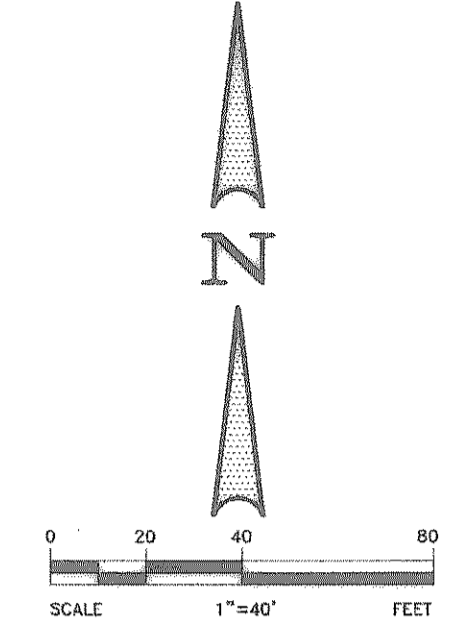
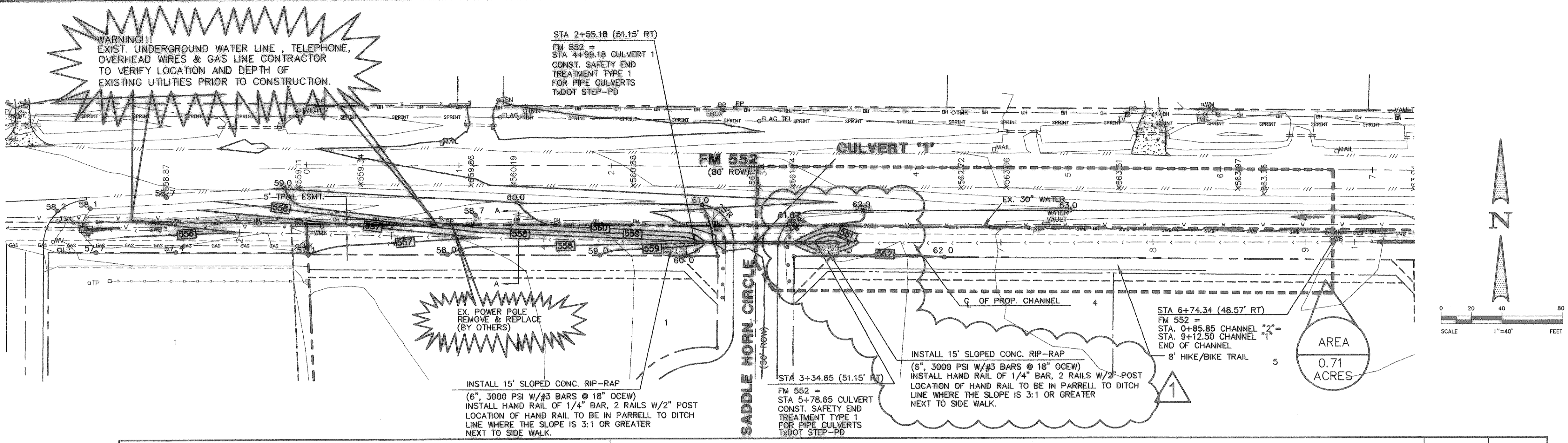


- LEGEND 1**
- TC TOP OF CURB
  - TR TOP OF PAVEMENT
  - OR CURB RETURN
  - 1 FLOW LINE
  - 2 STREET STATION
  - HANDICAP RAMP @ STREET & STREET INTERSECTION
  - HANDICAP RAMP @ STREET & ALLEY INTERSECTION
  - FLOW ARROWS
  - EXISTING CONCRETE PAVEMENT
  - ASPHALT PAVING
  - 742 PROPOSED CONTOUR LINE
  - 743 EXISTING CONTOUR LINE
  - PP POWER POLE
  - MH MANHOLE
  - WV WATER VALVE
  - TP TELEPHONE PEDESTAL
  - WM WATER METER
  - FH FIRE HYDRANT
  - LP LIGHT POLE
  - CO CLEAN OUT
  - AC AIR CONDITIONER
  - TV CABLE BOX
  - SB SIGNAL BOX
  - SP SIGNAL POLE
  - SN SIGN
  - SS SANITARY SEWER
  - W WATER LINE
  - OH OVERHEAD POWER LINES
  - EOX ELECTRICAL BOX
  - TXU TEXAS UTILITIES
  - SWB SOUTH WESTERN BELL
  - GAS GAS LINE
  - RCP REINFORCED CONCRETE PIPE
  - TSN TRAFFIC SIGNS
  - WMH WATER MANHOLE
  - TMK TELEPHONE MARKER
  - WMK WATER MARKER
  - GMK GAS MARKER
  - 58.1 EXISTING TOPO ELEVATION



**CULVERT DESIGN CALCULATIONS**

CULVERT LOCATION: DALTON RANCH, ROCKWALL, TEXAS

LENGTH, L = 80.00 FT DESIGN STORM FREQ. 100-YR

ROUGHNESS COEFF., n = 0.012 MAX. VEL. 12.0 ft/sec

TAILWATER 0.55' D.S. CHANNEL WIDTH TRIANGULAR

ENTRANCE DESCRIPTION 5 DESIGN DISCHARGE 2.55 cfs

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ROWY. ELEV. 581.92 U.S. CULV. F.L. 558.04

U.S. CULV. F.L. 558.02 D.S. CULV. F.L. 557.74

DIFFERENCE 3.50 DIFFERENCE 0.30

REQ'D. FREEBOARD 1.0 FT. CULV. SLOPE, S<sub>0</sub> = DIFF. FT. / LENGTH FT.

ALLOW. HEADWATER 2.50 FT. S<sub>0</sub> = 0.30 / 60.0 = 0.50%

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**DOWNSTREAM CHANNEL CALCULATIONS**

Q<sub>100</sub> = 3.63 cfs

n = 0.035

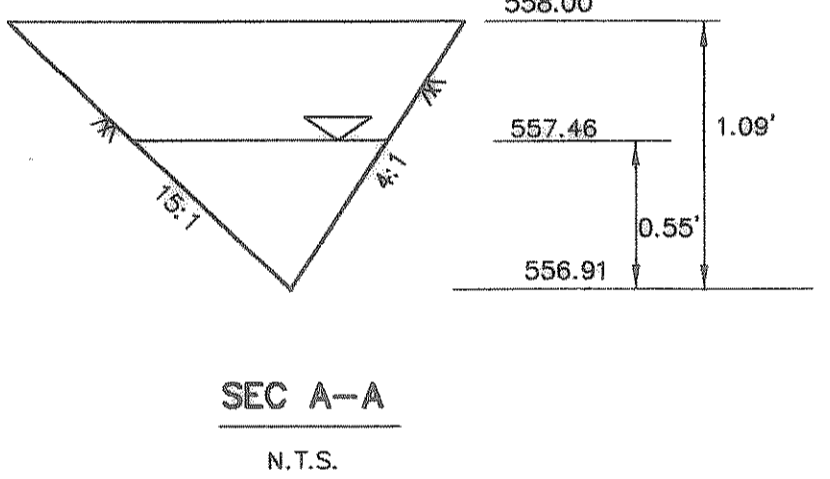
SIDE SLOPE (L.T. & RT.) = 4:1 & 15:1

LONGITUDINAL SLOPE = 0.50%

DEPTH OF FLOW = 0.55 ft

AVERAGE VELOCITY = 1.26 fps

Trial Area of Opening T.A.C. = V <sub>max</sub> (sq. ft.)	Channel Width "W" (feet)	T.A.C. W (feet)	AHW (feet)	Try Diameter "D" (Inch)	No. Openings	Pipe Dia. "D" (Inch)	Total Culvert Area "Ac" (sf)	"Q" Each Opening (c.f.s.)	HEADWATER CALCULATION										The Greater Controlling Head Water (Inlet or Outlet) (feet)	SELECTED CONDUIT SIZE						
									INLET CONTROL (Using Figure 26)					OUTLET CONTROL (Using Figure 28 & 30)												
									Entrance Case	HW D (figure 26)	HW (feet)	Entrance Coeff. K <sub>e</sub>	"H" (figure 28)	"TW" (feet)	L X S <sub>0</sub> (feet)	"HW" (figure 28)	"H" (figure 28)	d <sub>c</sub> (figure 30)			h <sub>0</sub> (feet)	"TW" (feet)	h <sub>0</sub> (feet)	L X S <sub>0</sub> (feet)	"HW" (feet)	
0.22	TRIANGULAR	-	2.63	18"	1	18"	1.77	2.55	5	I	0.55	0.83	0.20	0.20	0.55	0.40	0.28	0.20	0.60	1.05	0.55	1.05	0.40	0.85	0.85' (OUTLET)	18" RCP



NOTE: FIG. 26, 28 & 30 ARE THE NOMOGRAPHS OF BUREAU OF PUBLIC ROADS, JAN. 1963, PAGE NO. G-26, G-28, G-30

AREA = 0.71 AC  
 Q<sub>100</sub> = 3.48 c.f.s.  
 n = 0.035  
 S = 0.05%  
 d = 0.55'  
 V<sub>average</sub> = 1.26ft/sec  
 Q<sub>cap</sub> = 22.48 c.f.s.

Q<sub>100</sub> = (C)(I)<sup>0.77</sup>(A)  
 C = 0.50  
 I = 9.80  
 A = 0.71

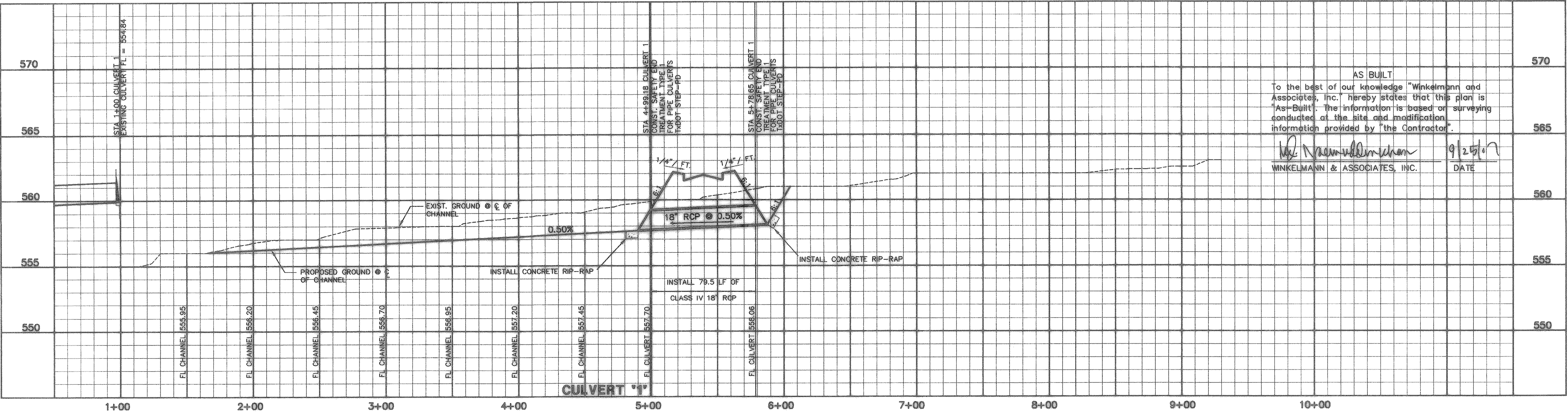
Q<sub>100</sub> = (0.50)(9.80)<sup>0.77</sup>(0.74)  
 Q<sub>100</sub> = 3.48 c.f.s.

**BENCHMARK 1** USGS Monument—stamped Boren 1986  
 Located approximately 1.25 miles east of Rockwall at the Rockwall Municipal Airport, in the north end of a circular grass area at the end of a taxiway.  
 ELEVATION = 574.77

**BENCHMARK 2** USGS Monument—5" cap stamped N 1495/1986  
 Located 24.6 feet west of the center of a paved road leading to the Rockwall Municipal Airport, 16.4 feet south of a utility pole with a transformer and light, 2 feet west of the north leg of a sign. Access to datum point is through a 5 inch logo cap.  
 ELEVATION = 567.44

**CAUTION !!! UNDERGROUND UTILITIES**

EXISTING UTILITIES AND UNDERGROUND FACILITIES INDICATED ON THESE PLANS HAVE BEEN LOCATED FROM REFERENCE INFORMATION SUPPLIED BY VARIOUS OWNERS OF THE FACILITIES. THE ENGINEER DOES NOT ACCEPT THE RESPONSIBILITY FOR THE UTILITY LOCATIONS SHOWN. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY BOTH HORIZONTALLY AND VERTICALLY THE LOCATION OF ALL EXISTING UTILITIES AND UNDERGROUND FACILITIES PRIOR TO CONSTRUCTION, TO TAKE NECESSARY PRECAUTIONS IN ORDER TO PROTECT ALL FACILITIES ENCOUNTERED, AND TO NOTIFY THE ENGINEER PROMPTLY OF ALL CONFLICTS OF THE WORK WITH EXISTING FACILITIES. THE CONTRACTOR SHALL PRESERVE AND PROTECT ALL EXISTING UTILITIES FROM DAMAGE DURING CONSTRUCTION. ANY DAMAGE BY THE CONTRACTOR TO EXISTING UTILITIES SHALL BE REPAIRED BY THE CONTRACTOR AT HIS EXPENSE. CONTACT ALL POSSIBLE UTILITY AND UNDERGROUND FACILITY OWNERS.



AS BUILT

To the best of our knowledge Winkelman and Associates, Inc. hereby states that this plan is "As-Built". The information is based on surveying conducted at the site and modification information provided by the Contractor.

*Winkelman*  
 WINKELMANN & ASSOCIATES, INC. DATE 9/25/07

ADD SLOPED CONCRETE RIP-RAP & RAILS

08/01/07

NO. DATE

REVISION

APPROVAL

THESE CONSTRUCTION PLANS WERE PREPARED UNDER THE RESPONSIBLE SUPERVISION OF MD. NAIM UDDIN KHAN, REGISTERED PROFESSIONAL ENGINEER NO. 87776

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MD. NAIM UDDIN KHAN, P.E. #87776

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 DALLAS, TEXAS 75230 (972) 482-7000 FAX (972) 482-7009 FAX

JOHN M. GLASS SURVEY ABSTRACT No. 88  
 CITY OF ROCKWALL  
 ROCKWALL COUNTY, TEXAS

D R HORTON  
 4306 MILLER ROAD, SUITE A  
 ROCKWALL, TEXAS 75086  
 214-907-4244

**CULVERT PLAN, PROFILE & CALCULATIONS**  
**CULVERT 1**

Scale: 1" = 40' Date: 08/08/06  
 Designed By: RS  
 Drawn By: RS  
 Checked By: NK  
 Project No.: 40709.00

**SHEET 29 OF 45**