

## DRAINAGE PLAN

## I. INTRODUCTION AND EXECUTIVE SUMMARY

THIS PROJECT, LOCATED IN DOWNTOWN ALBUQUERQUE, REPRESENTS A MODIFICATION TO AN EXISTING SITE WITHIN AN INFILL AREA. THE PROPOSED IMPROVEMENTS CONSIST OF A NEW PRIVATE BRANCH BANK, WITH ASSOCIATED PAVED PARKING AND ACCESS TO 15TH STREET SW. THE PROPOSED DRAINAGE CONCEPT IS TO LIMIT THE SITE TO A CONTROLLED DISCHARGE RATE OF 2.75 CFS/AC VIA ROUTING OF DEVELOPED RUNOFF THROUGH MULTIPLE WATER HARVESTING RETENTION AND DETENTION PONDS ONSITE PRIOR TO DISCHARGE TO THE ADJACENT PUBLIC STREET.

THIS SUBMITTAL IS MADE IN SUPPORT OF BUILDING PERMIT AND SO#19 PERMIT APPROVAL.

## II. PROJECT DESCRIPTION

AS SHOWN BY THE VICINITY MAP, THE SITE IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF WEST CENTRAL AVENUE AND 15TH STREET SW. THE CURRENT LEGAL DESCRIPTION OF THE SITE IS AN UNPLATTED PARCEL, TRACT 349-A, MIDDLE RIO GRANDE CONSERVANCY DISTRICT PROPERTY MAP NO. 38. AS SHOWN BY PANEL 333 OF 825 OF THE NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAPS FOR BERNALILLO COUNTY, NEW MEXICO, SEPTEMBER 26, 2008, THIS SITE DOES NOT LIE WITHIN A DESIGNATED FLOOD HAZARD ZONE. HOWEVER, IT IS LOCATED IMMEDIATELY UPSTREAM TO THE NORTH OF AN AO DESIGNATED FLOOD HAZARD ZONE, CONTAINED WITHIN THE 15TH STREET SW PUBLIC RIGHT OF WAY. CITY HYDROLOGY POLICY FOR THIS AREA LIMITS THE PEAK DISCHARGE RATE TO 2.75 CFS/AC FROM THE SITE. THEREFORE THE DEVELOPED RUNOFF FROM THE SITE WILL BE LIMITED TO THIS ALLOWABLE RATE.

## BACKGROUND DOCUMENTS AND RESEARCH

THE PREPARATION OF THIS SUBMITTAL RELIED UPON THE FOLLOWING DOCUMENTS:

- TOPOGRAPHIC SURVEY PREPARED BY HIGH MESA CONSULTING GROUP, NMPS 11184, DATED 12/02/2011. THIS REFERENCED SURVEY PROVIDES THE BASIS FOR THE EXISTING CONDITIONS OF THE PROJECT SITE.
- CONCEPTUAL GRADING PLAN (FOR EPC SITE PLAN APPROVAL) FOR THE NEW HUNING CASTLE BRANCH BANK, PREPARED BY HIGH MESA CONSULTING GROUP, NMPE 13676, DATED 04-26-2016. THE PURPOSE OF THE PLAN ESTABLISHED THE CONCEPT OF ROUTING DEVELOPED RUNOFF FROM THE SITE THROUGH NEW WATER HARVESTING RETENTION AND DETENTION PONDS PRIOR TO DISCHARGE TO 15TH STREET SW. THE PLAN ESTABLISHED THE LIMITATION OF CONTROLLED DEVELOPED DISCHARGE TO 2.75 CFS/AC (2.4 CFS FOR THE 0.88 AC SITE), OR LESS, PER THE CITY HYDROLOGY REQUIREMENTS FOR THIS AREA OF THE CITY.

## III. EXISTING CONDITIONS

THE EXISTING SITE IS A FORMER MULTI-FAMILY HOUSING DEVELOPMENT, THE MAJORITY OF WHICH HAS BEEN DEMOLISHED AND REMOVED. A VACANT BUILDING LIES AT THE SOUTH END OF THE SITE, WITH THE REMAINDER OF THE SITE CONSISTING OF BARE SOIL WITH MINIMAL VEGETATION. THE SITE GENERALLY SLOPES FROM NORTHEAST TO SOUTHWEST WITH SHEETFLOW RUNOFF DISCHARGING TO 15TH STREET SW. A FULLY DEVELOPED PUBLIC STREET, RUNOFF FLOWS SOUTH WITHIN 15TH STREET SW TO STORM INLETS CONNECTED TO A PUBLIC 24" STORM DRAIN AT THE INTERSECTION OF 15TH STREET SW AND LOS ALAMOS AVE.

WHILE THE SITE DOES NOT LIE WITHIN A DESIGNATED FLOOD ZONE, IT DOES LIE IMMEDIATELY UPSTREAM OF A FLOOD HAZARD ZONE (AO) CONTAINED WITHIN THE 15TH STREET SW PUBLIC ROW.

OFFSITE FLOWS DO NOT IMPACT THE SITE. WEST CENTRAL AVENUE TO THE NORTH AND 15TH STREET SW TO THE WEST ARE FULLY DEVELOPED PUBLIC STREETS WITH ASPHALT PAVING, CURB AND GUTTER AND SIDEWALK. RUNOFF WITHIN THESE STREETS IS CONTAINED WITHIN THEIR LIMITS. THE PAVED PUBLIC ALLEY TO THE EAST HAS PARALLEL TOPOGRAPHY AND DOES NOT APPEAR TO DISCHARGE ONTO THE SITE. THE MULTI-HOUSING DEVELOPMENT TO THE SOUTH IS TOPOGRAPHICALLY LOWER THAN THE SITE AND IS INCAPABLE OF CONTRIBUTING OFFSITE FLOWS.

## IV. DEVELOPED CONDITIONS

THE PROPOSED IMPROVEMENTS TO THE SITE CONSIST OF A NEW BANK BUILDING, PAVED PARKING AND SIDEWALKS, TWO NEW DRIVEPADS PROVIDING ACCESS TO 15TH STREET SW, CURB WALLS ALONG THE NORTH AND SOUTH EDGES OF THE PROJECT SITE, AND ASSOCIATED LANDSCAPED WATER HARVESTING RETENTION AND DETENTION POND AREAS. THESE IMPROVEMENTS WILL RESULT IN A MINOR INCREASE IN THE PEAK RATE OF DISCHARGE AND VOLUME OF RUNOFF GENERATED BY THE PROJECT SITE.

THE DEVELOPED SITE WILL GENERALLY SLOPE FROM NORTHEAST TO SOUTHWEST, WITH RUNOFF BEING ROUTED THROUGH ONSITE RETENTION POND AND DETENTION POND AREAS BEFORE OVERFLOWING INTO 15TH STREET SW. THE SITE IS SUBDIVIDED INTO THREE BASINS.

BASIN 1 CONSISTS OF THE LANDSCAPED AREA ON THE NORTH SIDE OF THE BANK DRIVE-THROUGH ROAD. DEVELOPMENT OF THIS AREA WILL RESULT IN MINIMAL VOLUME OF RUNOFF AND PEAK RATE OF DISCHARGE (0.2 CFS). RUNOFF FROM THIS BASIN WILL FREE DISCHARGE TO CENTRAL AVENUE AND 15TH STREET SW.

BASIN 2 CONSISTS OF A PORTION OF THE BANK BUILDING, THE NORTH PORTION OF THE BANK DRIVE-THROUGH ROAD, AND A SMALL LANDSCAPED WATER HARVESTING RETENTION POND. RUNOFF DISCHARGED FROM THE ROOF AND THE DRIVE-THROUGH ROAD WILL DRAIN TO THE RETENTION POND ON THE WEST SIDE OF THE BUILDING. THE NEW POND IS SIZED TO RETAIN 710 CF OF RUNOFF FROM BASIN 2, MITIGATING THE PEAK RATE OF DISCHARGE FROM BASIN 2 TO 0.35 CFS. OVERFLOW FROM THE POND WILL RELEASE NORTH THROUGH THE CURB OPENING ALONG THE NEW BANK DRIVE-THROUGH ROAD AND DISCHARGE WEST VIA A NEW DRIVEPAD TO 15TH STREET SW.

BASIN 3 CONSISTS OF THE REMAINDER OF THE SITE, INCLUDING THE SOUTH PORTION OF THE BANK BUILDING, THE EAST PORTION OF THE BANK DRIVE-THROUGH ROAD, AND THE PAVED PARKING LOT. BASIN 3 GENERALLY SLOPES FROM NORTH TO SOUTH, DRAINING TO A LANDSCAPED AREA ALONG THE SOUTH EDGE OF THE PROPERTY BEFORE DISCHARGING AT THE SOUTHWEST CORNER OF THE SITE TO 15TH STREET SW VIA SIDEWALK CULVERT. IN ORDER TO MEET THE 2.75 CFS/AC (2.4 CFS FOR THE 0.88 AC SITE) CONTROLLED DISCHARGE REQUIREMENT SET BY THE CITY FOR THIS AREA, THE CURB OPENING FROM THE PARKING LOT TO THE SOUTH LANDSCAPED AREA WILL BE SIZED TO MITIGATE THE PEAK RATE OF DISCHARGE FROM BASIN 3. AS BASINS 1 AND 2 RELEASE 0.2 CFS AND 0.35 CFS RESPECTIVELY, THE CURB OPENING IS SIZED TO RELEASE A CONTROLLED DISCHARGE RATE OF 1.85 CFS (2.4 CFS - 0.2 CFS - 0.35 CFS = 1.85 CFS). THIS CONTROLLED RATE OF DISCHARGE WILL RESULT IN DETENTION PONDING OF 630 CF WITHIN THE SOUTH PORTION OF THE PARKING LOT. THIS AREA OF THE PARKING LOT IS SIZED TO DETAIN 1,320 CF AT A MAXIMUM DEPTH OF 9 INCHES.

THE COMBINED 2.4 CFS OF ALLOWABLE DEVELOPED RUNOFF DISCHARGED FROM THE SITE WILL CONTINUE TO FLOW SOUTH WITHIN 15TH STREET SW TO THE PUBLIC 24" STORM DRAIN AT THE INTERSECTION OF 15TH STREET SW AND LOS ALAMOS AVE.

## V. GRADING PLAN

THE GRADING PLAN SHOWS 1.) EXISTING GRADES INDICATED BY SPOT ELEVATIONS AND CONTOURS AT 1'-0" INTERVALS AS TAKEN FROM THE TOPOGRAPHIC SURVEY DATED 12/02/2011, 2.) PROPOSED GRADES INDICATED BY SPOT ELEVATIONS AND CONTOURS AT 1'-0" INTERVALS, 3.) THE LIMIT AND CHARACTER OF THE EXISTING AND PROPOSED IMPROVEMENTS, AND 4.) CONTINUITY BETWEEN EXISTING AND PROPOSED GRADES.

## VI. CALCULATIONS

THE CALCULATIONS HEREON ANALYZE THE EXISTING AND DEVELOPED CONDITIONS FOR THE 100-YEAR, 6-HOUR RAINFALL EVENT FOR THE SITE. THE PROCEDURE FOR 40 ACRE AND SMALLER BASINS, AS SET FORTH IN THE REVISION OF SECTION 22.2, HYDROLOGY OF THE DEVELOPMENT PROCESS MANUAL, VOLUME 2, DESIGN CRITERIA, DATED JANUARY 1993, HAS BEEN USED TO QUANTIFY THE PEAK RATE OF DISCHARGE AND VOLUME OF RUNOFF GENERATED. AS DEMONSTRATED BY THESE CALCULATIONS, THE PROPOSED IMPROVEMENTS WILL RESULT IN A MINOR INCREASE IN THE PEAK RATE OF DISCHARGE AND VOLUME OF RUNOFF GENERATED BY THIS PROJECT.

HYDROGRAPH ANALYSIS INCLUDED HEREON IS USED TO CALCULATE THE ONSITE RETENTION AND DETENTION PONDING VOLUME REQUIRED TO DETAIN THE DISCHARGE RATE FROM THE SITE TO THE REQUIRED 2.75 CFS/ACRE DISCHARGE RATE (2.4 CFS FOR THIS 0.88 AC SITE). THE RESULTING ANALYSIS DEMONSTRATES 710 CF OF DEVELOPED RUNOFF FROM BASIN 2 AND 630 CF OF DEVELOPED RUNOFF FROM BASIN 3 MUST BE RETAINED AND/OR DETAINED ONSITE.

## VII. CONCLUSIONS

THE FOLLOWING CONCLUSIONS HAVE BEEN ESTABLISHED AS A RESULT OF THE EVALUATIONS AND ANALYSES CONTAINED HEREIN:

- THIS PROJECT REPRESENTS A MODIFICATION TO A PREVIOUSLY DEVELOPED SITE IN AN INFILL AREA.
- THIS SUBMITTAL IS MADE TO SUPPORT SITE DEVELOPMENT PLAN FOR BUILDING PERMIT AND SO#19 PERMIT.
- THE SITE DOES NOT LIE WITHIN A DESIGNATED FLOOD HAZARD ZONE.
- THE SITE DOES LIE IMMEDIATELY UPSTREAM AND CONTRIBUTE RUNOFF TO AN AO DESIGNATED FLOOD HAZARD ZONE (15TH STREET SW).
- DEVELOPED RUNOFF WILL BE ROUTED THROUGH ONSITE LANDSCAPED RETENTION AND DETENTION PONDS TO REDUCE THE DEVELOPED PEAK RATE OF DISCHARGE OF 3.6 CFS TO THE ALLOWABLE CONTROLLED DISCHARGE RATE OF 2.4 CFS (2.75 CFS PER ACRE).
- THE CURB OPENING RELEASE POINT IN BASIN 3 WILL BE SIZED TO MITIGATE THE DEVELOPED RUNOFF TO THE ALLOWABLE CONTROLLED DISCHARGE RATE. THE SOUTH PORTION OF THE PARKING LOT IS SIZED TO CONTAIN THE RESULTING DETENTION POND VOLUME REQUIRED.
- THE PROPOSED IMPROVEMENTS WILL RESULT IN A MINOR INCREASE IN RUNOFF GENERATED BY THE PROJECT SITE.
- THE PROPOSED IMPROVEMENTS WILL NOT ADVERSELY IMPACT DOWNSTREAM PROPERTIES OR CONDITIONS.

## CALCULATIONS

## I. SITE CHARACTERISTICS

- A. PRECIPITATION STATE = 2
- B.  $P_{100, 6 HR} = P_{360} = 2.35$
- C. TOTAL PROJECT AREA ( $A_T$ ) = 38,170 SF  
0.88 AC

## D. LAND TREATMENTS

## 1. EXISTING LAND TREATMENT

## a. ENTIRE SITE

TREATMENT	AREA (SF/AC)	%
C	34,890 / 0.80	91
D	3,280 / 0.08	9

## 2. DEVELOPED LAND TREATMENT

## a. BASIN 1

TREATMENT	AREA (SF/AC)	%
B	2,220 / 0.05	76
D	700 / 0.02	24

## b. BASIN 2

TREATMENT	AREA (SF/AC)	%
B	5,150 / 0.12	57
D	3,900 / 0.09	43

## c. BASIN 3

TREATMENT	AREA (SF/AC)	%
B	5,230 / 0.12	20
D	20,970 / 0.48	80

## II. HYDROLOGY

## A. EXISTING CONDITION

## 1. ENTIRE SITE

## a. VOLUME

$$E_W = (E_A A_A + E_B A_B + E_C A_C + E_D A_D) / A_T$$

$$E_W = (0.53 \times 0.00) + (0.78 \times 0.00) + (1.13 \times 0.80) + (2.12 \times 0.08) / 0.88 = 1.22 \text{ IN}$$

$$V_{100, 6 HR} = (E_W / 12) A_T = (1.22 / 12) \times 38,170 = 3,880 \text{ CF}$$

## b. PEAK DISCHARGE

$$Q_P = Q_{PA} A_A + Q_{PB} A_B + Q_{PC} A_C + Q_{PD} A_D$$

$$Q_P = Q_{100} = (1.56 \times 0.00) + (2.28 \times 0.00) + (3.14 \times 0.80) + (4.70 \times 0.08) = 2.9 \text{ CFS}$$

## B. DEVELOPED CONDITION

## 1. BASIN 1

## a. VOLUME

$$E_W = (E_A A_A + E_B A_B + E_C A_C + E_D A_D) / A_T$$

$$E_W = (0.53 \times 0.00) + (0.78 \times 0.05) + (1.13 \times 0.00) + (2.12 \times 0.02) / 0.07 = 1.10 \text{ IN}$$

$$V_{100, 6 HR} = (E_W / 12) A_T = (1.10 / 12) \times 700 = 270 \text{ CF}$$

## b. PEAK DISCHARGE

$$Q_P = Q_{PA} A_A + Q_{PB} A_B + Q_{PC} A_C + Q_{PD} A_D$$

$$Q_P = Q_{100} = (1.56 \times 0.00) + (2.28 \times 0.05) + (3.14 \times 0.00) + (4.70 \times 0.02) = 0.2 \text{ CFS}$$

## c. WATER HARVESTING AREA RETENTION CAPACITY (AVERAGE END AREA METHOD)

ELEV	AREA	VOLUME
4954.5	180	120
4954.8	610	

- A NEGLIGIBLE AMOUNT OF RUNOFF FROM BASIN 1 WILL CONTINUE TO FREE DISCHARGE TO THE ADJACENT PUBLIC STREETS FROM LANDSCAPED AREAS ONLY.

## 2. BASIN 2

## a. VOLUME

$$E_W = (E_A A_A + E_B A_B + E_C A_C + E_D A_D) / A_T$$

$$E_W = (0.53 \times 0.00) + (0.78 \times 0.12) + (1.13 \times 0.00) + (2.12 \times 0.09) / 0.21 = 1.36 \text{ IN}$$

$$V_{100, 6 HR} = (E_W / 12) A_T = (1.36 / 12) \times 2,100 = 1,030 \text{ CF}$$

## b. PEAK DISCHARGE

$$Q_P = Q_{PA} A_A + Q_{PB} A_B + Q_{PC} A_C + Q_{PD} A_D$$

$$Q_P = Q_{100} = (1.56 \times 0.00) + (2.28 \times 0.12) + (3.14 \times 0.00) + (4.70 \times 0.09) = 0.7 \text{ CFS}$$

## c. ALLOWABLE DISCHARGE (AS-BUILT)

$$Q_{BASIN 1 ALLOW} = Q_{SITE ALLOW} - Q_{BASIN 1} - Q_{BASIN 2 RELEASE}$$

$$Q_{BASIN 1 ALLOW} = 2.4 - 0.2 - 1.5$$

$$Q_{BASIN 1 ALLOW} = 0.7 \text{ CFS} = Q_{100} = 0.7 \text{ CFS}$$

## d. RETENTION POND VOLUME (AVERAGE END AREA METHOD)

ELEV	AREA	VOLUME	Σ VOLUME
4953.5	400	250	250
4954.0	600	460	710
4954.65	800	460	710

$$V_{POND CAP (RETENTION)} = 710 \text{ CF}$$

## e. 2" CURB OPENING (RETENTION POND EMERGENCY OVERFLOW)

$$Q = CLH^{3/2} \text{ (WEIR EQUATION)}$$

$$C = 3.0$$

$$L = 2.0 \text{ FT}$$

$$H = 0.5 \text{ FT (CURB OPENING HEIGHT)}$$

$$Q = 3.0 \times 2.0 \times (0.5)^{3/2}$$

$$Q_{CAP} = 2.1 \text{ CFS (EMERGENCY OVERFLOW CAPACITY)} >> Q_{100} = 0.7 \text{ CFS}$$

## f. HYDROGRAPH CALCULATIONS

$$T_P = 0.7 \times T_c + (1.6 - A_P / A_T) / 12$$

$$T_P = 0.7 \times 0.2 + (1.6 - 0.09 / 0.21) / 12$$

$$T_P = 0.2378 \text{ hr}$$

$$T_{PK} = 0.25 \times A_P / A_T$$

$$T_{PK} = 0.25 \times 0.09 / 0.21 = 0.1071 \text{ hr}$$

$$T_B = 2.017 \times E \times A_T / Q_P - 0.25 \times A_P / A_T$$

$$T_B = 2.017 \times 1.36 \times 0.21 / 0.7 - (0.25 \times 0.09 / 0.21)$$

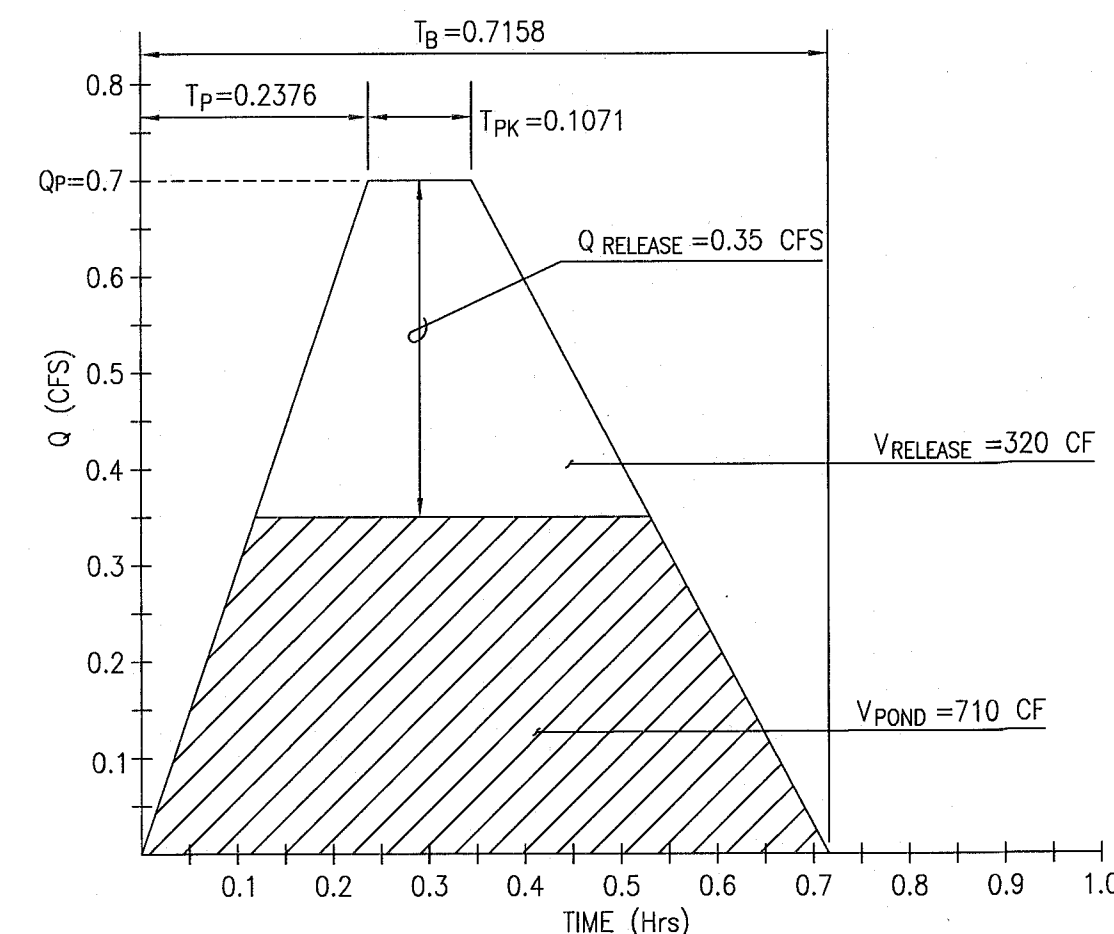
$$T_B = 0.7158 \text{ hr}$$

$$\text{Area of Hydrograph} = V_{TOTAL} = 1,030 \text{ CF}$$

$$\text{Volume Ponded (Retained)} = V_{POND} = 710 \text{ CF}$$

$$\text{Volume Released} = V_{REL} = 320 \text{ CF}$$

$$\text{Peak Discharge Released} = Q_{REL, BASIN 2} = 0.35 \text{ CFS}$$



## 3. BASIN 3

## a. VOLUME

$$E_W = (E_A A_A + E_B A_B + E_C A_C + E_D A_D) / A_T$$

$$E_W = (0.53 \times 0.00) + (0.78 \times 0.12) + (1.13 \times 0.00) + (2.12 \times 0.48) / 0.60 = 1.85 \text{ IN}$$

$$V_{100, 6 HR} = (E_W / 12) A_T = (1.85 / 12) \times 4,040 = 4,040 \text{ CF}$$

## b. PEAK DISCHARGE

$$Q_P = Q_{PA} A_A + Q_{PB} A_B + Q_{PC} A_C + Q_{PD} A_D$$

$$Q_P = Q_{100} = (1.56 \times 0.00) + (2.28 \times 0.12) + (3.14 \times 0.00) + (4.70 \times 0.48) = 2.5 \text{ CFS}$$

## c. DETENTION POND VOLUME (AVERAGE END AREA METHOD)

ELEV	AREA	VOLUME	Σ VOLUME
4,952.8	83	0	0
4,953.0	380	330	330
4,953.6	57	3,900	4,230

$$V_{POND CAP (DETENTION)} = 1,320 \text{ CF}$$

## d. HYDROGRAPH CALCULATIONS

$$\text{Total Allowable Discharge (Site)} = Q_{SITE ALLOW} = 2.75 \text{ cfs/ac} = (2.75 \text{ cfs/ac}) \times (0.88 \text{ ac}) = 2.4 \text{ cfs}$$

$$\text{Basin 3 Controlled Discharge Allowable} = Q_{SITE ALLOW} - Q_{REL, BASIN 1} - Q_{REL, BASIN 2}$$

$$Q_{REL, BASIN 3} = 2.4 \text{ CFS} - 0.2 \text{ CFS} - 0.35 \text{ CFS}$$

$$Q_{REL, BASIN 3} = 1.85 \text{ CFS} \text{ 1.4 CFS (AS-BUILT)}$$

$$T_P = 0.7 \times T_c + (1.6 - A_P / A_T) / 12$$

$$T_P = 0.7 \times 0.2 + (1.6 - 0.48 / 0.60) / 12$$

$$T_P = 0.2067 \text{ hr}$$

$$T_{PK} = 0.25 \times A_P / A_T$$

$$T_{PK} = 0.25 \times 0.48 / 0.60 = 0.2000 \text{ hr}$$

$$T_B = 2.017 \times E \times A_T / Q_P - 0.25 \times A_P / A_T$$

$$T_B = 2.017 \times 1.85 \times 0.60 / 2.5 - (0.25 \times 0.48 / 0.60)$$

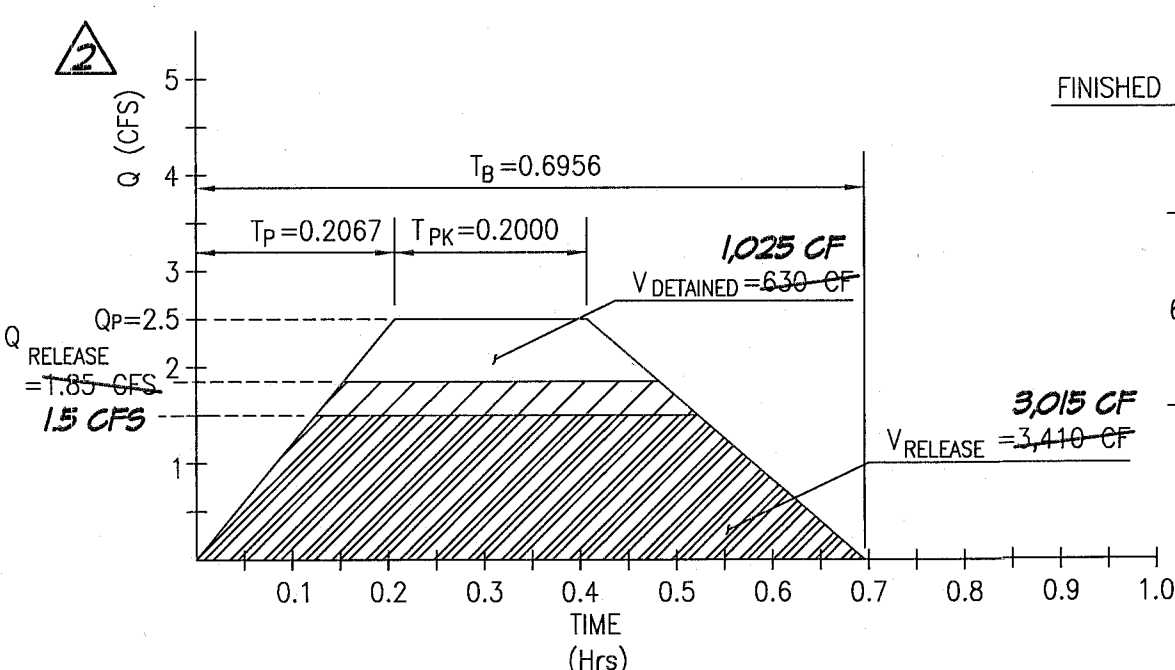
$$T_B = 0.6956 \text{ hr}$$

$$\text{Area of Hydrograph} = V_{TOTAL} = 4,040 \text{ CF}$$

$$Q_{REL, BASIN 3} = 1.85 \text{ CFS} \text{ 1.5 CFS (AS-BUILT)}$$

$$\text{Volume Released (@ 1.85 1.5 CFS)} = 3,410 \text{ 3,015 CF}$$

$$\text{Volume Detained in Basin 3} = 630 \text{ 1,025 CF} < V_{POND CAP} = 1,320 \text{ 1,330 CF (AS-BUILT)}$$



## e. CURB OPENING DIMENSIONS FOR ALLOWABLE CONTROLLED DISCHARGE

$$Q = CLH^{3/2} \text{ (WEIR EQUATION)}$$

$$Q = 1.85 \text{ CFS (ALLOWABLE CONTROLLED DISCHARGE)}$$

$$C = 3.0$$

$$H = 0.74' \text{ (53.57-52.83)}$$

$$L = 0.75' \text{ (AS-BUILT WIDTH)}$$

$$Q = 1.5 \text{ CFS}$$

## f. COMPARISON

$$1. \text{ VOLUME (GROSS)}$$

$$\Delta V_{100, 6 HR} = (270 + 1,030 + 4,040) - 3,880 = 1,460 \text{ CF (INCREASE)}$$

$$2. \text{ PEAK DISCHARGE (GROSS)}$$

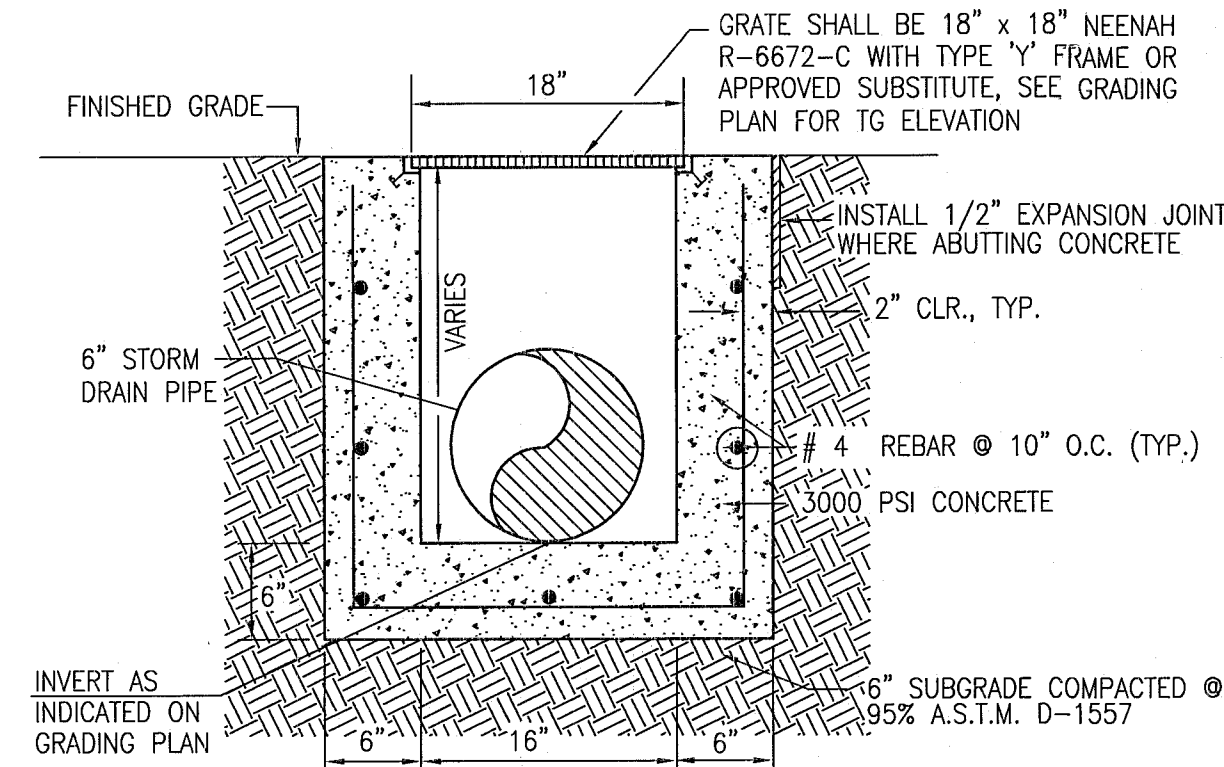
$$\Delta Q_{100} = (0.2 + 0.7 + 2.5) - 2.9 = 0.5 \text{ CFS (INCREASE)}$$

$$3. \text{ VOLUME (NET - RETAINED & DETAINED)}$$

$$\Delta V = V_{100, REL} - V_{100, EXIST} = (270 + 320 + 3,410) - 3,880 = 120 \text{ CF (INCREASE)}$$

$$4. \text{ PEAK DISCHARGE (NET - RETAINED & DETAINED)}$$

$$\Delta Q = Q_{100, REL} - Q_{100, EXIST} = (0.2 + 0.35 + 1.85) - 2.9 = -0.5 \text{ CFS (DECREASE)}$$



TYPICAL 18"x18" STORM INLET SECTION

SCALE: 1" = 1' - 0"

## ENGINEER'S CERTIFICATION FOR PERMANENT CERTIFICATE OF OCCUPANCY

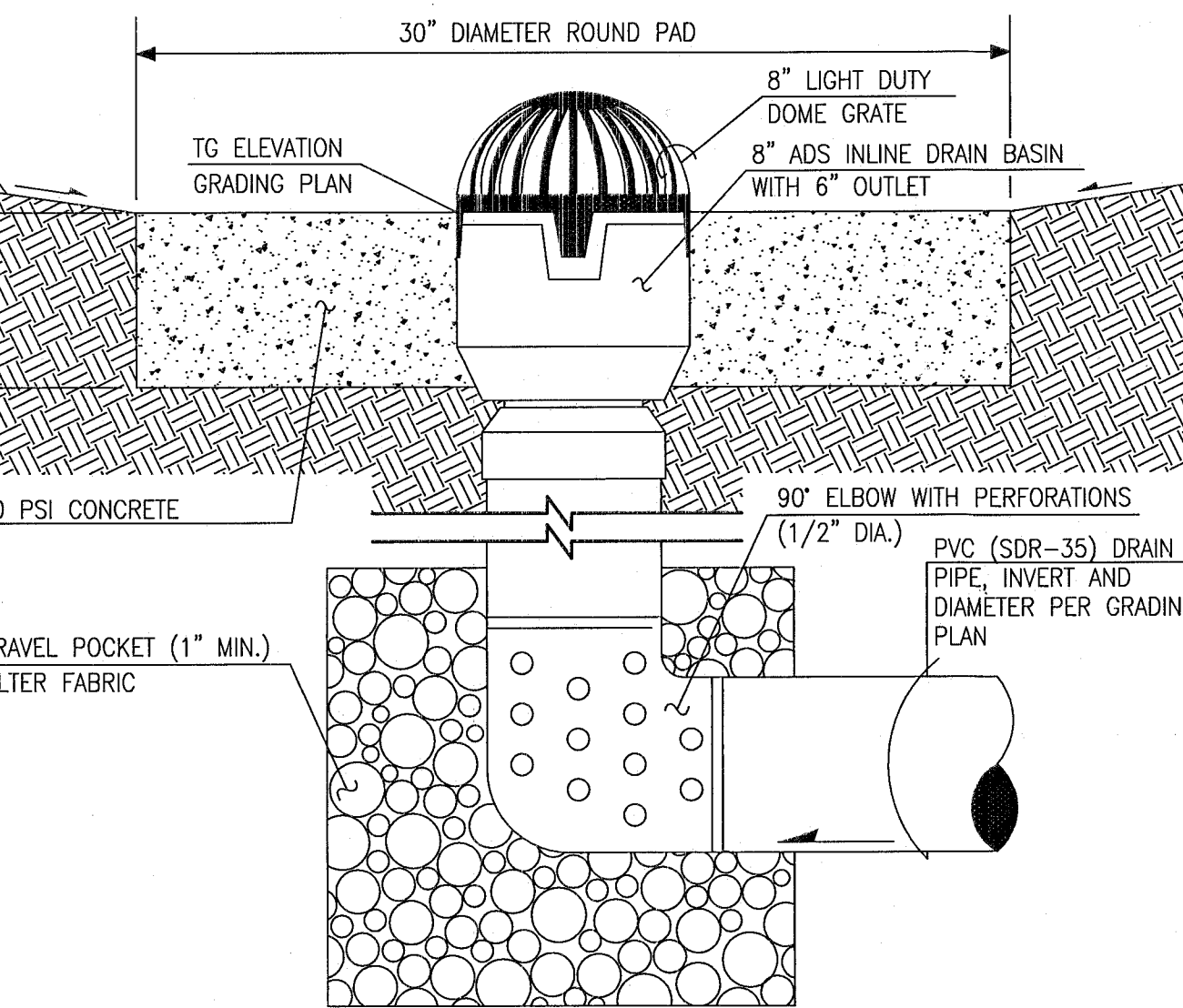
I, J. GRAEME MEANS, NMPE 13676, OF THE FIRM HIGH MESA CONSULTING GROUP, HEREBY CERTIFY THAT THIS PROJECT HAS BEEN GRADED, DRAINED AND CONSTRUCTED IN SUBSTANTIAL COMPLIANCE WITH AND IN ACCORDANCE WITH THE DESIGN INTENT OF THE APPROVED PLAN DATED 01/11/2013 AND REVISED 01/21/2013. THE RECORD INFORMATION FOR ALL SURFACE IMPROVEMENTS EDITED ONTO THE ORIGINAL DESIGN DOCUMENT HAS BEEN OBTAINED FROM THE AS-BUILT SURVEY DATED 04-10-2014 AND SUPPLEMENTED 05-14-2014, PERFORMED UNDER THE DIRECT SUPERVISION OF CHARLES G. CALA, JR. (NMPS 11184) OF THE FIRM HIGH MESA CONSULTING GROUP AND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. THIS CERTIFICATION IS SUBMITTED TO SUPPORT A PERMANENT CERTIFICATE OF OCCUPANCY BY THE CITY OF ALBUQUERQUE.

THE FOLLOWING EXCEPTIONS NOTED IN THE ENGINEER'S CERTIFICATION FOR TEMPORARY CERTIFICATE OF OCCUPANCY (DATED 4/14/14) HAVE BEEN CORRECTED AND VERIFIED TO MEET THE INTENT OF THE ORIGINAL APPROVED PLAN:

- THE PREVIOUSLY NOTED DEPTH DEFICIENCY IN THE BASIN 2 RETENTION POND (LOCATED WEST OF THE BUILDING) HAS BEEN CORRECTED AND VERIFIED, THEREBY SATISFYING THE INTENT OF THE APPROVED PLAN. THE CORRECTIONS INCLUDE RAISING THE WEST EDGE OF THE BASIN, ELIMINATING THE POTENTIAL FOR RUNOFF OVERFLOWING THE CITY SIDEWALK.
- THE CURB OPENING AT THE SOUTH END OF THE PARKING LOT IN BASIN 3 WAS CONSTRUCTED AS A 0.8 FT WIDE OPENING INSTEAD OF 0.9 FT PER THE ORIGINAL DESIGN. THIS AS-CONSTRUCTED OPENING WILL DECREASE THE DISCHARGE RATE FROM BASIN 3 TO 15TH STREET SW FROM 1.85 CFS (DESIGNED) TO 1.5 CFS (CONSTRUCTED). AS-BUILT CALCULATIONS DEMONSTRATE THE PARKING LOT HAS CAPACITY TO DETAIN THIS INCREASED DETENTION VOLUME.
- THE SIDEWALK CULVERT AT THE SOUTHWEST CORNER OF THE SITE IN BASIN 3 WAS CONSTRUCTED AS A 12" CULVERT INSTEAD OF 24" PER THE ORIGINAL DESIGN. THE AS-CONSTRUCTED CULVERT WAS APPROVED BY THE CITY INSPECTOR. THE AS-CONSTRUCTED CULVERT WAS NOT ORIGINALLY DESIGNED TO CONTROL THE DISCHARGE RATE TO 15TH STREET SW, HOWEVER THE REDUCED WIDTH WILL SLOW THE DISCHARGE AND THEREBY INCREASE WATER HARVESTING WITHIN THE AREA SOUTH OF THE PARKING LOT IN ACCORDANCE WITH THE OVERALL SITE DESIGN INTENT.

THE RECORD INFORMATION PRESENTED HEREON IS NOT NECESSARILY COMPLETE, DOES NOT ADDRESS COMPLIANCE TO A.D.A. GUIDELINES, AND IS INTENDED ONLY TO VERIFY SUBSTANTIAL COMPLIANCE OF THE GRADING AND DRAINAGE ASPECTS OF THIS PROJECT. THOSE RELYING ON THIS RECORD DOCUMENT ARE ADVISED TO OBTAIN INDEPENDENT VERIFICATION OF ITS ACCURACY BEFORE USING IT FOR ANY OTHER PURPOSE.

*J. Graeme Means* 05/22/2014  
J. GRAEME MEANS, NMPE 13676 DATE  
J. GRAEME MEANS, NMPE 13676  
REGISTERED PROFESSIONAL ENGINEER  
NEW MEXICO  
13676

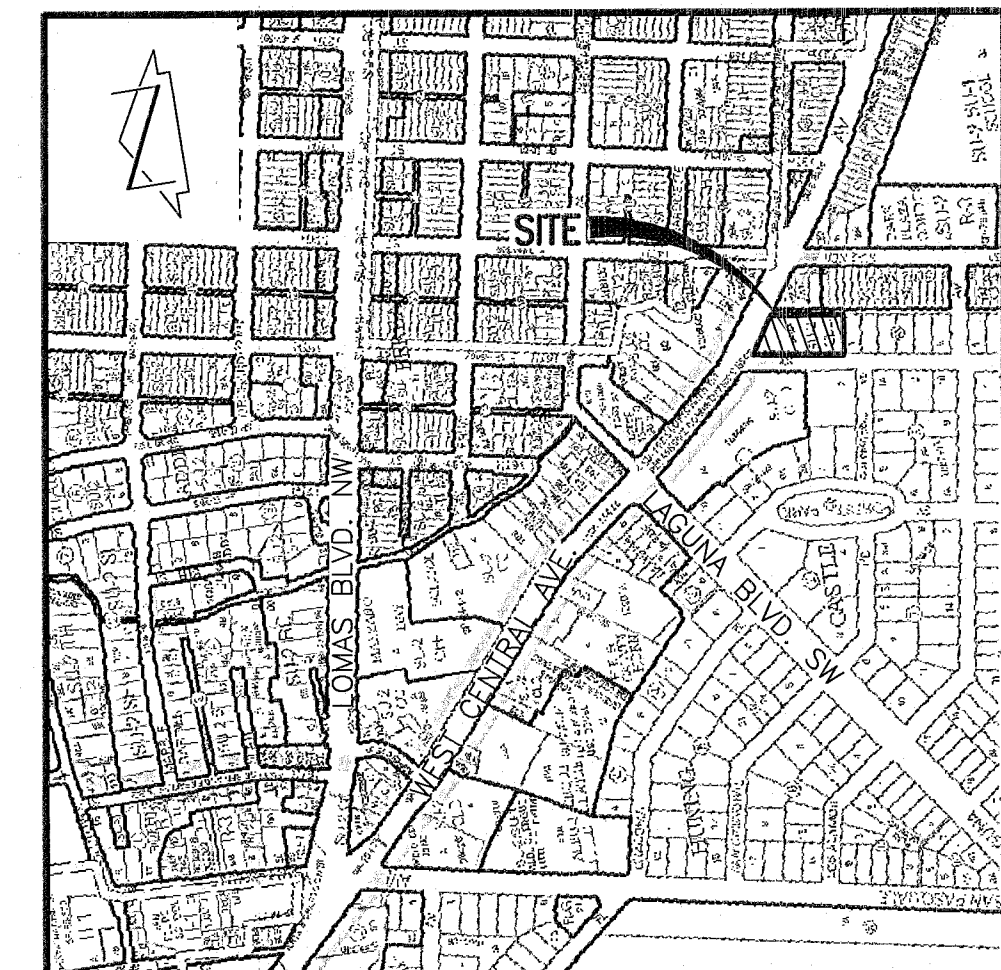


TYPICAL ROOF DRAIN BUBBLER

SCALE: 1" = 6"

# RMKM

RMKM ARCHITECTURE, P.C.  
400 GOLD AVE SW STUDIO 1100 ABUQUERQUE, NM 87102 505.243.5454



VICINITY MAP

SCALE: 1" = 750'

## FEDERAL EMERGENCY MANAGEMENT AGENCY