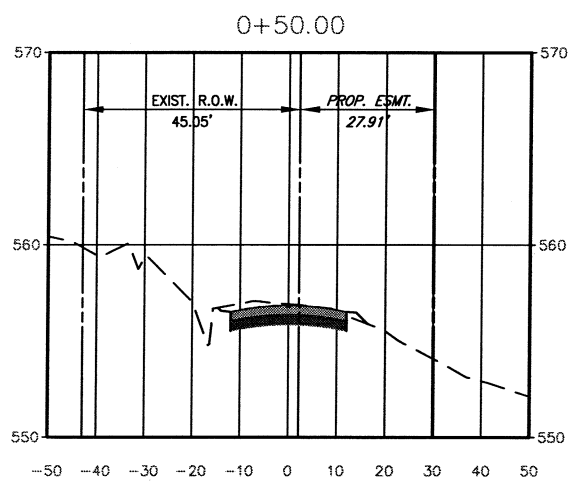
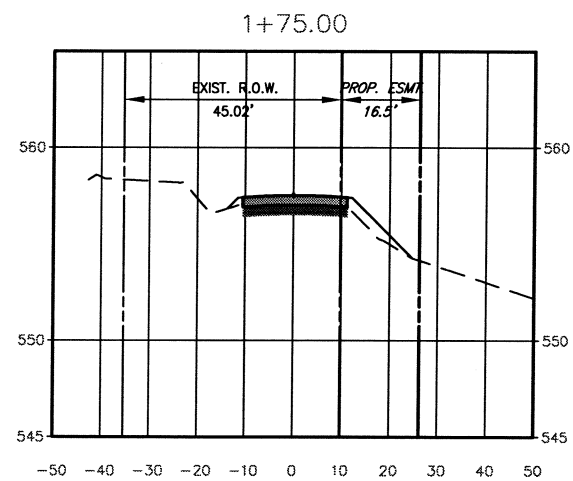
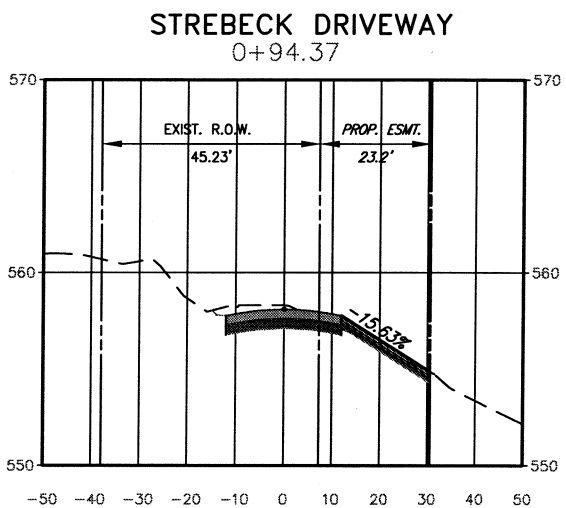
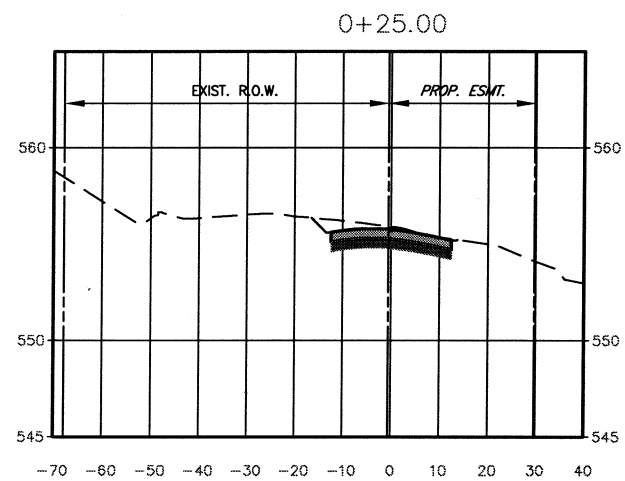
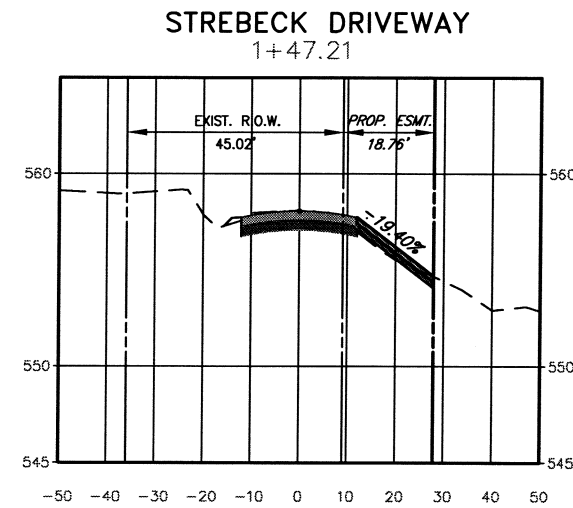
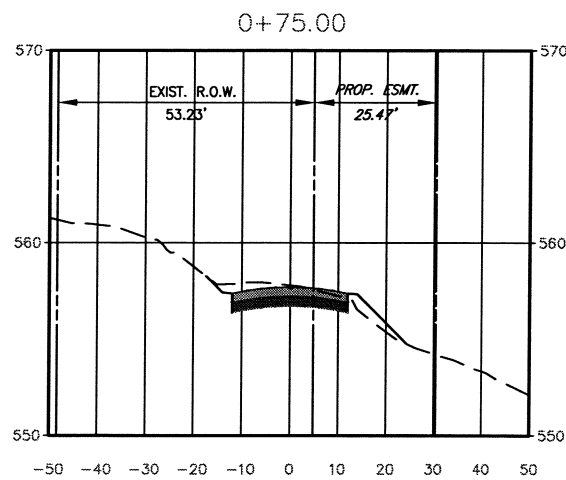
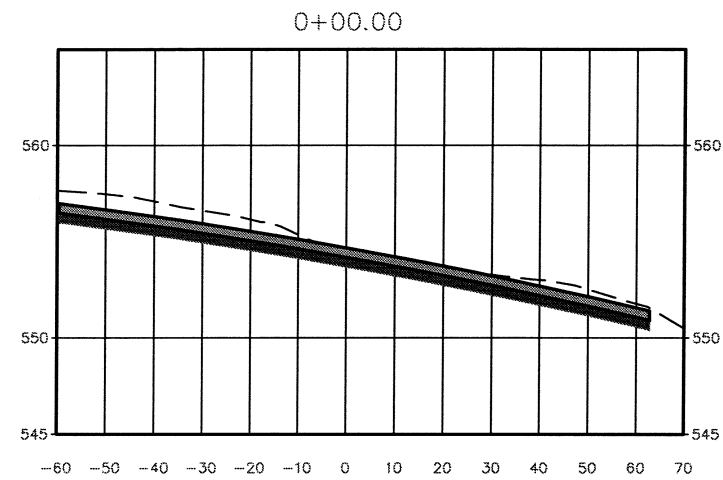
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 REVERSE CURVE-PAVING & DRAINAGE IMPROVEMENTS  
 WINNINGKOFF ROAD N CROSS SECTIONS  
 STA. 0+00 TO STA. 2+00

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 2016-108  
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