CITY OF ALBUQUERQUE

Planning Department
David Campbell, Director

Mayor Timothy M. Keller

PO Box 1293

Albuquerque

NM 87103

www.cabq.gov

October 9, 2018

Ronald Bohannan, P.E.
Tierra West, LLC
5571 Midway Park Place NE
Albuquerque, NM, 87109

RE: Maverik Fuel Center
3737 Princeton Drive NE
Grading and Drainage Plan & Drainage Report
Engineer's Stamp Date: 10/03/18
Hydrology File: G16D029

Dear Mr. Bohannan:

Based upon the information provided in your submittal received 10/03/2018, the Grading & Drainage Plan and Drainage Report **are not** approved for Building Permit and SO-19 Permit. The following comments need to be addressed for approval of the above referenced project:

1. The site currently shows more than 1 acre of disturbance is being proposed. An Erosion and Sediment Control Plan is required and has to be submitted to the storm water quality engineer (Curtis Cherne, PE, ccherne@cabq.gov). Hydrology's approval for Grading or Building Permit will not be given until the submittal of the ESC Plan.

2. Sheet C5. Please provide the FIRM Map's effective date (8/16/12).

3. Sheet C5. Please provide the benchmark information for the survey contour information provided.

4. Sheet C5. Please provide the top of wall and bottom of wall (grade level) of the existing retaining wall at both ends and the middle. Since it appears that there will be some grading on both sides of the wall.

5. Sheet C5. In the water quality pond sections, please change the word "detention" to "water quality".

6. Sheet D1. Please darken the proposed storm sewer pipes so that they can be seen.

7. Sheet D1. Please turn off the accessible path layer. This is not needed on this sheet and is a little confusing with the drainage area lines.

8. Please provide a detail or cut sheet of what kind of water quality inlet you are proposing in the back of the drainage report.

Prior to approval letter in support of Permanent Release of Occupancy by Hydrology, please provide an approval from NMDOT. An email of this will suffice.

If you have any questions, please contact me at 924-3995 or rbrissette@cabq.gov .

Sincerely,

Renée C. Brissette

Renée C. Brissette, P.E. CFM
Senior Engineer, Hydrology
Planning Department

City of Albuquerque

Planning Department

Development & Building Services Division

DRAINAGE AND TRANSPORTATION INFORMATION SHEET (REV 6/2018)

Project Title: Maverik- Comanche/Princeton Building Permit #:________ Hydrology File #: ________

DRB#: ________ EPC#: ________ Work Order#: ________

Legal Description: ________

City Address: 3737 Princeton Dr NE Albuquerque NM 87107

Applicant: Tierra West, LLC Contact: Richard Stevenson

Address: 5571 Midway Park Place NE Albuquerque NM 87109

Phone#: 505-858-3100 Fax#: 505-858-1118 E-mail: rstevenson@tierrawestllc.com

Other Contact: ________ Contact: ________

Address: ________

Phone#: ________ Fax#: ________ E-mail: ________

TYPE OF DEVELOPMENT: ____ PLAT (# of lots) ____ RESIDENCE ____ DRB SITE ✓ ADMIN SITE

IS THIS A RESUBMITTAL? ____ Yes ✓ No

DEPARTMENT ____ TRANSPORTATION ✓ HYDROLOGY/DRAINAGE

Check all that Apply:

TYPE OF SUBMITTAL:

- ____ ENGINEER/ARCHITECT CERTIFICATION
- ____ PAD CERTIFICATION
- ____ CONCEPTUAL G & D PLAN
- ✓ GRADING PLAN
- ✓ DRAINAGE REPORT
- ____ DRAINAGE MASTER PLAN
- ____ FLOODPLAIN DEVELOPMENT PERMIT APPLIC
- ____ ELEVATION CERTIFICATE
- ____ CLOMR/LOMR
- ____ TRAFFIC CIRCULATION LAYOUT (TCL)
- ____ TRAFFIC IMPACT STUDY (TIS)
- ____ STREET LIGHT LAYOUT
- ____ OTHER (SPECIFY) ________
- ____ PRE-DESIGN MEETING?

TYPE OF APPROVAL/ACCEPTANCE SOUGHT:

- ✓ BUILDING PERMIT APPROVAL
- ____ CERTIFICATE OF OCCUPANCY
- ____ PRELIMINARY PLAT APPROVAL
- ____ SITE PLAN FOR SUB'D APPROVAL
- ____ SITE PLAN FOR BLDG. PERMIT APPROVAL
- ____ FINAL PLAT APPROVAL
- ____ SIA/ RELEASE OF FINANCIAL GUARANTEE
- ____ FOUNDATION PERMIT APPROVAL
- ____ GRADING PERMIT APPROVAL
- ✓ SO-19 APPROVAL
- ____ PAVING PERMIT APPROVAL
- ____ GRADING/ PAD CERTIFICATION
- ____ WORK ORDER APPROVAL
- ____ CLOMR/LOMR
- ____ FLOODPLAIN DEVELOPMENT PERMIT
- ____ OTHER (SPECIFY) ________

DATE SUBMITTED: 10/3/2018 By: Richard Stevenson

COA STAFF: ELECTRONIC SUBMITTAL RECEIVED:________

FEE PAID:________

DRAINAGE REPORT

For

Maverik Fuel Center

3737 Princeton Drive NE
Albuquerque, NM 87107

Prepared for:

Maverik, Inc.
185 South State Street,
Salt Lake City, Utah 84111

Prepared by:

Tierra West, LLC
5571 Midway Park Place NE
Albuquerque, New Mexico 87109

October, 2018

I certify that this report was prepared under my supervision, and I am a registered professional engineer in the State of New Mexico in good standing.

RONALD R BOHANNAN
NEW MEXICO
7868
REGISTERED PROFESSIONAL ENGINEER

10/3/18

Ronald R. Bohannan
PE # 7868

Job No. 2018039

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Purpose

The purpose of this report is to outline the Drainage Plan and present a solution for the re-development of the site to a Maverik Gas Station and Convenience Store. The site will consist of a single-story 4,300 square foot c-store with twenty gasoline refueling pumps for vehicles and recreational users. No truck refueling is proposed.

This report outlines the developed flows associated in redeveloping the 1.56 acre site and describes the on-site surface improvements needed to safely convey the developed flows. As the site is a gas station with fueling activities, the design is required to demonstrate control of oil from vehicle refueling areas and will be addressing the 80th percentile flows from the site. These provisions are included in the proposed drainage solution.

In the pre-submittal meeting with Hydrology it was confirmed the downstream capacity will not be required to be verified. Coordination with New Mexico Department of Transportation will be required for this site as a portion drains directly into the Interstate 25 (I-25) right-of-way. A copy of this report shall be submitted to the DOT for review and comment.

Location and Background

The site is located on the southwest corner of Comanche Road and Princeton Drive. The address of the parcel is 3737 Princeton Dr NE, Albuquerque, NM 87107. The subject property is legally described as LOT NUMBERED SEVEN (7), OF CUTTER INDUSTRIAL PARK, UNIT 6, A SUBDIVISION, ALBUQUERQUE, NEW MEXICO, AS THE SAME IS SHOWN AND DESIGNATED ON THE PLAT OF SAID SUBDIVISION, FILED IN THE OFFICE OF THE COUNTY CLEERK OF BERNALILLO COUNTY, NEW MEXICO, ON JULY 27, 1972, IN PLAT BOOK B6, FOLIO 200. The site is currently developed with a single story 16,237 square foot office building on the parcel. The site Hydronum number is G16D029.

The site is bordered to the south by an existing warehouse building, Princeton Drive to the east, Comanche Road to the north and Interstate-25 north bound frontage road to the west.

The parcel in its current developed condition does not have any storm water facilities or first flush retention ponds. The site is developed which freely discharge the developed runoff. The approximate area of unimproved areas is 25%, 5% is landscaped areas and the balance is paved or concrete surface. The property directs storm water runoff generated on-site to the east to the existing Princeton curb and gutter via an existing vehicle access point. Flows are conveyed to Comanche Road via the gutter system for approximately 360 lineal feet west to an existing grate inlet in Comanche Road. Sheet flow is also directed to the north along the north boundary of the parcel and enters into Comanche Road right-of-way and is conveyed in the gutter system to the grate inlet. There is also an existing catch basin within the landscape right-of-way area on the east side of the I-25 frontage road. A small portion of the parcels western area sheet flows to this grate inlet. The proposed re-development will require all existing on-site improvements, pavement and structures to be demolished.

In June 1995 an addition to the paved parking areas and an all-weather entryway to the existing structure was approved by City Hydrology. On file is the Drainage and Grading Plans detailing the calculations presented by Celia S. Tomlinson, P.E. The report references the installation of a retention pond to maintain the historic discharge, however, a letter on file from the City states this pond is to be removed when the County constructed the storm drain in Greigos Rd. downstream of the site. At some point in the past decade the retention ponds were removed and the site freely discharges to Comanche Road.

The drainage information associated with the Special Assessment District BC-83-1 / 216 detailing the Greigos Detention Pond was reviewed in preparing this report. The parcel is labeled #136 and falls within the Drainage Basin Boundary for the pond. Included in the appendix is the Griegos Detention Pond Location Map and Drainage Area sheet. No further review of the detention pond capacity was completed or is justified.

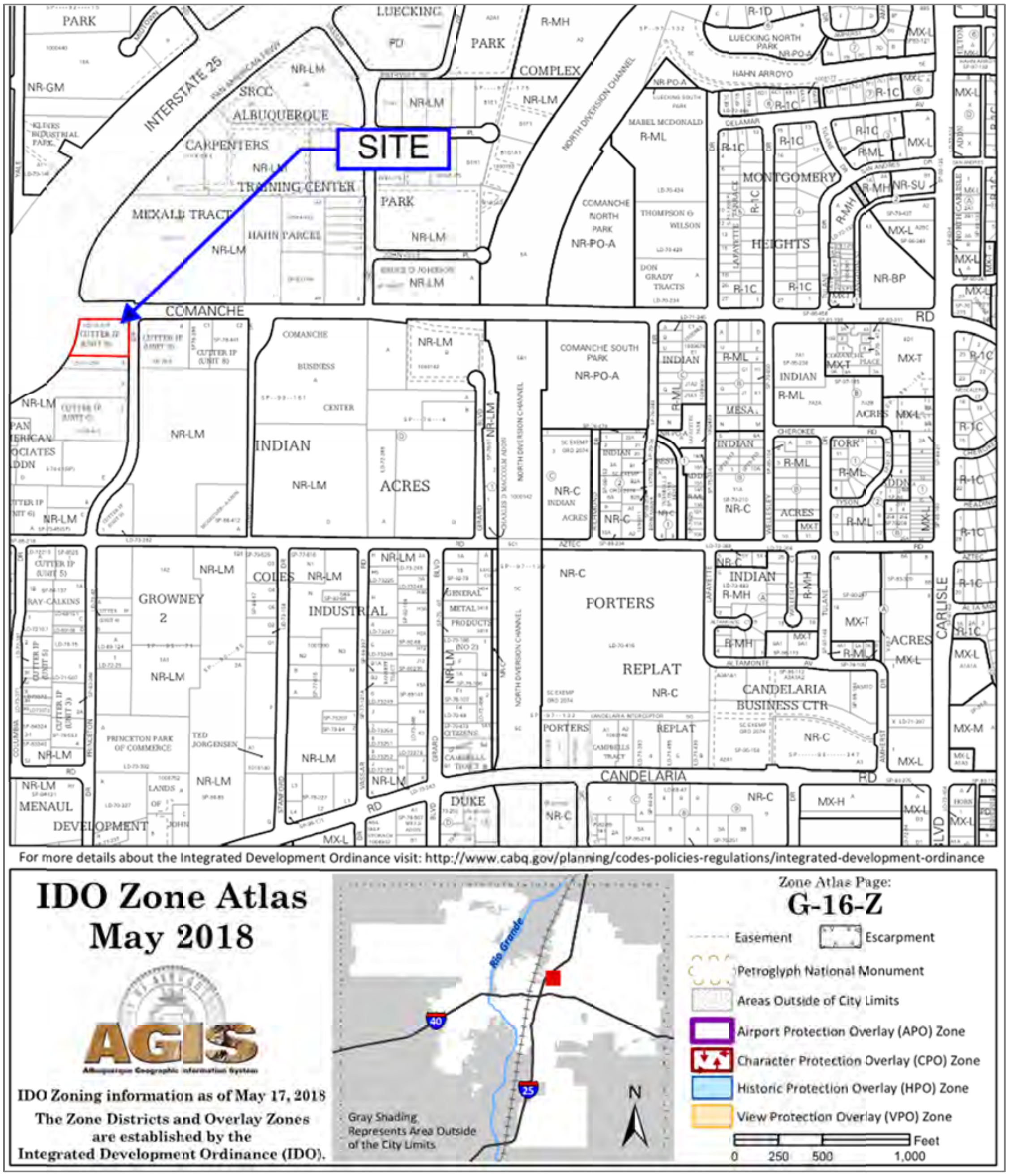


Exhibit A – Vicinity Map

Exhibit B – Site Aerial Image

Flood Plain

The floodplain information is published for the site by the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Bernalillo County, New Mexico and Incorporated Areas. The subject site is detailed on Community Panel Number 35001C0351H dated August 16, 2012 and is shown below.

The subject site is located within Flood Zone X, which is which is defined as, “Areas determined to be outside the 0.2% annual chance floodplain”. The site does not lie within a Flood Hazard Area as shown on the FEMA map requiring no further flood-proofing or other flood mitigation.

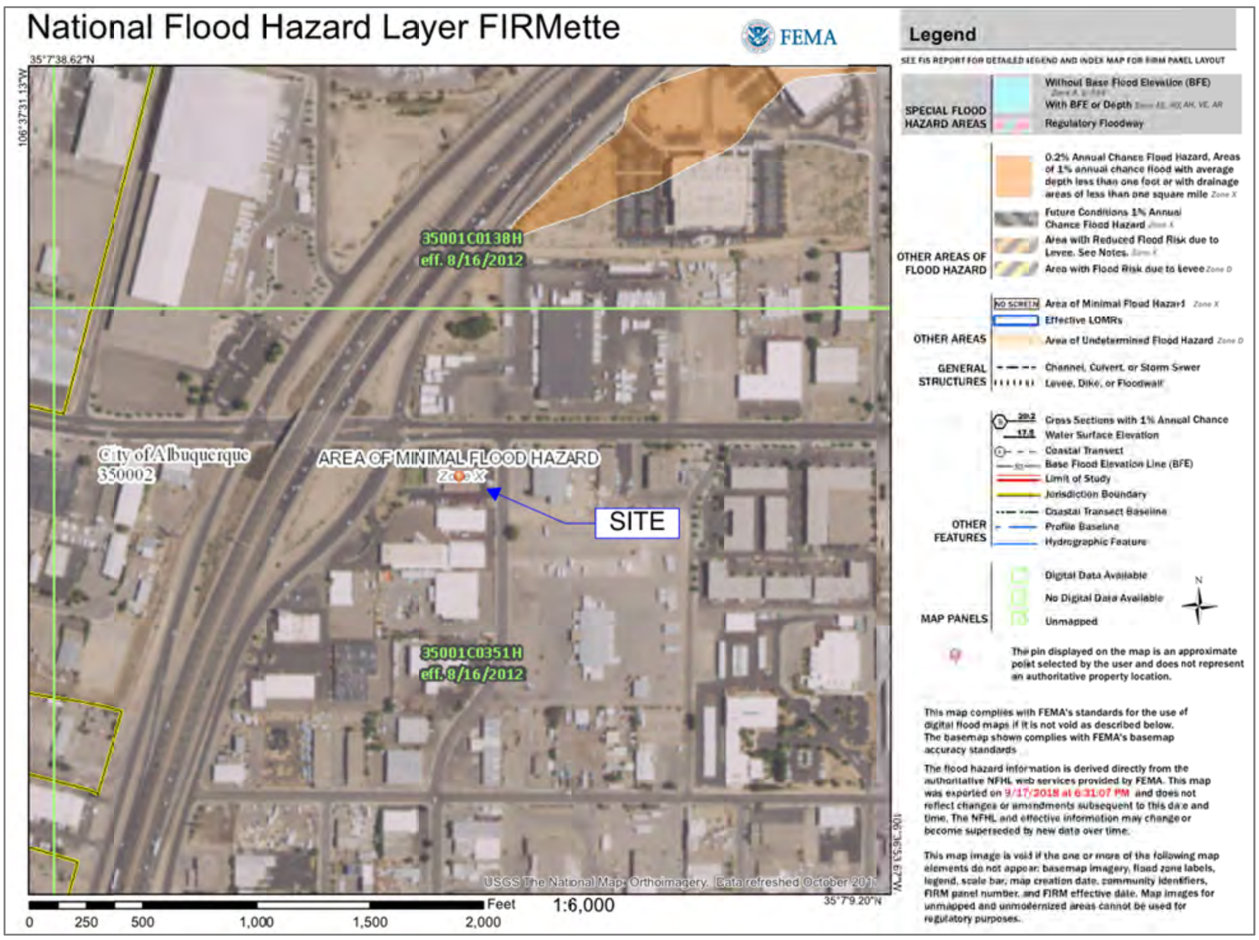


Exhibit C – FIRM Map

Calculations

The site is located within Precipitation Zone 2, between the Rio Grande and San Mateo as specified in Chapter 22, Section A.1 of the City of Albuquerque Development Process Manual Volume I – Design Criteria, 2006 Revision (DPM). The principal design storm is the 100-year 6 hour event. No detention basins or retention basins are proposed and therefore longer duration design storms are not considered in the calculations. As stated in the DPM in Chapter 22 Section A.2, the 100-year 6 hour event is 2.35 inches.

The appropriate land treatments A through D, as defined in the DPM Chapter 22 Section A.3, will be applied to the various pervious and impervious areas for the proposed re-developed site.

Excess precipitation is the depth of runoff remaining after the initial volume of rainfall retained on the surface and infiltration has been subtracted from the design storm hydrograph. The DPM defines the excess precipitation for the 100-year 6 hour event in Chapter 22 Table A-8 for Zone 2 with the corresponding land treatments.

A weighted excess precipitation rate is used to calculate the volume runoff as defined in the DPM Chapter 22 (a-5, a-6). The calculation requires the sum of excess precipitation multiplied by the corresponding treatment areas divided by the total area, multiplied by the weighted excess precipitation of the watershed area.

To determine the peak discharge for the re-development the corresponding treatment areas are multiplied by the peak rate for each treatment and sum to compute the total flow. The peak rates for the treatment areas are defined in the DPM Chapter 22 Table A-9 for the 100 year event.

As this site is a re-development the storm water quality volume is calculated based on the 0.48 inch storm. To calculate the required storm water quality volume to be captured and retained onsite, the impervious areas are multiplied by 0.28 inches for the 80th percentile storm.

Existing (Pre-Developed) Conditions

No offsite flows enter the site. The site is divided into two drainage basins consisting of Treatment B and C for the landscape and slope areas, and Treatment D for the impervious areas for the existing buildings and pavement areas. The site is bounded by developed streets and a building warehouse to the south. The property drains to Princeton Drive from the east and south sides; to the north side to Comanche Road and to the west to the I-25 Frontage Road. The entire site sheet flows to these discharge locations with no drainage infrastructure installed.

The peak discharge calculated for the site matches the approved peak discharge presented in the 1995 drainage report for the parcel of 6.6 cfs for the 100-year 6 hour event, as to be expected as the calculation methods listed in the DPM have not significantly changed. The runoff and volume calculations for the existing condition, based on the drainage criteria detailed in the DPM and discussed previously, is included in the appendix.

Proposed Conditions

The proposed condition involves developing slightly more landscaping and installing water quality retention treatment ponding on site. A 1,590 square foot reduction of impervious areas is proposed which results in a slightly reduced volume of runoff and peak discharge. Included in the appendix are the calculations for the proposed site conditions. The expected total runoff from the site for the 100-year 6 hour event is 6.47 cfs with a volume of 0.231 ac-ft.

To manage the developed flows from the impervious areas the site is generally divided into three basin areas based on the design elevations for the site.

Roof drains will collect runoff from the proposed c-store and discharge directly into the first flush basins. Roof drains are planned for the fuel center canopy with runoff collected and conveyed to an 8-inch diameter drain that will discharge flows directly to the oil/water separator.

Per DPM Chapter 22.9.E, Table 1 all fueling stations must demonstrate control of oil from vehicle parking areas. Basin B4 covers the majority of the pavement area, including all of the sheet flow generated from the re-fueling area under the canopy, and sheet flow is directed to a single modified oil-water separator Type C curb inlet at the north east corner of the site. The curb inlet has the capacity of 3.87 cfs and will convey the calculated 2.87 cfs that will flow to inlet. The single inlet will be modified to include a 24-inch deep sump box and installation of a baffle plate to restrict the passing of trash with a 12-inch by 12-inch exfiltration opening at the base of the concrete box to release the stormwater held in the sump. For the designed sump depth of 24-inches the box inlet will retain 130 gallons which is adequate for any major fuel spill/s that may occur during operations at the site. During regular site maintenance the inlet shall be cleaned of debris and sediment that accumulates over time in the sump.

A 12-inch storm drain is connected to the inlet box and discharges the treated stormwater directly to the first flush pond located at the north east corner of the parcel. This method will provide a ‘double action’ protection to retain on site any debris or hydrocarbon particles that were able to pass through the oil-water separator inlet box. The water quality pond #3 will retain a volume of 800 cubic feet before releasing the additional flow to Comanche Road right-of-way through a concrete weir and a 2-foot concrete rundown / sidewalk culvert conforming to the SO19 Permit. The concrete rundown sidewalk channel is required to have the capacity to pass the 100-year 6 hour event combined flows that enter into the pond which is a total of 5.3 cfs. At the proposed 2% grade the sidewalk culvert has a capacity of 6.97 cfs. The proposed concrete weir design has the capacity of 17.5 cfs and will safely convey the required 5.3 cfs into the concrete rundown.

All other site runoff generated from the pervious areas (Basins B2, B4 and B5) will be conveyed as surface flows to the on-site curb and gutters and be released via curb cuts to the respective first flush ponds.

Basin B2 calculated flow is 1.45 cfs which enters into the water quality pond #1. The pond has the capacity to retain a volume of 660 cubic feet. At the designed inlet elevation additional flow shall enter the proposed Nyloplast 12-inch dome inlet and drain basin and be conveyed through an 8-inch HDPE storm pipe. This storm pipe is connected to the Nyloplast 12-inch dome inlet proposed at the water quality pond #2. This pond is associated with the runoff from Basin B5 which totals 0.98 cfs. The Nyloplast 12-inch dome inlet has the adequate capacity based on designed storage head in the ponds to pass the runoff flows. In the case of a blockage at an inlet, emergency overflow riprap rundowns are proposed. The calculations confirming the riprap weirs and the rundown have capacity to pass and carry the design flows is included in Appendix A. The weir invert elevations are listed on the plans for each water quality pond.

The water quality pond #2 has the capacity to retain a volume of 580 cubic feet. At the designed inlet elevation the additional flow shall enter the inlet and into the 12-inch HDPE storm drain. This storm drain passes the additional flows from basins B2 and B5, a total of 2.44 cfs. The storm drain at the designed slope of 1.40% has the capacity to discharge a total of 4.23 cfs. This storm drain discharges the additional flows from ponds #1 and #2 into the water quality pond #3.

All site runoff generated from the landscaped slope areas (Basins B1 and B6) will freely discharge to the north and west into the respective right-of-ways. A small portion of runoff totaling 0.05 cfs discharges directly into the Princeton Drive right-of-way at the driveway entrances (Basins B8 and B9). The basin map is shown in the figure below.

As the sheet flow runoff from Basin B1 and a portion of B6 enter directly into the New Mexico DOT right-of-way, the drainage report and solution for the re-development will be presented to the District 3 Drainage Engineer. As the flows are not increased from the existing site discharge, no offsite drainage improvements are proposed in DOT the right-of-way.

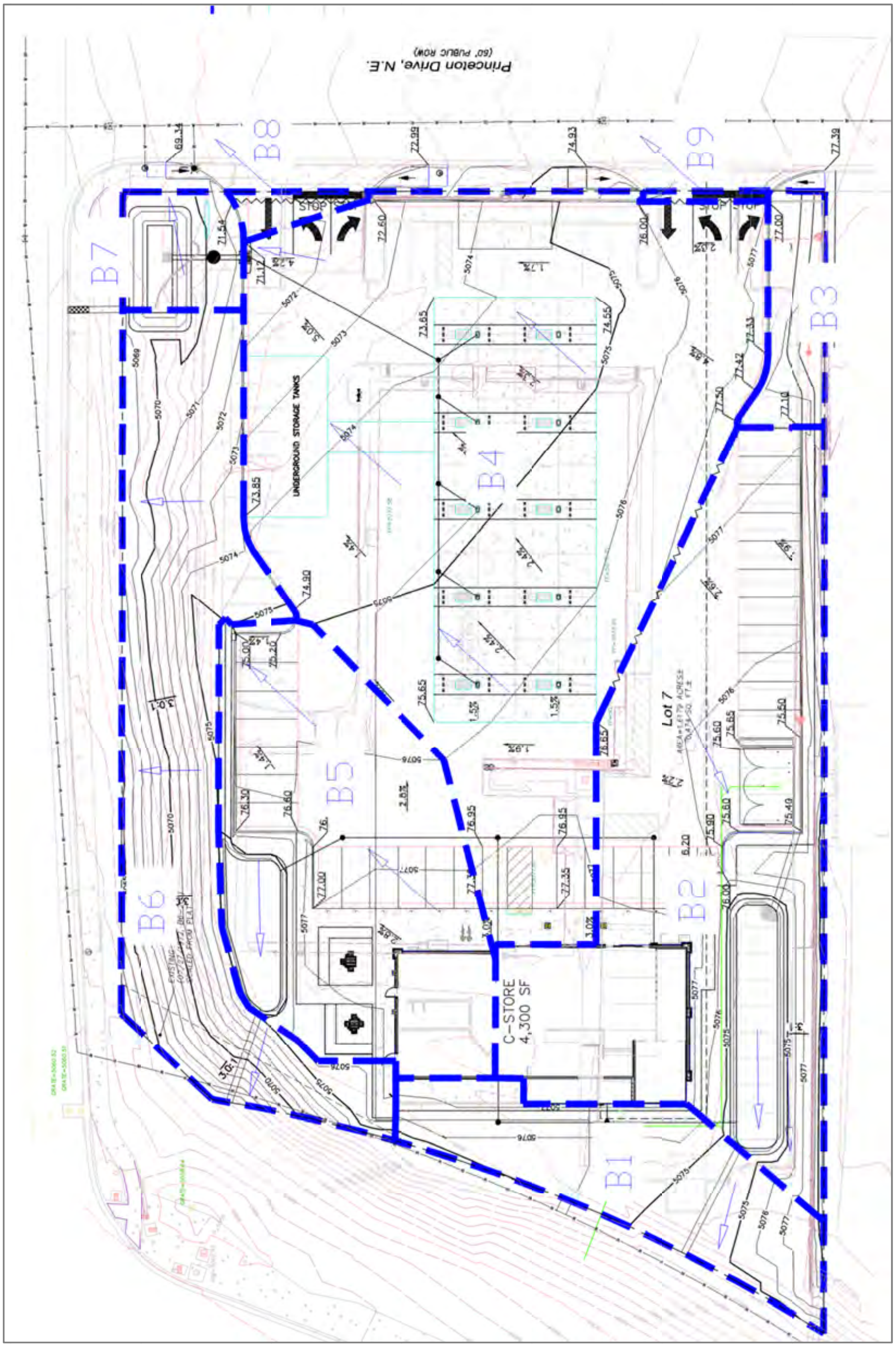


Exhibit D – Drainage Basin Map

Water Quality Management

As this site is a re-development, the water quality volume is calculated based on the 0.48 inch storm. The impervious area is multiplied by 0.28 inches for the 80th percentile storm to determine the volume to be captured and retained onsite.

The total impervious area is 1.06 acres and requires a total water quality volume of 1,081 cubic feet for the basin areas. Three water quality ponds are proposed across the re-developed site. They are located in the landscape areas where the impervious area sheet flow runoff is directed to, or discharged into from the storm drain. The proposed total volume of the three water quality pond areas is 2,040 cubic feet. All developed flows from impervious areas are routed through the landscape ponds meeting the intent of the ordinance. Basin B1 and B6 are landscape slope areas with runoff entering directly into the street right-of-way.

The water quality volume calculations are detailed on the hydrology table in the appendix.

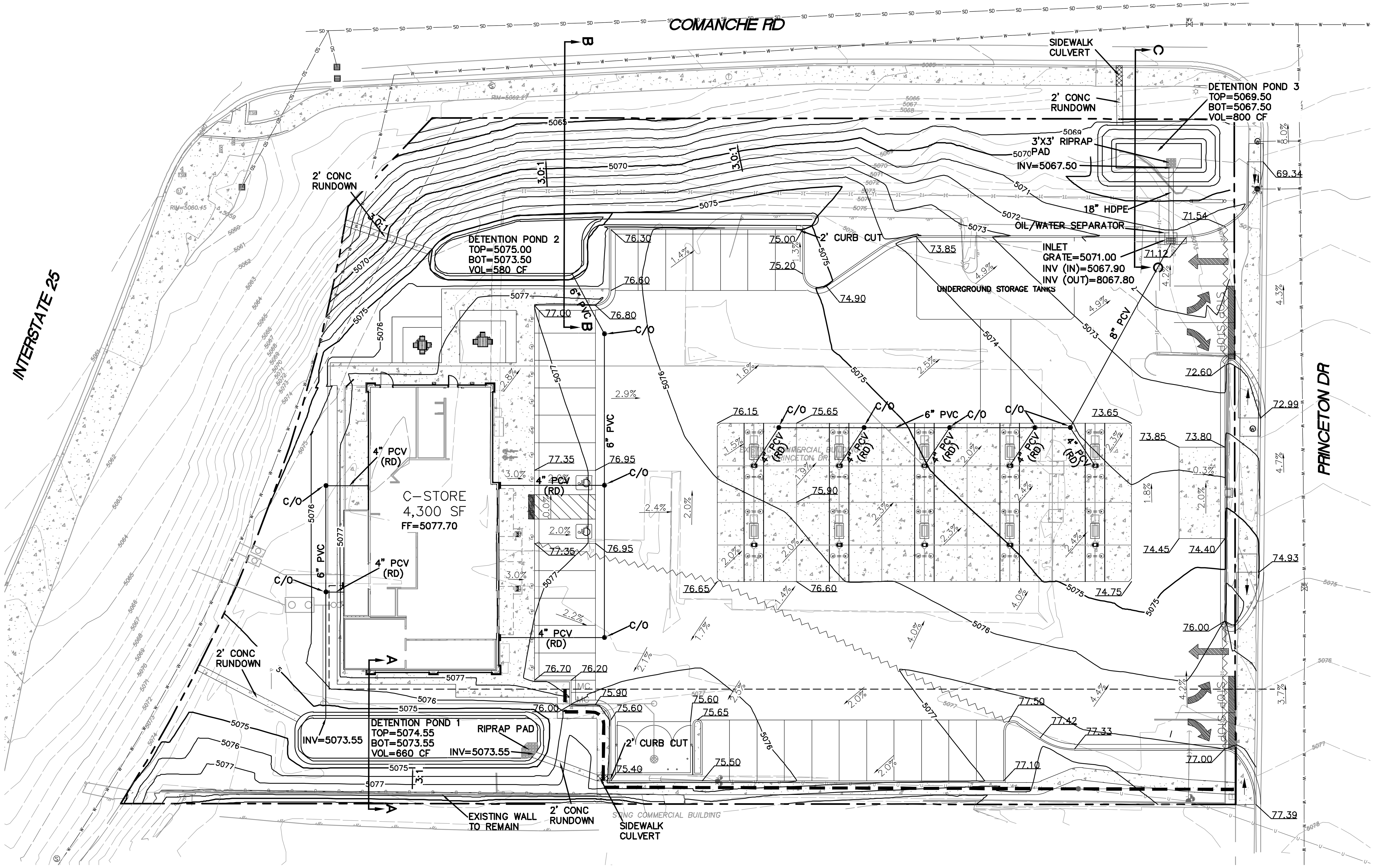
A Drainage Covenant will be required for the water quality ponds. As the ponds only function as first flush ponds the appropriate covenant is the Private Facility Drainage Covenant. This will be submitted to the City with the final Building Permit set.

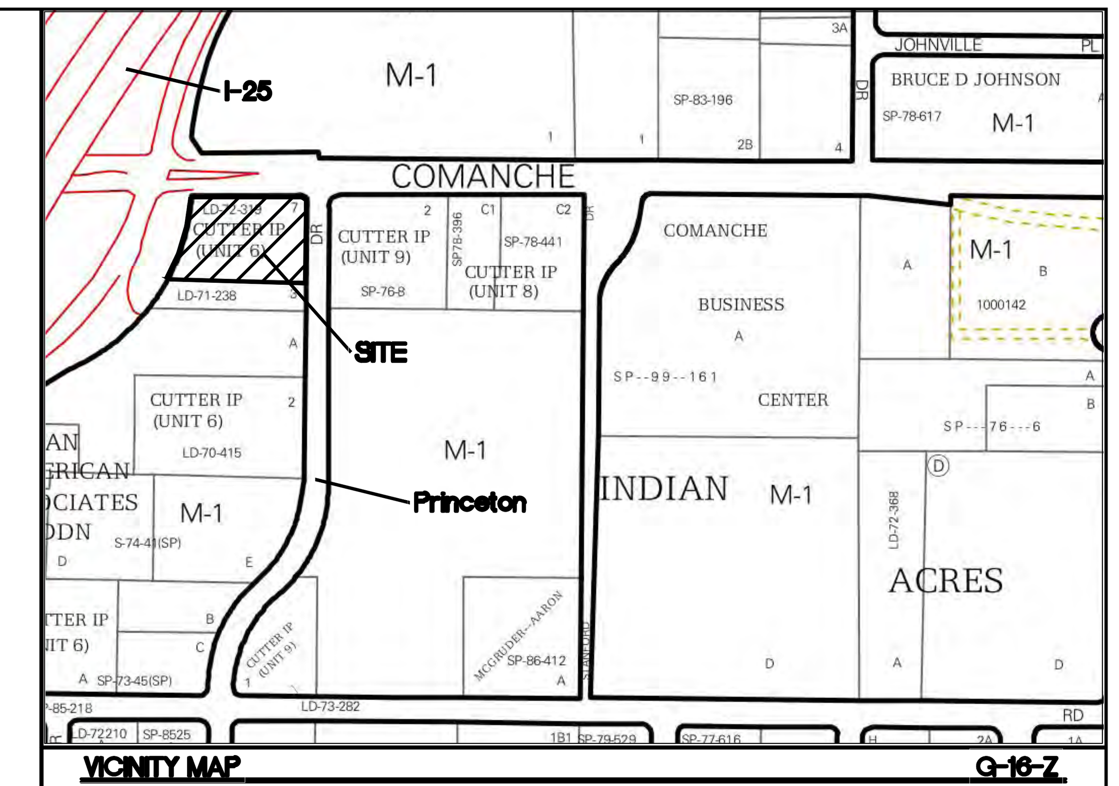
Summary

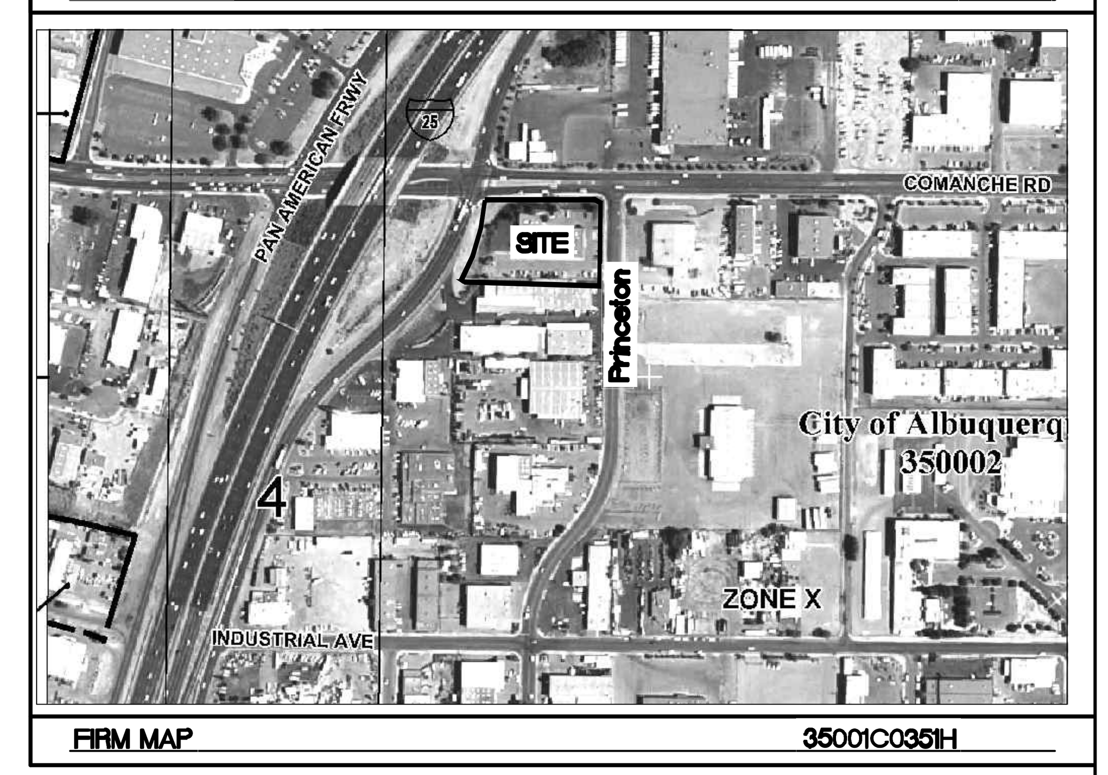
This report outlines the Drainage Plan and present the on-site surface and subsurface drainage improvements needed to safely convey the developed flows for the re-development of the site to a Maverik Gas Station and Convenience Store.

Per the DPM the design is required to control the oil wash-off from vehicle refueling areas and is achieved with the oil-water separator. Three first flush ponds are proposed to retain a total of 2,040 cubic feet, meeting the water quality ponding requirements. The site does not increase the historic flow released from the site and the solution adheres to best practices for stormwater quality management.

APPENDIX A







LEGEND

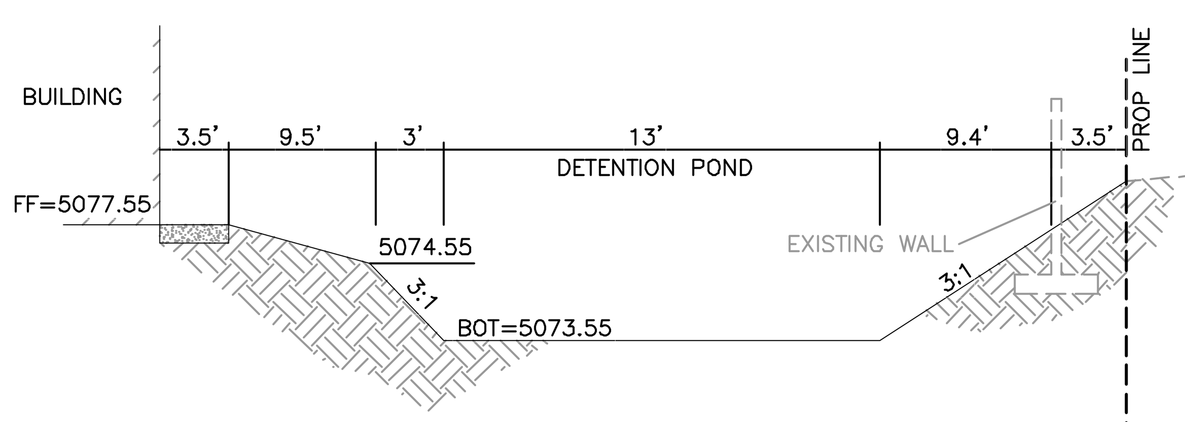
- CURB & GUTTER
- BOUNDARY LINE
- EASEMENT
- SIDEWALK
- 5010 CONTOUR MAJOR
- 5011 CONTOUR MINOR
- x 5048.25 SPOT ELEVATION
- FLOW ARROW
- EXISTING CURB & GUTTER
- 5010 EXISTING CONTOUR MAJOR
- 5011 EXISTING CONTOUR MINOR
- x 5048.25 EXISTING SPOT ELEVATION
- WATER BLOCK
- ACCESSIBLE PATH

NOTICE TO CONTRACTORS

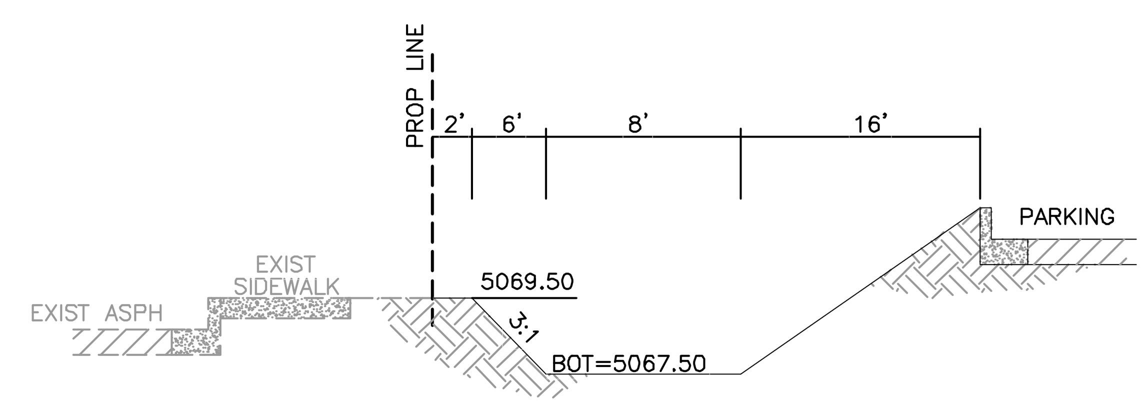
1. AN EXCAVATION/CONSTRUCTION PERMIT WILL BE REQUIRED BEFORE BEGINNING ANY WORK WITHIN CITY RIGHT-OF-WAY.
2. ALL WORK DETAILED ON THESE PLANS TO BE PERFORMED, EXCEPT AS OTHERWISE STATED OR PROVIDED HERON, SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY OF ALBUQUERQUE INTERIM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1985.
3. TWO WORKING DAYS PRIOR TO ANY EXCAVATION, CONTRACTOR MUST CONTACT LINE LOCATING SERVICE, 765-1234, FOR LOCATION OF EXISTING UTILITIES.
4. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL EXCAVATE AND VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL CONNECTIONS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE CONFLICT CAN BE RESOLVED WITH A MINIMUM AMOUNT OF DELAY.
5. BACKFILL COMPACTION SHALL BE ACCORDING TO TRAFFIC/STREET USE.
6. MAINTENANCE OF THESE FACILITIES SHALL BE THE RESPONSIBILITY OF THE OWNER OF THE PROPERTY SERVED.
7. WORK ON ARTERIAL STREETS SHALL BE PERFORMED ON A 24-HOUR BASIS.
8. PRIOR TO WORK WITHIN THE PASEO DEL NORTE RIGHT-OF-WAY, A NMDOT PERMIT WILL BE REQUIRED

EROSION CONTROL NOTES

1. CONTRACTOR IS RESPONSIBLE FOR OBTAINING A TOPSOIL DISTURBANCE PERMIT PRIOR TO BEGINNING WORK.
2. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING RUN-OFF ON SITE DURING CONSTRUCTION.
3. CONTRACTOR IS RESPONSIBLE FOR CLEANING ALL SEDIMENT THAT GETS INTO EXISTING RIGHT-OF-WAY.
4. REPAIR OF DAMAGED FACILITIES AND CLEANUP OF SEDIMENT ACCUMULATIONS ON ADJACENT PROPERTIES AND IN PUBLIC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR.
5. ALL EXPOSED EARTH SURFACES MUST BE PROTECTED FROM WIND AND WATER EROSION PRIOR TO FINAL (CITY) ACCEPTANCE OF ANY PROJECT.



SECTION A-A
NTS



SECTION C-C
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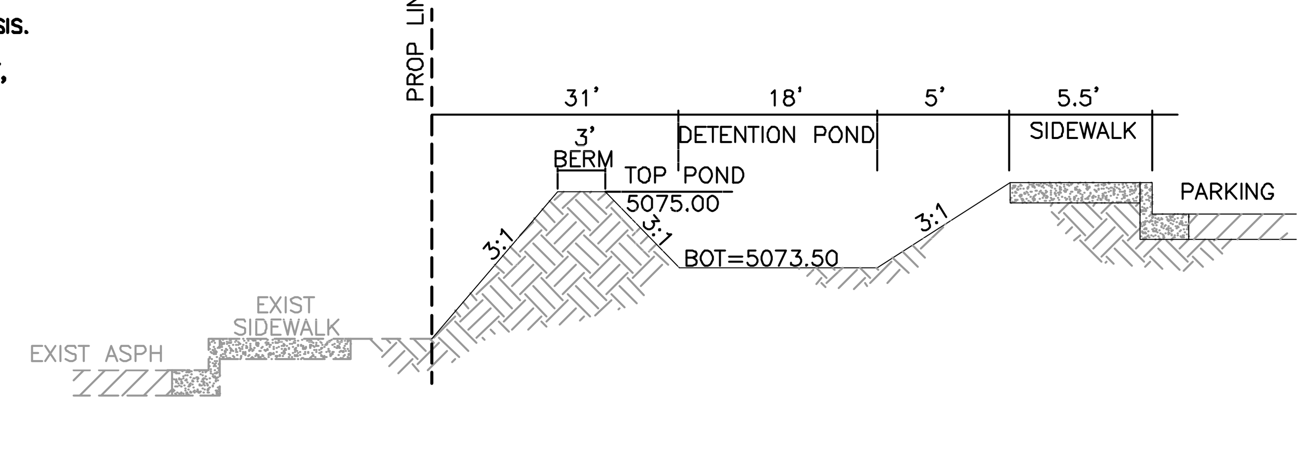

SECTION B-B
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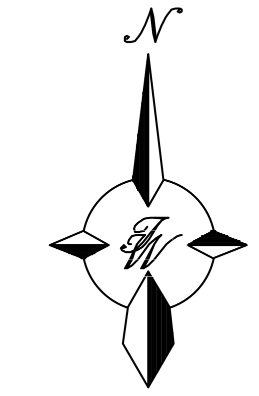


GRAPHIC SCALE

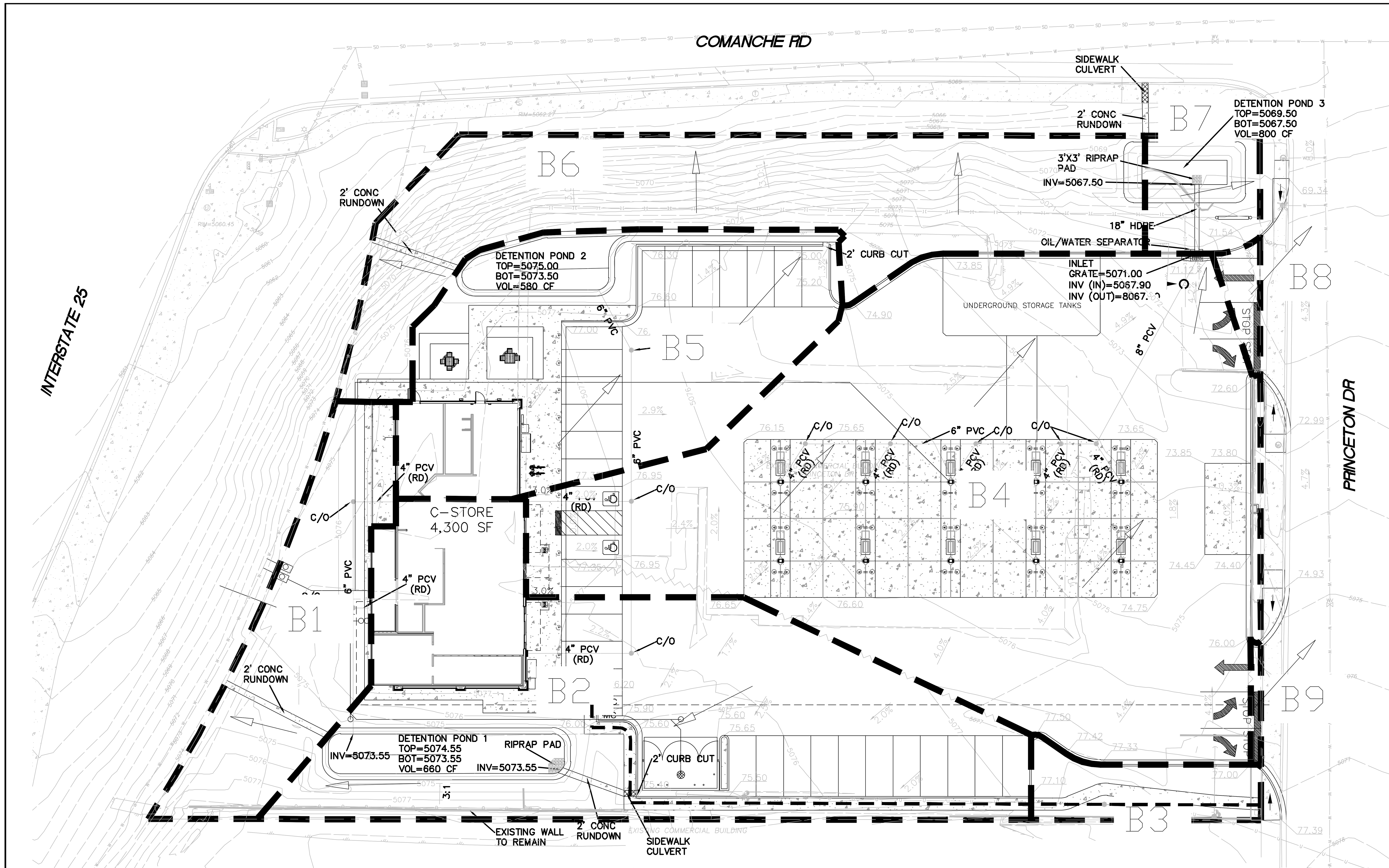
20 10 0 10 20

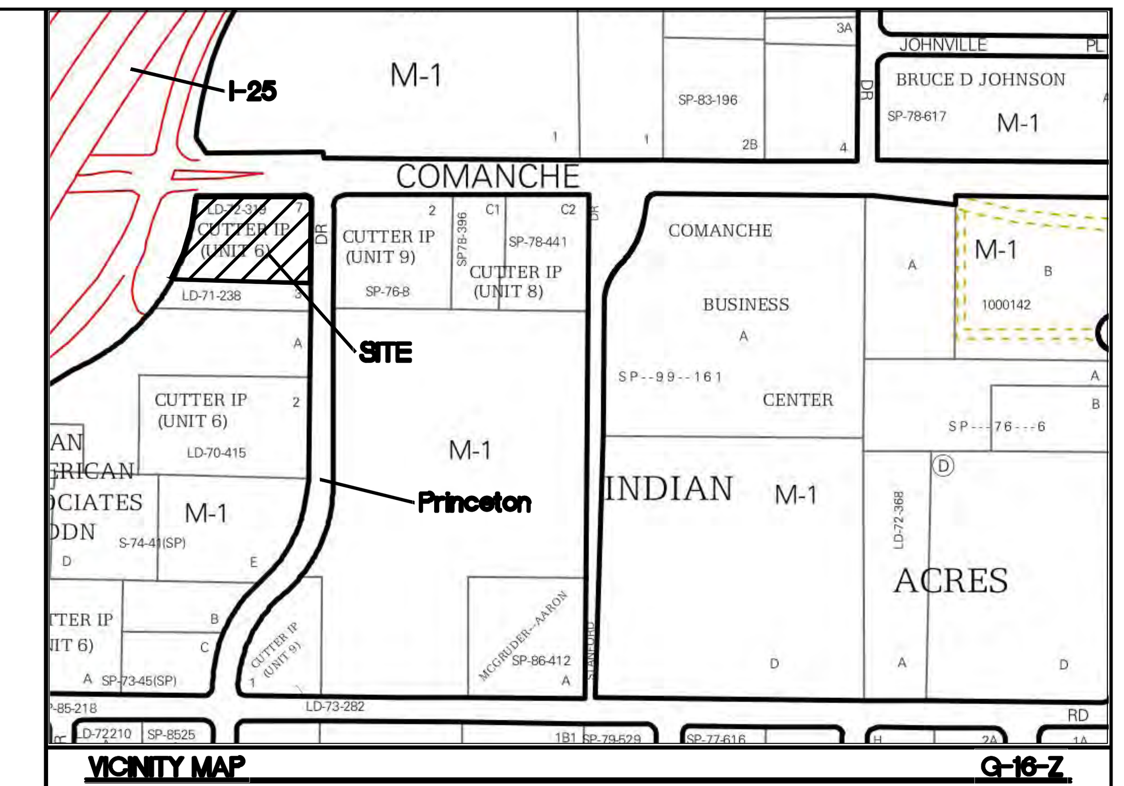
SCALE: 1"=20'

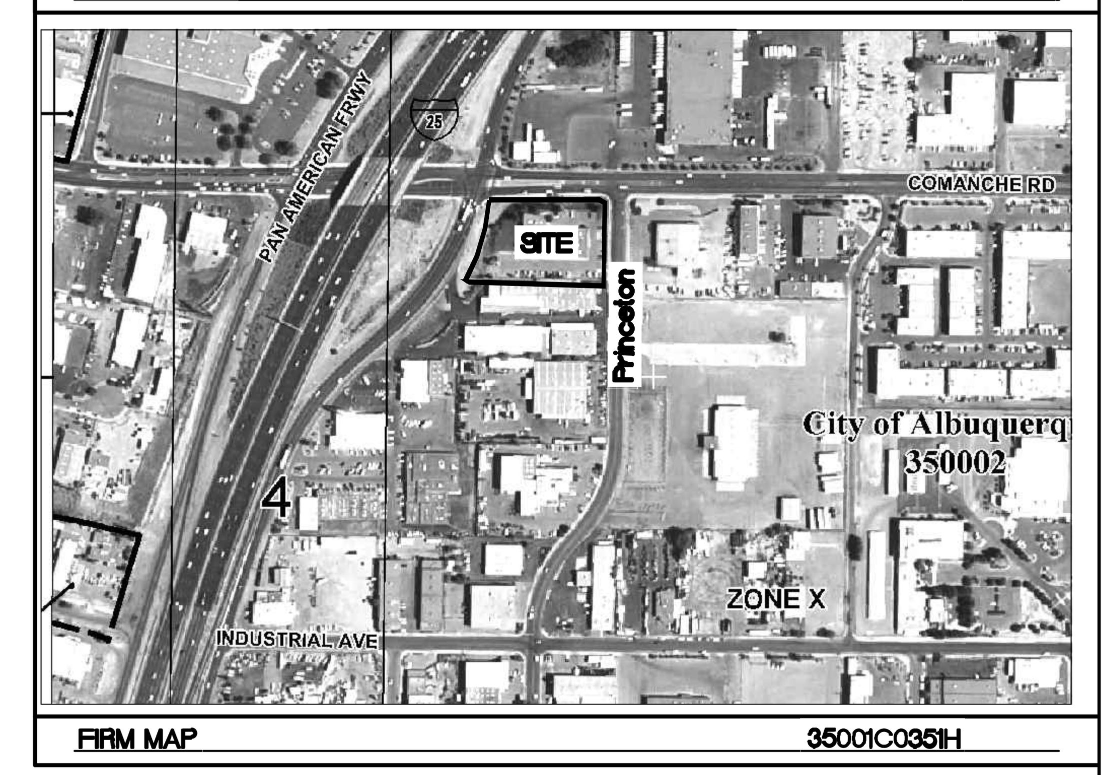
CAUTION:
ALL EXISTING UTILITIES SHOWN WERE OBTAINED FROM RESEARCH, AS-BUILTS, SURVEYS OR INFORMATION PROVIDED BY OTHERS. IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO CONDUCT ALL NECESSARY FIELD INVESTIGATIONS PRIOR TO AND INCLUDING ANY EXCAVATION, TO DETERMINE THE ACTUAL LOCATION OF UTILITIES AND OTHER IMPROVEMENTS, PRIOR TO STARTING THE WORK. ANY CHANGES FROM THIS PLAN SHALL BE COORDINATED WITH AND APPROVED BY THE ENGINEER.

ENGINEER'S SEAL	MAVERICK INC. STORE ALBUQUERQUE, NM	DRAWN BY pm
	GRADING AND DRAINAGE PLAN	DATE 10-28-18
		DRAWING 2018039-GR
	TIERRA WEST, LLC 5571 MIDWAY PARK PL NE ALBUQUERQUE, NEW MEXICO 87109 (505) 858-3100 www.tierrawestllc.com	SHEET # C5
RONALD R. BOHANNAN P.E. #7868		JOB # 2018039

Z:\2018\2018039 Maverick Comanche & Princeton\dwg\DRB\2018039_GR.dwg Sep 27, 2018 -- 3:39pm







LEGEND

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- x 5048.25 EXISTING SPOT ELEVATION
- WATER BLOCK
- ACCESSIBLE PATH

PROPOSED DRAINAGE SOLUTION

THE TOTAL RUNOFF FROM THE SITE FOR THE 100-YEAR 6 HOUR EVENT IS 6.47 CFS WITH A VOLUME OF 0.231 AC-FT. TO MANAGE THE DEVELOPED FLOWS FROM THE IMPERVIOUS AREAS THE SITE IS GENERALLY DIVIDED INTO THREE BASIN AREAS BASED ON THE DESIGN ELEVATIONS FOR THE SITE. ROOF DRAINS WILL COLLECT RUNOFF FROM THE PROPOSED C-STORE AND DISCHARGE DIRECTLY INTO THE FIRST FLUSH BASINS.

PER DPM CHAPTER 22.9.E, TABLE 1 ALL FUELING STATIONS MUST DEMONSTRATE CONTROL OF OIL FROM VEHICLE PARKING AREAS. BASIN B4 IS THE MAJORITY OF THE PAVEMENT AREA, INCLUDING ALL OF THE SHEET FLOW GENERATED FROM THE RE-FUELING AREA UNDER THE CANOPY, IS DIRECTED TO A SINGLE TYPE C CURB INLET AT THE NORTH EAST CORNER OF THE SITE. THE CURB INLET HAS THE CAPACITY FOR THE CALCULATED 2.87 CFS THAT WILL FLOW TO INLET. THE SINGLE INLET WILL BE MODIFIED TO INCLUDE A SUMP BOX AND BAFFLE PLATE TO RESTRICT THE PASSING OF TRASH AND INCLUDE A 12-INCH BY 12-INCH EXFILTRATION OPENING AT THE BASE OF THE CONCRETE BOX TO PASS ANY REMAINING HYDROCARBON FLUID THAT ENTERS INTO THE INLET. WITH A DESIGNED SUMP DEPTH OF 24-INCHES THE BOX INLET WILL RETAIN 130 GALLONS WHICH IS ADEQUATE FOR ANY MAJOR FUEL SPILL/S THAT MAY OCCUR DURING REGULAR OPERATIONS AT THE SITE. DURING REGULAR MAINTENANCE THE INLET SHALL BE CLEANED OF DEBRIS AND SEDIMENT THAT ACCUMULATE OVER TIME. AN 18-INCH STORM DRAIN IS CONNECTED TO THE INLET BOX AND DISCHARGES THE TREATED STORMWATER DIRECTLY TO THE FIRST FLUSH POND LOCATED AT THE NORTH EAST CORNER OF THE PARCEL. THE FIRST FLUSH POND WILL RETAIN A VOLUME OF 800 CUBIC FEET BEFORE RELEASING THE ADDITIONAL FLOW TO COMANCHE ROAD RIGHT-OF-WAY VIA A 2-FOOT CONCRETE RUNDOWN AND 2-FOOT SIDEWALK CULVERT.

ALL SITE RUNOFF GENERATED FROM THE PERVIOUS AREAS (BASINS B2, B4 AND B5) WILL BE CONVEYED AS SURFACE FLOWS TO THE ON-SITE CURB AND GUTTERS AND BE RELEASED VIA CURB CUTS TO THE RESPECTIVE FIRST FLUSH PONDS. ALL SITE RUNOFF GENERATED FROM THE LANDSCAPED SLOPE AREAS (BASINS B1 AND B6) WILL FREELY DISCHARGE TO THE NORTH AND WEST INTO THE RESPECTIVE RIGHT-OF-WAYS. A SMALL PORTION OF RUNOFF TOTALING 0.05 CFS DISCHARGES DIRECTLY INTO THE PRINCETON DRIVE RIGHT-OF-WAY AT THE DRIVEWAY ENTRANCES (BASINS B8 AND B9).

Basin Descriptions												100-Year, 6-Hr			10-Year, 6-Hr			Water Quality Volume	
Basin ID	Area (sf)	Area (acres)	Area (sq miles)	Treatment A %	(acres)	Treatment B %	(acres)	Treatment C %	(acres)	Treatment D %	(acres)	Weighted E (in)	Volume (ac-ft)	Flow cfs	Weighted E (in)	Volume (ac-ft)	Flow cfs	FF Pond Required CF	FF Pond Provided CF
1	4,793	0.11	0.00017	0%	0.000	100%	0.110	0%	0.000	0%	0.000	0.780	0.007	0.25	0.280	0.003	0.10	0	0
2	16,120	0.37	0.00058	0%	0.000	32%	0.118	0%	0.000	68%	0.252	1.691	0.052	1.45	1.001	0.031	0.90	255	660
3	1,477	0.03	0.00005	0%	0.000	100%	0.034	0%	0.000	0%	0.000	0.780	0.002	0.08	0.280	0.001	0.03	0	0
4	26,570	0.61	0.00095	0%	0.000	0%	0.000	0%	0.000	100%	0.610	2.120	0.108	2.87	1.340	0.068	1.92	619	800
5	9,939	0.23	0.00036	0%	0.000	16%	0.037	0%	0.000	84%	0.192	1.906	0.036	0.98	1.170	0.022	0.64	195	580
6	10,066	0.23	0.00036	0%	0.000	10%	0.023	90%	0.208	0%	0.000	1.095	0.021	0.71	0.496	0.010	0.38	0	0
7	1,440	0.03	0.00005	0%	0.000	100%	0.033	0%	0.000	0%	0.000	0.780	0.002	0.08	0.280	0.001	0.03	0	0
8	397	0.01	0.00001	0%	0.000	0%	0.000	0%	0.000	100%	0.009	2.120	0.002	0.04	1.340	0.001	0.03	9	0
9	135	0.00	0.00000	0%	0.000	0%	0.000	0%	0.000	100%	0.003	2.120	0.001	0.01	1.340	0.000	0.01	3	0
Total	70,937	1.63	0.003		0.000		0.355		0.208		1.065		0.231	6.470		0.136	4.039	1,081	2,040

CURRENT SITE DRAINAGE

NO OFFSITE FLOWS ENTER THE SITE. THE SITE IS BOUNDED BY DEVELOPED STREETS AND A BUILDING WAREHOUSE TO THE SOUTH. THE PROPERTY DRAINS TO PRINCETON DRIVE FROM THE EAST AND SOUTH SIDES; TO THE NORTH SIDE TO COMANCHE ROAD AND TO THE WEST TO THE I-25 FRONTAGE ROAD. THE ENTIRE SITE SHEET FLOWS TO THESE DISCHARGE LOCATIONS WITH NO DRAINAGE INFRASTRUCTURE INSTALLED. THE PEAK DISCHARGE CALCULATED FOR THE SITE MATCHES THE APPROVED PEAK DISCHARGE PRESENTED IN THE 1995 DRAINAGE REPORT FOR THE PARCEL OF 6.6 CFS FOR THE 100-YEAR 6 HOUR EVENT.

Excess Precipitation, E (in.)			Peak Discharge (cfs/acre)		
Zone 2	100-Year	10-Year	Zone 2	100-Year	10-Year
Ea	0.53	0.13	Qa	1.56	0.38
Eb	0.78	0.28	Qb	2.28	0.95
Ec	1.13	0.52	Qc	3.14	1.71
Ed	2.12	1.34	Qd	4.70	3.14

Water Quality Volume - "First Flush Pond" - Redevelopment Site

Total Impervious Area =	ΣArea in "Treatment D"
Retainage depth = 0.28"	0.0233 foot
Retention Volume =	**=0.0233 x area** CF

Pipe Capacity

Pipe Number	D (in)	Slope (%)	Area (ft^2)	R	Q Provided (cfs)	Velocity (ft/s)
1	4	1.00	0.09	0.083	0.23	2.58
2	6	1.00	0.20	0.125	0.66	3.39
3	8	1.00	0.35	0.167	1.43	4.10
4	12	1.00	0.79	0.250	4.22	5.38
5	18	2.00	1.77	0.375	14.90	8.43

Manning's Equation:

Q = 1.49/n * A * R^(2/3) * S^(1/2)

A = Area

R = D/4

S = Slope

n = 0.011 PVC

n = 0.013 HDPE

CAUTION:

ALL EXISTING UTILITIES SHOWN WERE OBTAINED FROM RESEARCH, AS-BUILTS, SURVEYS OR INFORMATION PROVIDED BY OTHERS. IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO CONDUCT ALL NECESSARY FIELD INVESTIGATIONS PRIOR TO AND INCLUDING ANY EXCAVATION, TO DETERMINE THE ACTUAL LOCATION OF UTILITIES AND OTHER IMPROVEMENTS, PRIOR TO STARTING THE WORK. ANY CHANGES FROM THIS PLAN SHALL BE COORDINATED WITH AND APPROVED BY THE ENGINEER.

GRAPHIC SCALE

20 10 0 10 20

SCALE: 1"=20'

ENGINEER'S SEAL	MAVERICK INC. STORE ALBUQUERQUE, NM	DRAWN BY pm
	DRAINAGE PLAN	DATE 10-28-18
		DRAWING 2018039-GR
	TIERRA WEST, LLC 5571 MIDWAY PARK PL NE ALBUQUERQUE, NEW MEXICO 87109 (505) 858-3100 www.tierrawestllc.com	SHEET # D1
RONALD R. BOHANNAN P.E. #7868		JOB # 2018039

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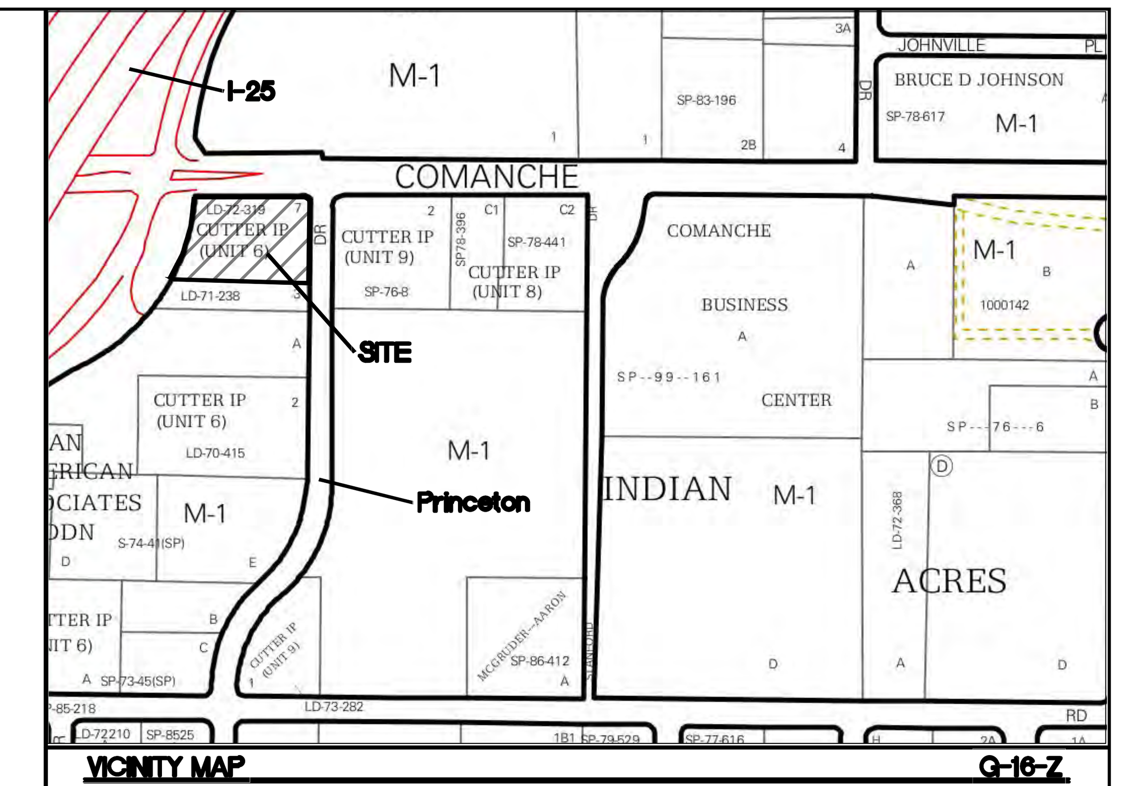

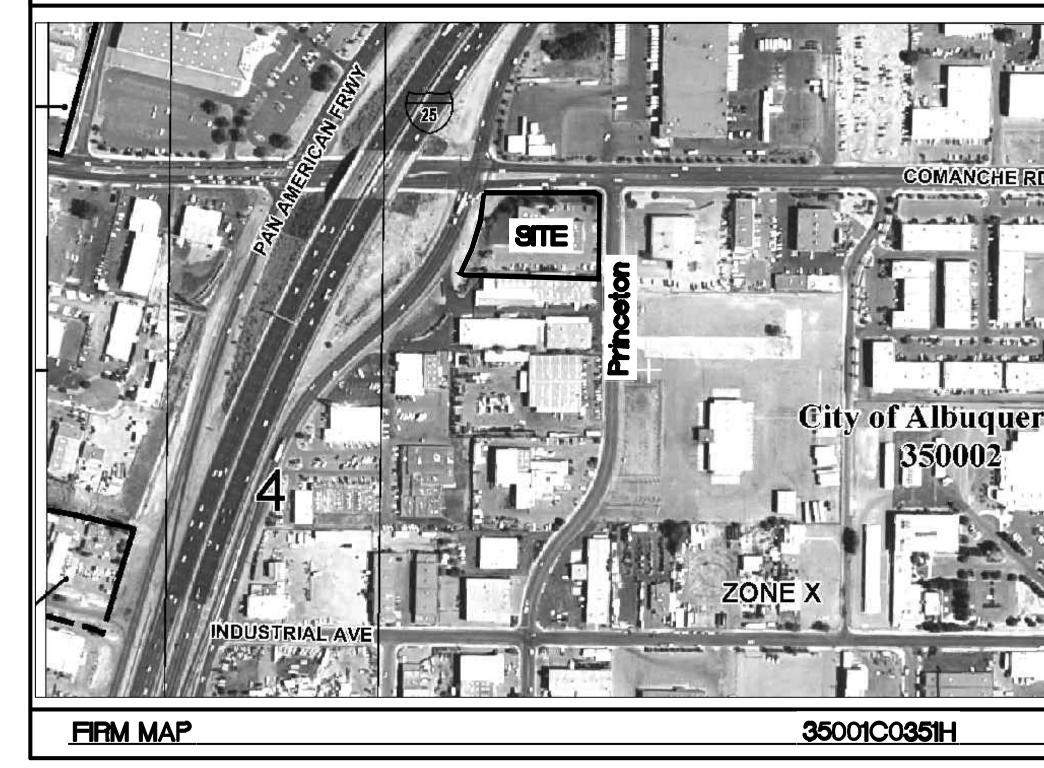

LEGEND

- CURB & GUTTER
- BOUNDARY LINE
- EASEMENT
- SIDEWALK
- 5010 CONTOUR MAJOR
- 5011 CONTOUR MINOR
- x 5048.25 SPOT ELEVATION
- FLOW ARROW
- EXISTING CURB & GUTTER
- 5010 EXISTING CONTOUR MAJOR
- 5011 EXISTING CONTOUR MINOR
- x 5048.25 EXISTING SPOT ELEVATION

N

GRAPHIC SCALE

20 10 0 10 20

SCALE: 1"=20'

CURRENT SITE DRAINAGE

NO OFFSITE FLOWS ENTER THE SITE. THE SITE IS BOUNDED BY DEVELOPED STREETS AND A BUILDING WAREHOUSE TO THE SOUTH. THE PROPERTY DRAINS TO PRINCETON DRIVE FROM THE EAST AND SOUTH SIDES; TO THE NORTH SIDE TO COMANCHE ROAD AND TO THE WEST TO THE I-25 FRONTAGE ROAD. THE ENTIRE SITE SHEET FLOWS TO THESE DISCHARGE LOCATIONS WITH NO DRAINAGE INFRASTRUCTURE INSTALLED. THE PEAK DISCHARGE CALCULATED FOR THE SITE MATCHES THE APPROVED PEAK DISCHARGE PRESENTED IN THE 1995 DRAINAGE REPORT FOR THE PARCEL OF 6.6 CFS FOR THE 100-YEAR 6 HOUR EVENT.

Basin Descriptions												100-Year, 6-Hr			10-Year, 6-Hr		
Basin ID	Area (sf)	Area (acres)	Area (sq miles)	Treatment A %	(acres)	Treatment B %	(acres)	Treatment C %	(acres)	Treatment D %	(acres)	Weighted E (in)	Volume (ac-ft)	Flow cfs	Weighted E (in)	Volume (ac-ft)	Flow cfs
1	22,935	0.53	0.00082	0%	0.000	50%	0.263	50%	0.263	0%	0.000	0.955	0.042	1.43	0.400	0.018	0.70
2	48,003	1.10	0.00172	0%	0.000	0%	0.000	0%	0.000	100%	1.102	2.120	0.195	5.18	1.340	0.123	3.46
Total	**70,937**	**1.63**	**0.003**		**0.000**		**0.263**		**0.263**		**1.102**		**0.237**	**6.606**		**0.141**	**4.161**

Excess Precipitation, E (in.)			Peak Discharge (cfs/acre)		
Zone 2	100-Year	10-Year	Zone 2	100-Year	10-Year
Ea	0.53	0.13	Qa	1.56	0.38
Eb	0.78	0.28	Qb	2.28	0.95
Ec	1.13	0.52	Qc	3.14	1.71
Ed	2.12	1.34	Qd	4.70	3.14

Equations:

Weighted E = Ea*Aa + Eb*Ab + Ec*Ac + Ed*Ad / (Total Area)

Volume = Weighted E * Total Area

Flow = Qa*Aa + Qb*Ab + Qc*Ac + Qd*Ad

CAUTION:
ALL EXISTING UTILITIES SHOWN WERE OBTAINED FROM RESEARCH, AS-BUILTS, SURVEYS OR INFORMATION PROVIDED BY OTHERS. IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO CONDUCT ALL NECESSARY FIELD INVESTIGATIONS PRIOR TO AND INCLUDING ANY EXCAVATION, TO DETERMINE THE ACTUAL LOCATION OF UTILITIES AND OTHER IMPROVEMENTS, PRIOR TO STARTING THE WORK. ANY CHANGES FROM THIS PLAN SHALL BE COORDINATED WITH AND APPROVED BY THE ENGINEER.

ENGINEER'S SEAL	MAVERICK INC. STORE ALBUQUERQUE, NM	DRAWN BY pm
	HISTORIC DRAINAGE PLAN	DATE 10-28-18
		DRAWING 2018039-GR
	TIERRA WEST, LLC 5571 MIDWAY PARK PL NE ALBUQUERQUE, NEW MEXICO 87109 (505) 858-3100 www.tierrawestllc.com	SHEET # D2
RONALD R. BOHANNAN P.E. #7868		JOB # 2018039

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Historic Conditions - See Basin Map Exhibit

Basin Descriptions												100-Year, 6-Hr			10-Year, 6-Hr		
Basin ID	Area (sf)	Area (acres)	Area (sq miles)	Treatment A		Treatment B		Treatment C		Treatment D		Weighted E (in)	Volume (ac-ft)	Flow cfs	Weighted E (in)	Volume (ac-ft)	Flow cfs
				%	(acres)	%	(acres)	%	(acres)	%	(acres)						
1	22,935	0.53	0.00082	0%	0.000	50%	0.263	50%	0.263	0%	0.000	0.955	0.042	1.43	0.400	0.018	0.70
2	48,003	1.10	0.00172	0%	0.000	0%	0.000	0%	0.000	100%	1.102	2.120	0.195	5.18	1.340	0.123	3.46
Total	**70,937**	**1.63**	**0.003**		**0.000**		**0.263**		**0.263**		**1.102**		**0.237**	**6.606**		**0.141**	**4.161**

DPM Weighted E Method & First Flush Volume

Precipitation Zone 2
Maverik C-Store and Light Vehicle Fueling Station
3737 Princeton Dr NE # 100, Albuquerque, NM 87107
TWLLC **Date** **8/15/2018**

Proposed Conditions - See Basin Map Exhibit

Basin Descriptions												100-Year, 6-Hr			10-Year, 6-Hr			Water Quality Volume	
Basin	Area	Area	Area	Treatment A		Treatment B		Treatment C		Treatment D		Weighted E	Volume	Flow	Weighted E	Volume	Flow	FF Pond	FF Pond
ID	(sf)	(acres)	(sq miles)	%	(acres)	%	(acres)	%	(acres)	%	(acres)	(in)	(ac-ft)	cfs	(in)	(ac-ft)	cfs	Required CF	Provided CF
1	4,793	0.11	0.00017	0%	0.000	100%	0.110	0%	0.000	0%	0.000	0.780	0.007	0.25	0.280	0.003	0.10	0	0
2	16,120	0.37	0.00058	0%	0.000	32%	0.118	0%	0.000	68%	0.252	1.691	0.052	1.45	1.001	0.031	0.90	255	660
3	1,477	0.03	0.00005	0%	0.000	100%	0.034	0%	0.000	0%	0.000	0.780	0.002	0.08	0.280	0.001	0.03	0	0
4	26,570	0.61	0.00095	0%	0.000	0%	0.000	0%	0.000	100%	0.610	2.120	0.108	2.87	1.340	0.068	1.92	619	800
5	9,939	0.23	0.00036	0%	0.000	16%	0.037	0%	0.000	84%	0.192	1.906	0.036	0.98	1.170	0.022	0.64	195	580
6	10,066	0.23	0.00036	0%	0.000	10%	0.023	90%	0.208	0%	0.000	1.095	0.021	0.71	0.496	0.010	0.38	0	0
7	1,440	0.03	0.00005	0%	0.000	100%	0.033	0%	0.000	0%	0.000	0.780	0.002	0.08	0.280	0.001	0.03	0	0
8	397	0.01	0.00001	0%	0.000	0%	0.000	0%	0.000	100%	0.009	2.120	0.002	0.04	1.340	0.001	0.03	9	0
9	135	0.00	0.00000	0%	0.000	0%	0.000	0%	0.000	100%	0.003	2.120	0.001	0.01	1.340	0.000	0.01	3	0
Total	**70,937**	**1.63**	**0.003**		**0.000**		**0.355**		**0.208**		**1.065**		**0.231**	**6.470**		**0.136**	**4.039**	**1,081**	**2,040**

Equations:

Weighted E = Ea*Aa + Eb*Ab + Ec*Ac + Ed*Ad / (Total Area)

Volume = Weighted E * Total Area

Flow = Qa*Aa + Qb*Ab + Qc*Ac + Qd*Ad

Excess Precipitation, E (in.)			Peak Discharge (cfs/acre)		
Zone 2	100-Year	10-Year	Zone 2	100-Year	10-Year
Ea	0.53	0.13	Qa	1.56	0.38
Eb	0.78	0.28	Qb	2.28	0.95
Ec	1.13	0.52	Qc	3.14	1.71
Ed	2.12	1.34	Qd	4.70	3.14

Water Quality Volume - "First Flush Pond"

Total Impervious Area =	ΣArea in "Treatment D"	
Retainage depth = 0.44"-0.1" = 0.34" =	0.0283	foot
Retention Volume =	**=0.0283 x area**	CF

Water Quality Volume - "First Flush Pond" - Redevelopment Site

Total Impervious Area =	ΣArea in "Treatment D"	
Retainage depth = 0.28"	0.0233	foot
Retention Volume =	**=0.0233 x area**	CF

Worksheet for 2' Concrete Sidewalk Culvert at 2% Slope

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02000	ft/ft
Normal Depth	0.50	ft
Section Definitions		

Station (ft)	Elevation (ft)
0+00	0.58
0+00	0.08
0+01	0.00
0+02	0.08
0+02	0.58

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.58)	(0+02, 0.58)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	6.97	ft³/s
Elevation Range	0.00 to 0.58 ft	
Flow Area	0.92	ft²
Wetted Perimeter	2.84	ft
Hydraulic Radius	0.32	ft
Top Width	2.00	ft
Normal Depth	0.50	ft
Critical Depth	0.76	ft

Worksheet for 2' Concrete Sidewalk Culvert at 2% Slope

Results

Critical Slope		0.00550	ft/ft
Velocity		7.61	ft/s
Velocity Head		0.90	ft
Specific Energy		1.40	ft
Froude Number		1.98	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.76	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.00550	ft/ft

Cross Section for 2% Slope

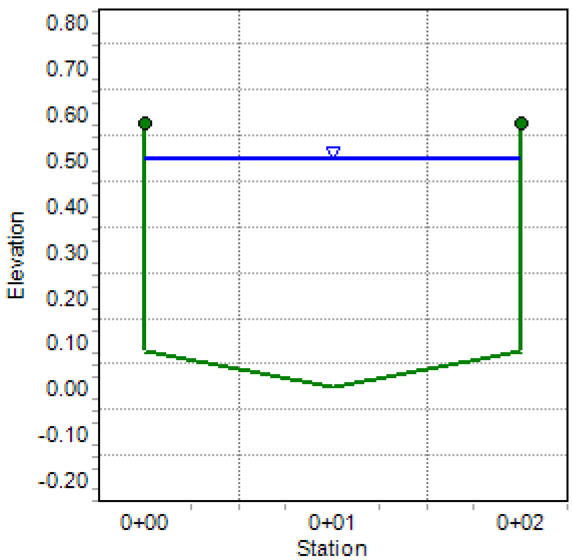
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02000	ft/ft
Normal Depth	0.50	ft
Discharge	6.97	ft³/s

Cross Section Image



Pipe Capacity

Pipe Number	D	Slope	Area	R	Q Provided	Velocity
	(in)	(%)	(ft^2)		(cfs)	(ft/s)
1	4	1.00	0.09	0.083	0.23	2.58
2	6	1.00	0.20	0.125	0.66	3.39
3	8	1.00	0.35	0.167	1.43	4.10
4	12	1.00	0.79	0.250	4.22	5.38
5	18	2.00	1.77	0.375	14.90	8.43

Manning's Equation:

Q = 1.49/n * A * R^(2/3) * S^(1/2)

A = Area

R = D/4

S = Slope

n = 0.011 PVC

n = 0.013 HDPE

CAPACITY OF SINGLE 'C' STORM DROP INLET

Capacity of the grate:

L = 47.375" - 2(6" $_{ends}$) - 14(½" $_{middle\ bars}$)
= 28.375"
= 2.365'

W = 30" - 13(½" $_{middle\ bars}$)
= 23.5"
= 1.958'

Area = 2.365' x 1.958'
= 4.63 ft^2

Effective Area = 4.63 – 4.63 (0.5 $_{clogging\ factor}$)
= 2.3 ft^2 at the grate

CHECK CAPACITY FOR MIN. H=0.10'

Orifice Equation
Q = CA sqrt(2gH)
Q = 0.6*2.3*sqrt(2*32.2*0.10)
Q = 3.50 cfs

Capacity of the throat:

L = 47-⅜"
= 3.948'

Weir Equation
Q = CLH^(3/2)
Q = 2.95 * 3.948 * 0.10^(3/2)
Q = 0.37 cfs

Total Capacity (FOR MIN. H=0.10'):

Q = 3.50_{grate} + 0.37_{throat}
Q = 3.87 cfs = Q $_{available}$

Curb Inlet Area "B4" Q $_{required}$ =2.87 cfs < Q $_{available}$, therefore **OK**.

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Nyloplast Grate Inlet Capacity Charts

These charts are based on equations from the USDOT/FAA Advisory Circular pertaining to Surface Drainage Design, AC No: AC150/5320-5C and the USDOT/FHWA Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22, Third Edition, Publication No. FHWA-NHI-10-009. Certain assumptions have been made, and no two installations will necessarily perform the same way. Safety factors should change with site conditions and is left to the discretion of the design engineer.








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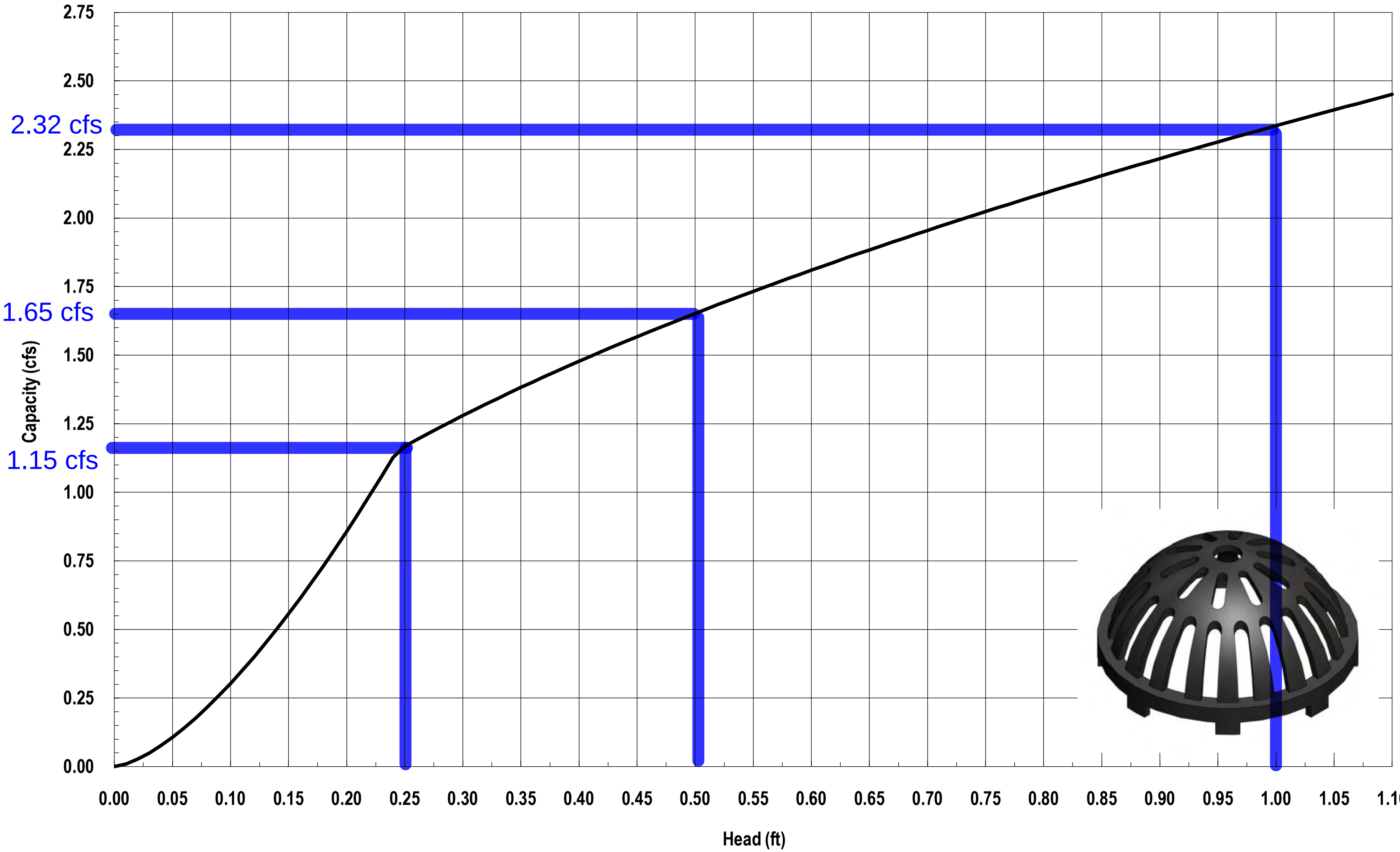
Nyloplast 12" Dome Grate Inlet Capacity Chart



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Worksheet for Concrete Weir at Water Quality Pond #3

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02000	ft/ft
Normal Depth	0.50	ft
Section Definitions		

Station (ft)	Elevation (ft)
0+00	2.00
0+02	1.50
0+04	1.50
0+06	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 2.00)	(0+06, 2.00)	0.012

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	17.50	ft³/s
Elevation Range	1.50 to 2.00 ft	
Flow Area	2.00	ft²
Wetted Perimeter	5.66	ft
Hydraulic Radius	0.35	ft
Top Width	5.50	ft
Normal Depth	0.50	ft
Critical Depth	0.82	ft
Critical Slope	0.00286	ft/ft

Worksheet for Concrete Weir at Water Quality Pond #3

Results

Velocity		8.75	ft/s
Velocity Head		1.19	ft
Specific Energy		1.69	ft
Froude Number		2.56	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.82	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.00286	ft/ft

Cross Section for Concrete Weir at Water Quality Pond #3

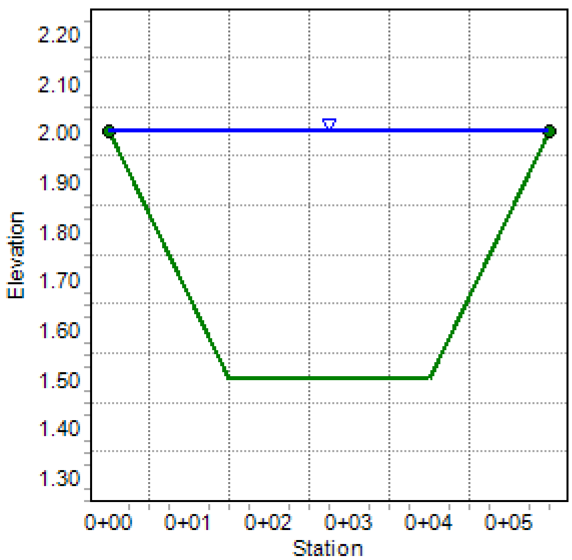
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02000	ft/ft
Normal Depth	0.50	ft
Discharge	17.50	ft³/s

Cross Section Image



Overflow Weir

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02000	ft/ft
Normal Depth	0.50	ft
Section Definitions		

Station (ft)	Elevation (ft)
0+00	2.00
0+02	1.50
0+04	1.50
0+06	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 2.00)	(0+06, 2.00)	0.069

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	3.04	ft³/s
Elevation Range	1.50 to 2.00 ft	
Flow Area	2.00	ft²
Wetted Perimeter	5.66	ft
Hydraulic Radius	0.35	ft
Top Width	5.50	ft
Normal Depth	0.50	ft
Critical Depth	0.31	ft
Critical Slope	0.11408	ft/ft

Overflow Weir

Results

Velocity		1.52	ft/s
Velocity Head		0.04	ft
Specific Energy		0.54	ft
Froude Number		0.44	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.31	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.11408	ft/ft

Cross Section for Irregular Section - 1

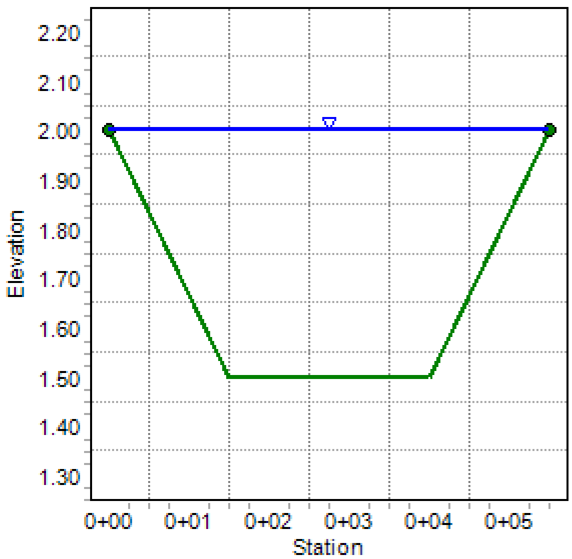
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02000	ft/ft
Normal Depth	0.50	ft
Discharge	3.04	ft^3/s

Cross Section Image



Worksheet for 2' Rock Riprap Rundown

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.10000	ft/ft
Normal Depth	0.83	ft
Section Definitions		

Station (ft)	Elevation (ft)
0+00	0.83
0+00	0.33
0+01	0.00
0+02	0.33
0+02	0.83

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.83)	(0+02, 0.83)	0.069

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	5.15	ft³/s
Elevation Range	0.00 to 0.83 ft	
Flow Area	1.33	ft²
Wetted Perimeter	3.11	ft
Hydraulic Radius	0.43	ft
Top Width	2.00	ft
Normal Depth	0.83	ft
Critical Depth	0.76	ft

Worksheet for 2' Rock Riprap Rundown

Results

Critical Slope		0.13928	ft/ft
Velocity		3.87	ft/s
Velocity Head		0.23	ft
Specific Energy		1.06	ft
Froude Number		0.84	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.83	ft
Critical Depth	0.76	ft
Channel Slope	0.10000	ft/ft
Critical Slope	0.13928	ft/ft

Cross Section for 2' Concrete Rundown

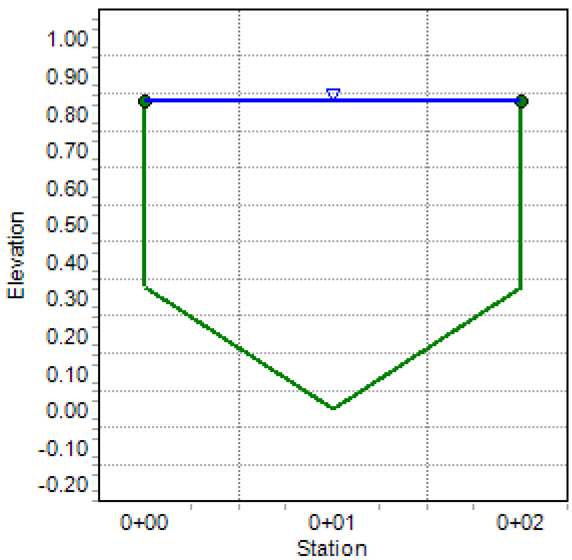
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.10000	ft/ft
Normal Depth	0.83	ft
Discharge	5.15	ft³/s

Cross Section Image



Worksheet for 2' Concrete Sidewalk Culvert at 2% Slope

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02000	ft/ft
Normal Depth	0.50	ft
Section Definitions		

Station (ft)	Elevation (ft)
0+00	0.58
0+00	0.08
0+01	0.00
0+02	0.08
0+02	0.58

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.58)	(0+02, 0.58)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	6.97	ft³/s
Elevation Range	0.00 to 0.58 ft	
Flow Area	0.92	ft²
Wetted Perimeter	2.84	ft
Hydraulic Radius	0.32	ft
Top Width	2.00	ft
Normal Depth	0.50	ft
Critical Depth	0.76	ft

Worksheet for 2' Concrete Sidewalk Culvert at 2% Slope

Results

Critical Slope		0.00550	ft/ft
Velocity		7.61	ft/s
Velocity Head		0.90	ft
Specific Energy		1.40	ft
Froude Number		1.98	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.76	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.00550	ft/ft

Cross Section for 2' Concrete Sidewalk Culvert at 2% Slope

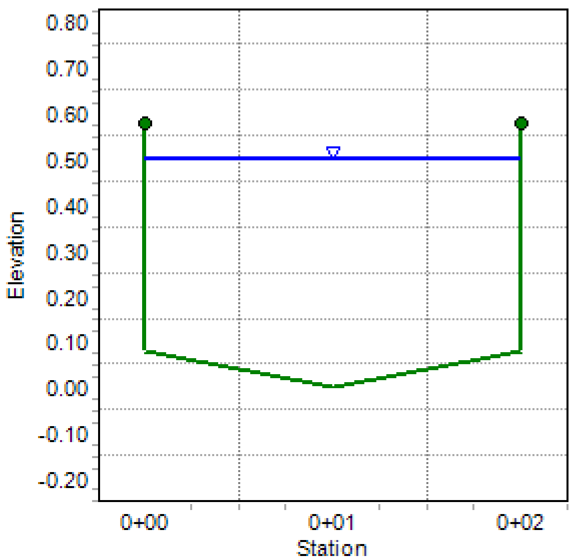
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02000	ft/ft
Normal Depth	0.50	ft
Discharge	6.97	ft³/s

Cross Section Image



APPENDIX B

LEGEND

DRAINAGE BASIN BOUNDARY

DRAINAGE BASIN BOUNDARY
OVERLAND FLOW-PMP STORM

STORM DRAIN

(160) SPECIAL ASSESSMENT DISTRICT PROPERTY IDENTIFICATION NUMBER

NOTES

TOTAL DRAINAGE AREA - 522 ACRES

DRAINAGE AREA
OVERLAND FLOW-PMP STORM - 52 ACRES

AS BUILT INFORMATION

CONTRACTOR BSC
WORK STAKED BY S. YOUTSEY DATE 6/1/01
INSPECTOR'S ACCEPTANCE BY LARKIN GRP DATE 6/1/01
FIELD VERIFICATION BY BCPWD/COA DATE 6/1/01
DRAWINGS CORRECTED BY LARKIN GRP DATE 4/02

MICRO-FILM INFORMATION

RECORDED BY DATE
NO

BENCH MARKS

ACS/NMHCS STA. "I-26-20"
BRASS TABLET SET IN CONCRETE POST LOCATED ON THE WESTERLY R.O.W. LINE OF I-25, 0.5 MILES SOUTHWESTERLY FROM THE INTERSECTION WITH MONTANO ROAD
ELEV. 5079.46
STATE PLANE COORDINATES: X= 390,403.88
Y= 1,502,304.95

SURVEY INFORMATION

FIELD NOTES		
NO.	BY	DATE

ENGINEER'S SEAL

REGISTERED PROFESSIONAL ENGINEER, STATE OF NEW MEXICO, JOHN A. ANDREWS

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS
ALBUQUERQUE 83-347 NEW MEXICO

NO.	DATE	REMARKS	BY

REVISIONS

DESIGN

DESIGNED BY DA, JA 12-98 DATE Jan. 1992
DRAWN BY TL, RP 12-98 DATE Jan 1992
CHECKED BY JA 12-98 DATE Feb. 1992

RECORD DRAWING
John A. Andrews

SCALE: 1"=300'

N

COUNTY OF BERNALILLO
PUBLIC WORKS DEPARTMENT

SPECIAL ASSESSMENT DISTRICT BC-83-1
SPECIAL ASSESSMENT DISTRICT 216

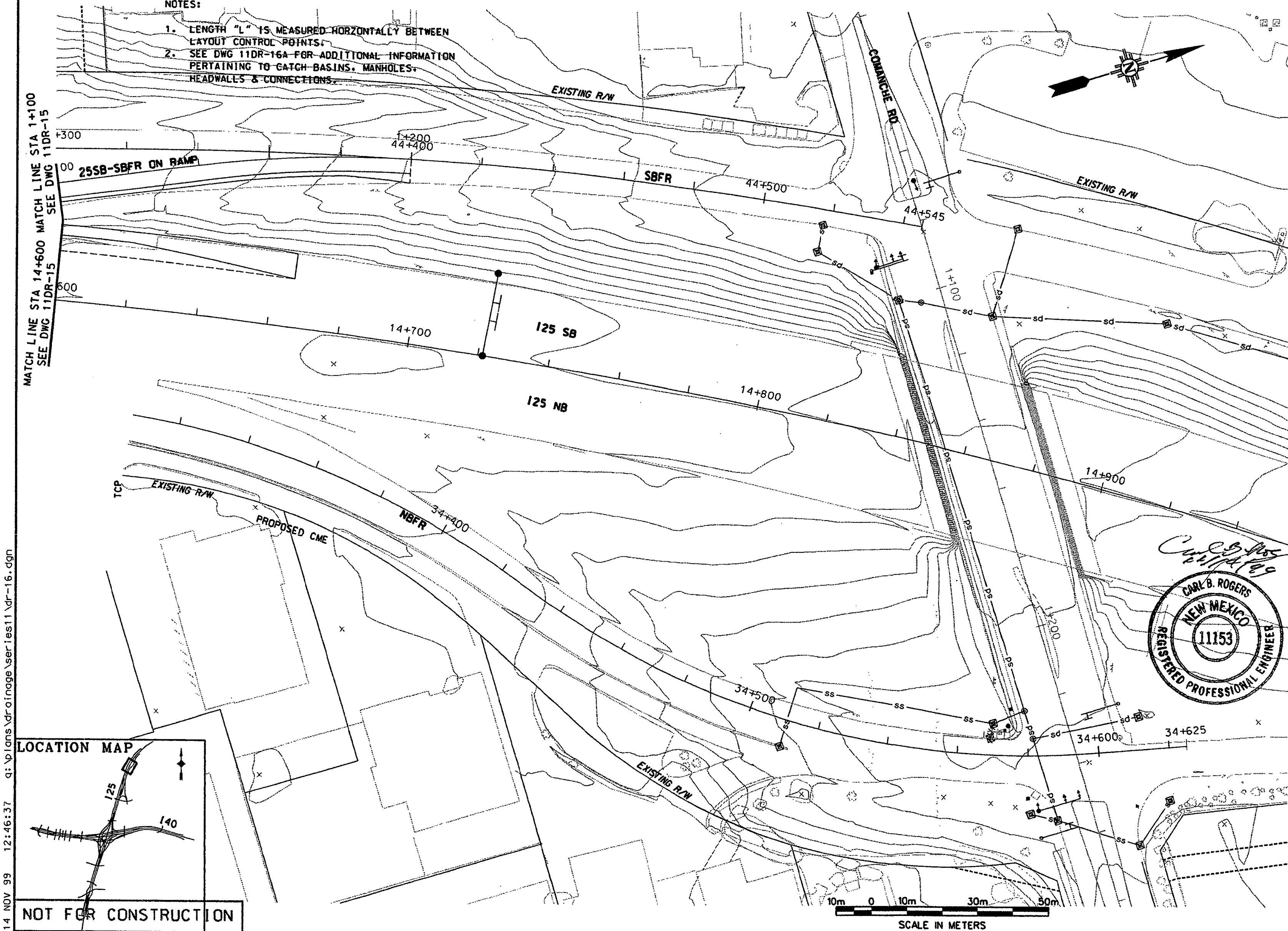
GRIEGOS DETENTION POND
LOCATION MAP & DRAINAGE AREA

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
DRC CHAIRMAN	APPROVED		WATER	APPROVED	
TRANSPORTATION	SEP 27 1999		WASTE WATER	SEP 27	
HYDROLOGY					
	DESIGN REVIEW COMMITTEE			CITY ENGINEER	

PROJECT NO. 3960 | MAP NO. G-15 | SHEET P-2 OF 13 | SHEET 17-2

NOTES:

1. LENGTH "L" IS MEASURED HORIZONTALLY BETWEEN LAYOUT CONTROL POINTS.
2. SEE DWG 11DR-16A FOR ADDITIONAL INFORMATION PERTAINING TO CATCH BASINS, MANHOLES, HEADWALLS & CONNECTIONS.



NOT FOR CONSTRUCTION

14 NOV 99 12:46:37 q:\plans\drainage\series11\dr-16.dgn

NO.	DATE	REV. BY	DESCRIPTION
	11-19-99		ISSUED FOR BID

REVISIONS (OR CHANGE NOTICES)

NEW MEXICO STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
I25/I40 SYSTEM INTERCHANGE - THE BIG I
FHWA REGION NO. 6 NEW MEXICO PROJECT NO. CN 0586 AC-MIP-(IM)-(TPU)-025-4(78)227

URS Greiner Woodward Clyde

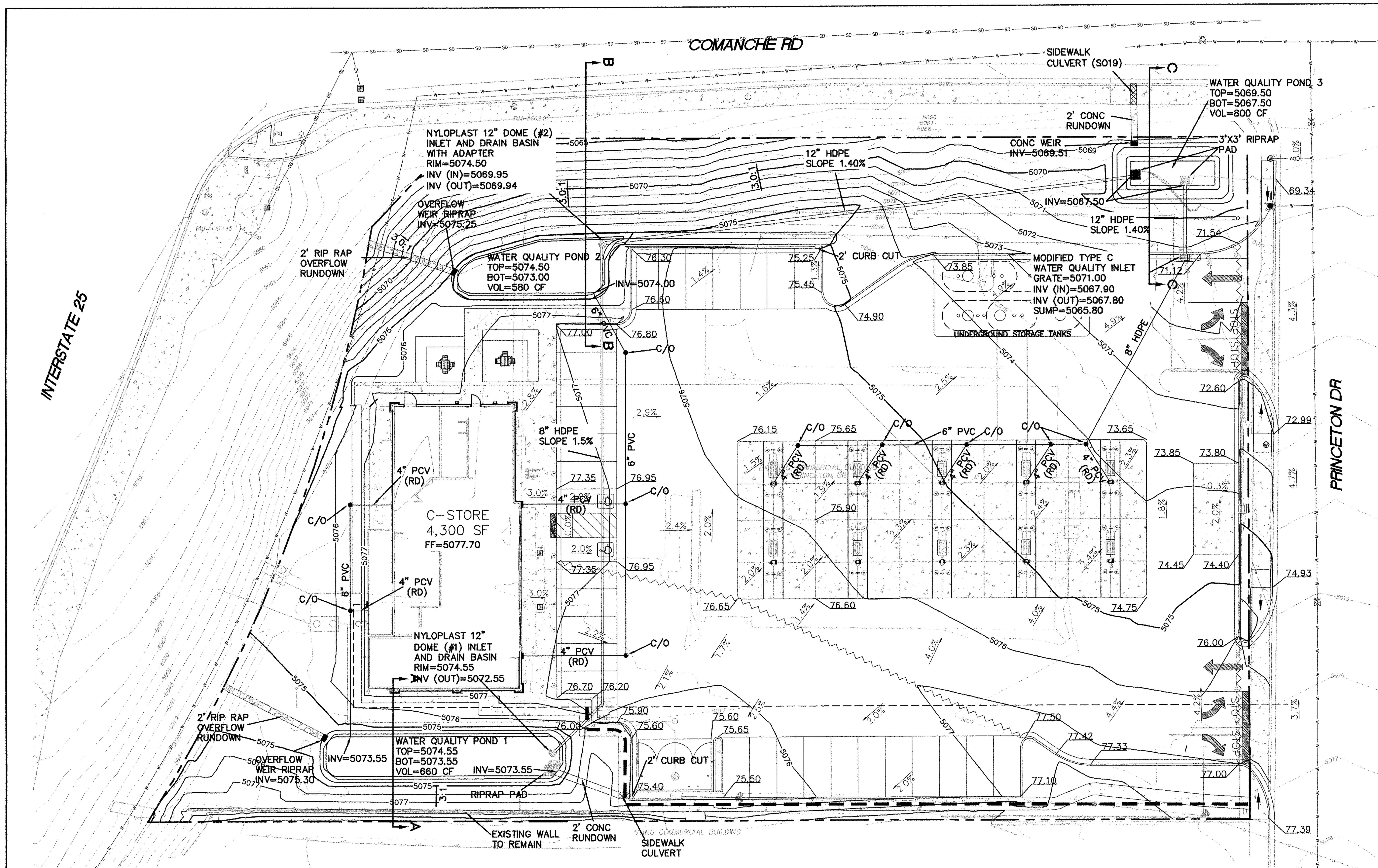
APPROVAL DATE	DDG 11/19/99	DESIGN DATE	LSR 11/19/99
ENGINEER DATE	CBR 11/19/99	DRAWN DATE	KPS 11/19/99

DRAINAGE PLANS

METRIC

SHEET NO.

DWG NO. 11DR-16

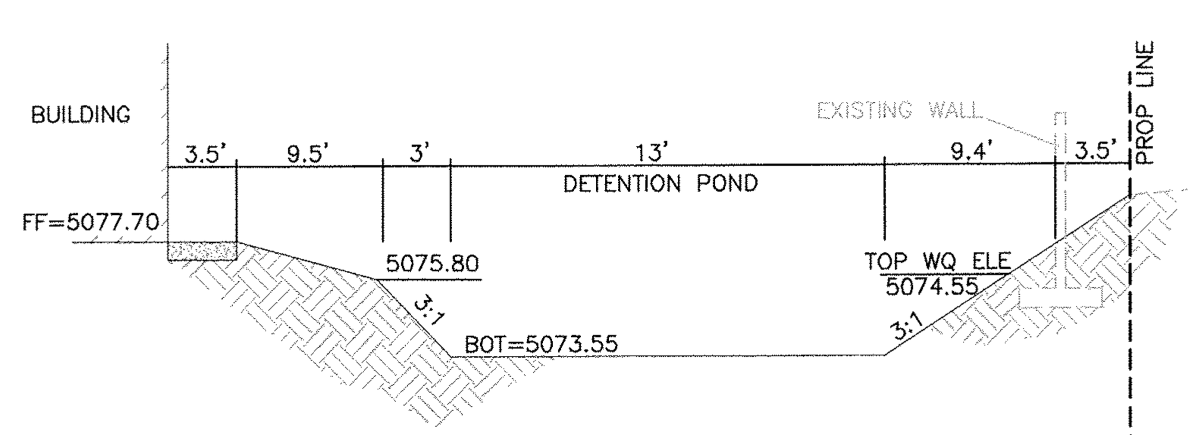


NOTICE TO CONTRACTORS

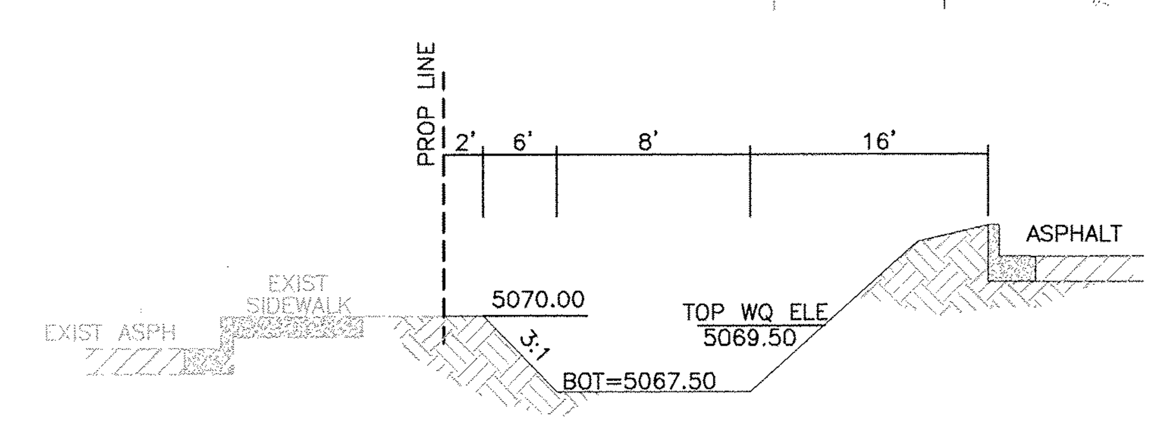
1. AN EXCAVATION/CONSTRUCTION PERMIT WILL BE REQUIRED BEFORE BEGINNING ANY WORK WITHIN CITY RIGHT-OF-WAY.
2. ALL WORK DETAILED ON THESE PLANS TO BE PERFORMED, EXCEPT AS OTHERWISE STATED OR PROVIDED HERON, SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY OF ALBUQUERQUE INTERIM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1985.
3. TWO WORKING DAYS PRIOR TO ANY EXCAVATION, THE CONTRACTOR MUST CONTACT NEW MEXICO ONE CALL, DIAL "811" [OR (505) 260-1990] FOR THE LOCATION OF EXISTING UTILITIES.
4. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL EXCAVATE AND VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL CONNECTIONS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL
5. NOTIFY THE ENGINEER SO THAT THE CONFLICT CAN BE RESOLVED WITH A MINIMUM AMOUNT OF DELAY.
6. BACKFILL COMPACTION SHALL BE ACCORDING TO TRAFFIC/STREET USE.
7. MAINTENANCE OF THESE FACILITIES SHALL BE THE RESPONSIBILITY OF THE OWNER OF THE PROPERTY SERVED.
8. WORK ON ARTERIAL STREETS SHALL BE PERFORMED ON A 24-HOUR BASIS.
9. CONTRACTOR MUST CONTACT JASON RODRIGUEZ AT 235-8016 AND CONSTRUCTION COORDINATION AT 924-3416 TO SCHEDULE AN INSPECTION.

EROSION CONTROL NOTES

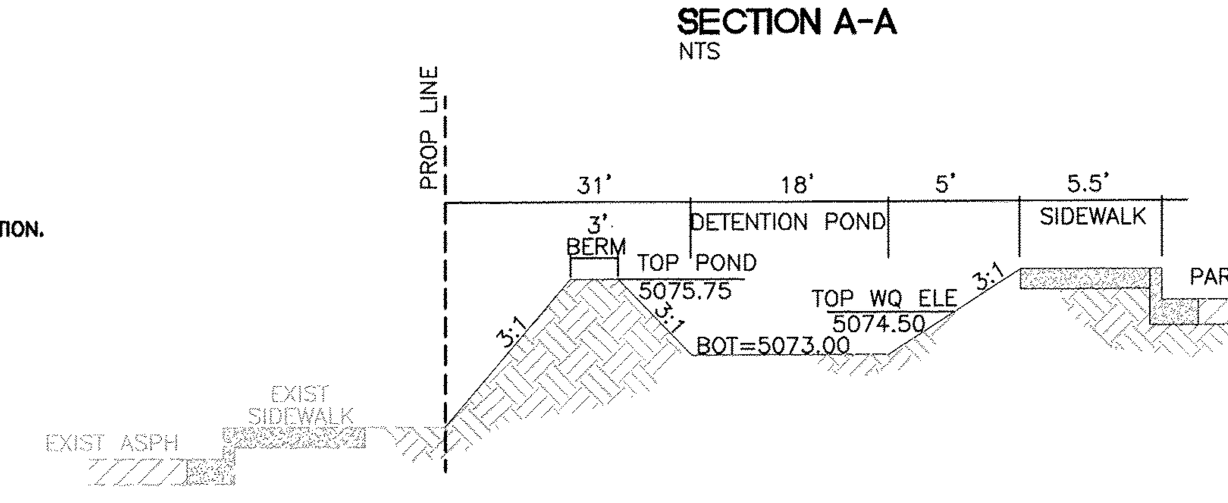
1. CONTRACTOR IS RESPONSIBLE FOR OBTAINING A TOPSOIL DISTURBANCE PERMIT PRIOR TO BEGINNING WORK.
2. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING RUN-OFF ON SITE DURING CONSTRUCTION.
3. CONTRACTOR IS RESPONSIBLE FOR CLEANING ALL SEDIMENT THAT GETS INTO EXISTING RIGHT-OF-WAY.
4. REPAIR OF DAMAGED FACILITIES AND CLEANUP OF SEDIMENT ACCUMULATIONS ON ADJACENT PROPERTIES AND IN PUBLIC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR.
5. ALL EXPOSED EARTH SURFACES MUST BE PROTECTED FROM WIND AND WATER EROSION PRIOR TO FINAL (CITY) ACCEPTANCE OF ANY PROJECT.



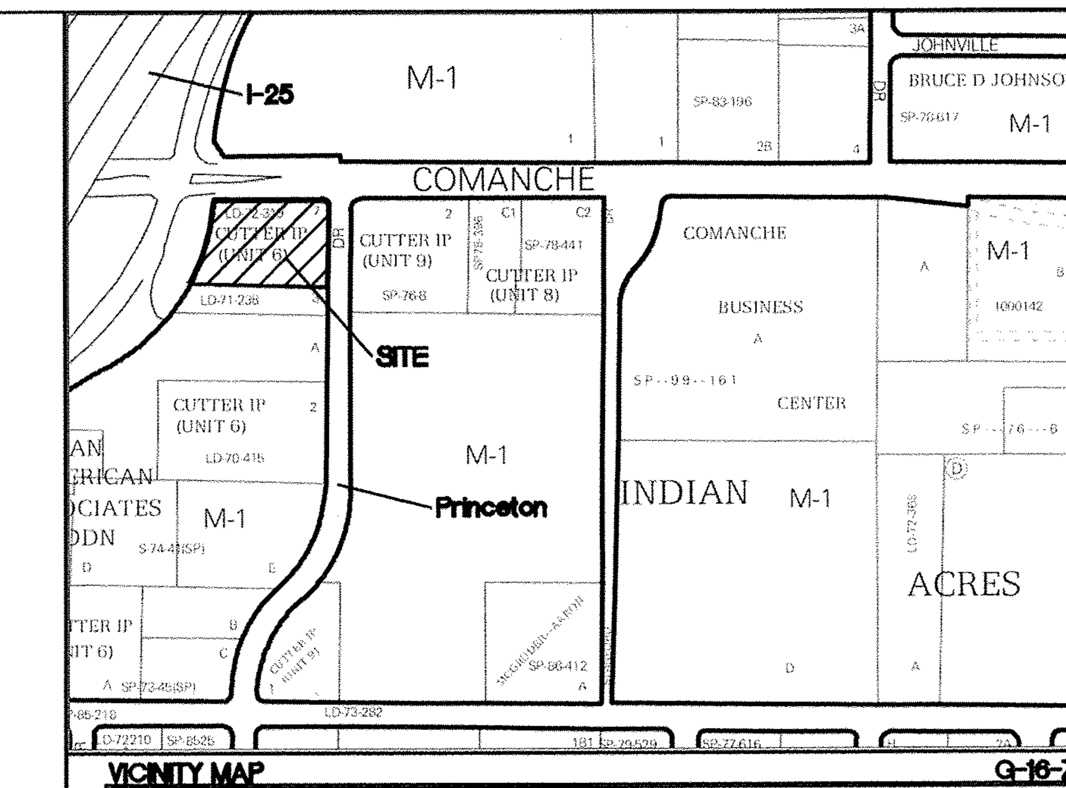
SECTION A-A
NTS



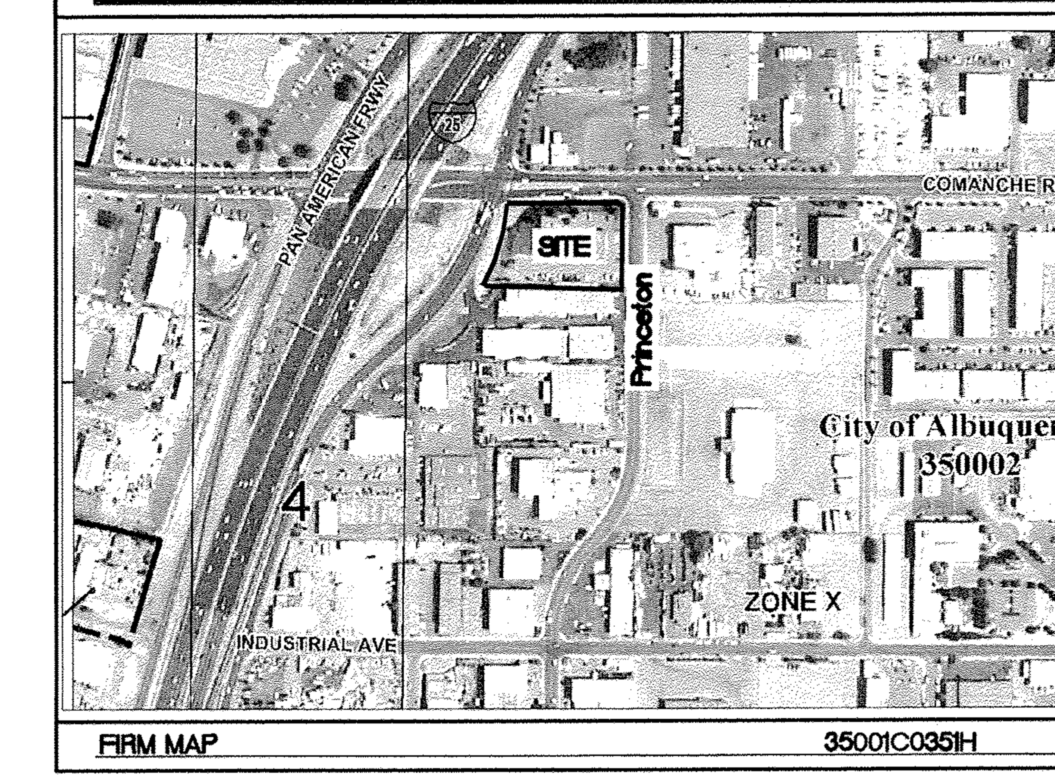
SECTION C-C
NTS



SECTION B-B
NTS



VICINITY MAP G-16-Z



FIRM MAP 35001C0351H

LEGEND

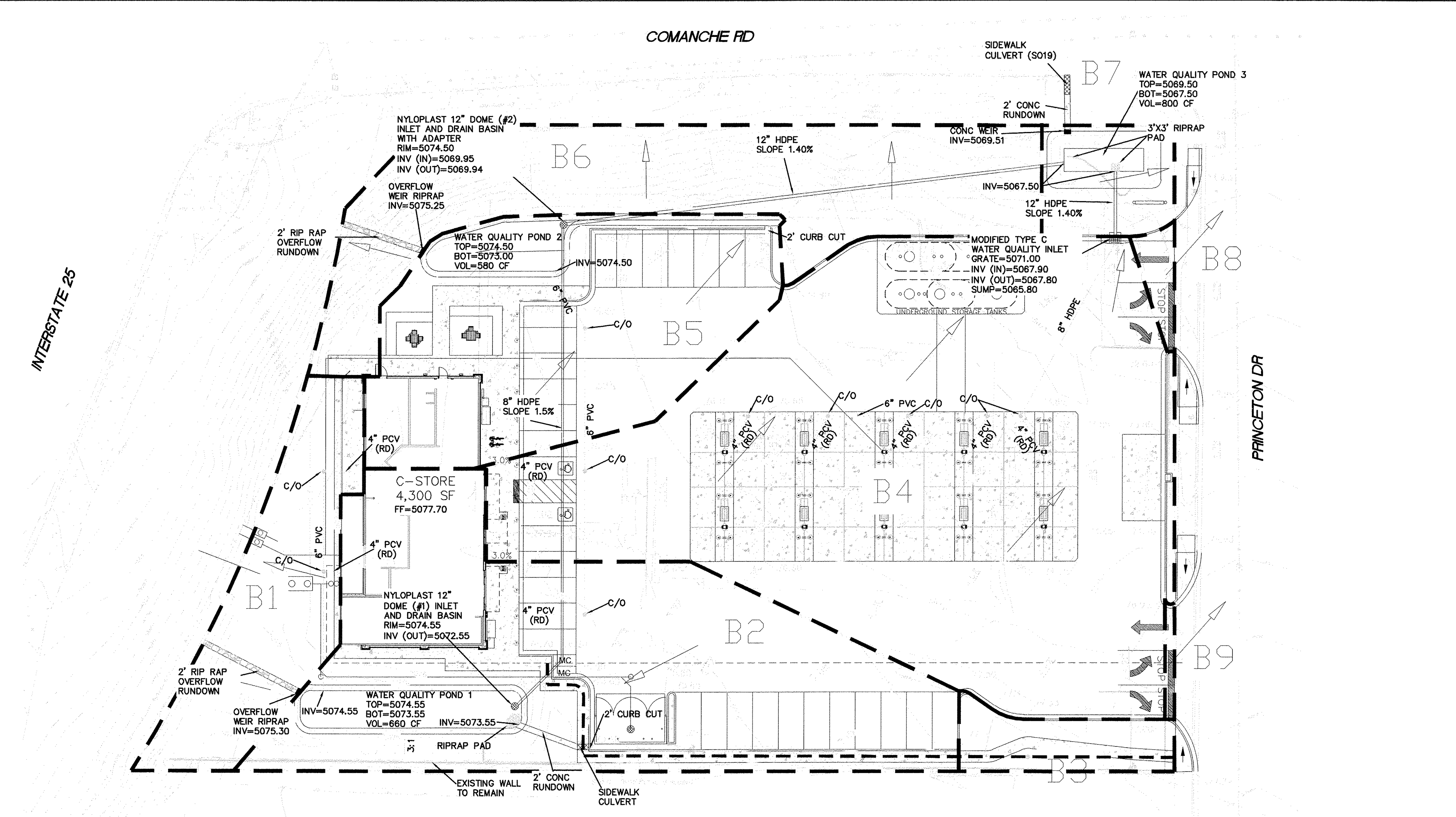
- CURB & GUTTER
- BOUNDARY LINE
- EASEMENT
- SIDEWALK
- 5010 CONTOUR MAJOR
- 5011 CONTOUR MINOR
- x 5048.25 SPOT ELEVATION
- FLOW ARROW
- EXISTING CURB & GUTTER
- 5010 EXISTING CONTOUR MAJOR
- 5011 EXISTING CONTOUR MINOR
- x 5048.25 EXISTING SPOT ELEVATION
- WATER BLOCK
- ACCESSIBLE PATH
- OVERFLOW RIPRAP/CONCRETE WEIR 2.0'W, 0.5'H, 3:1 SIDES

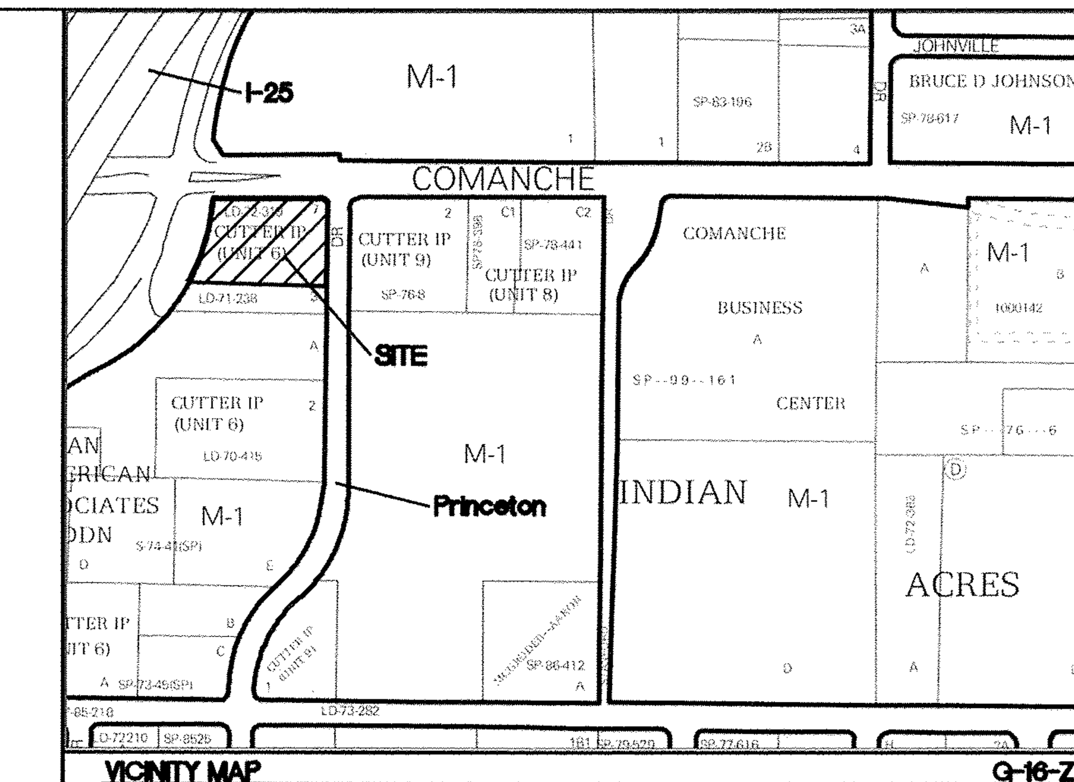
N

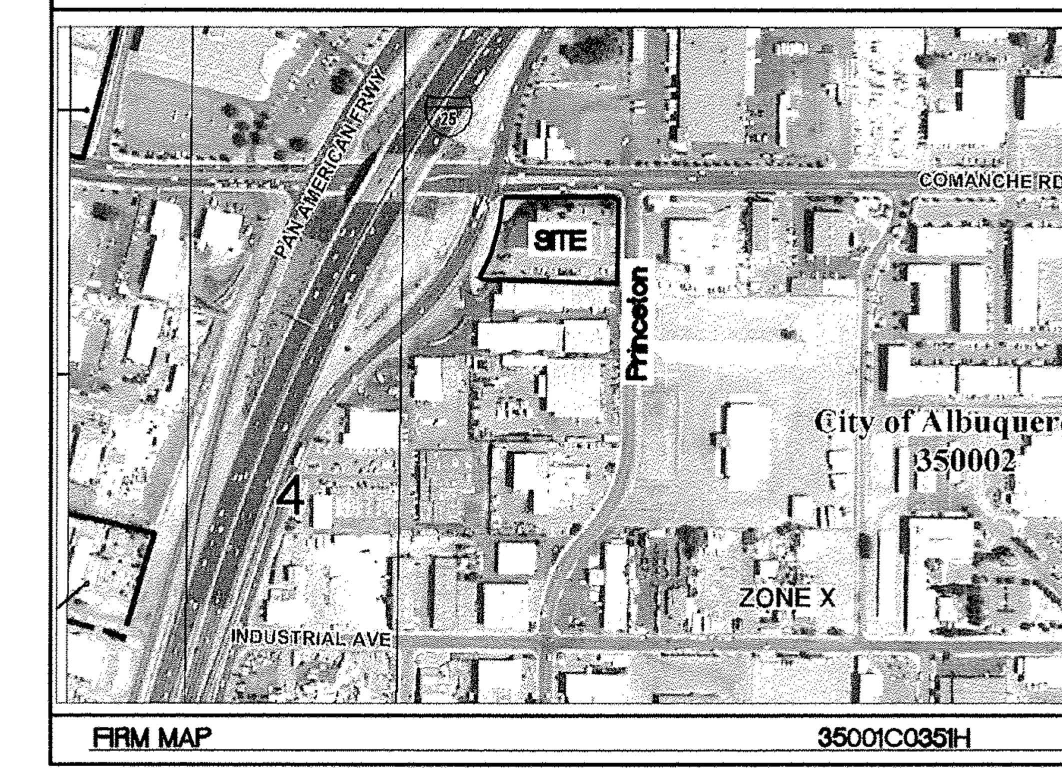
GRAPHIC SCALE
20 10 0 10 20
SCALE: 1"=20'

CAUTION:
ALL EXISTING UTILITIES SHOWN WERE OBTAINED FROM RESEARCH, AS-BUILTS, SURVEYS OR INFORMATION PROVIDED BY OTHERS. IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO CONDUCT ALL NECESSARY FIELD INVESTIGATIONS PRIOR TO AND INCLUDING ANY EXCAVATION, TO DETERMINE THE ACTUAL LOCATION OF UTILITIES AND OTHER IMPROVEMENTS, PRIOR TO STARTING THE WORK. ANY CHANGES FROM THIS PLAN SHALL BE COORDINATED WITH AND APPROVED BY THE ENGINEER.

ENGINEER'S SEAL RONALD R. BOHANNAN NEW MEXICO 7868 REGISTERED PROFESSIONAL ENGINEER	MAVERICK INC. STORE ALBUQUERQUE, NM	DRAWN BY pm
		DATE 10-28-18
	GRADING AND DRAINAGE PLAN	DRAWING 2018039-GR
	TIERRA WEST, LLC 5571 MIDWAY PARK PL NE ALBUQUERQUE, NEW MEXICO 87109 (505) 858-3100 www.tierrawestllc.com	SHEET # C5
RONALD R. BOHANNAN P.E. #7868		JOB # 2018039







LEGEND

- CURB & GUTTER
- BOUNDARY LINE
- EASEMENT
- SIDEWALK
- 5010 CONTOUR MAJOR
- 5011 CONTOUR MINOR
- x 5048.25 SPOT ELEVATION
- FLOW ARROW
- EXISTING CURB & GUTTER
- EXISTING CONTOUR MAJOR
- 5011 EXISTING CONTOUR MINOR
- x 5048.25 EXISTING SPOT ELEVATION
- WATER BLOCK
- ACCESSIBLE PATH
- DRAINAGE BASINS

PROPOSED DRAINAGE SOLUTION

THE EXPECTED TOTAL RUNOFF FROM THE SITE FOR THE 100–YEAR 6 HOUR EVENT IS 6.47 CFS WITH A VOLUME OF 0.231 AC–FT. ROOF DRAINS WILL COLLECT RUNOFF FROM THE PROPOSED C–STORE AND DISCHARGE DIRECTLY INTO THE FIRST FLUSH BASINS. PER DPM CHAPTER 22.9.E, TABLE 1 ALL FUELING STATIONS MUST DEMONSTRATE CONTROL OF OIL FROM VEHICLE PARKING AREAS. BASIN B4 COVERS THE MAJORITY OF THE PAVEMENT AREA, INCLUDING ALL OF THE SHEET FLOW GENERATED FROM THE RE–FUELING AREA UNDER THE CANOPY, AND SHEET FLOW IS DIRECTED TO A SINGLE MODIFIED OIL–WATER SEPARATOR TYPE C CURB INLET AT THE NORTH EAST CORNER OF THE SITE. THE CURB INLET HAS THE CAPACITY OF 3.87 CFS AND WILL CONVEY THE CALCULATED 2.87 CFS THAT WILL FLOW TO INLET. THE SINGLE INLET WILL BE MODIFIED TO INCLUDE A 24–INCH DEEP SUMP BOX AND INSTALLATION OF A BAFFLE PLATE TO RESTRICT THE PASSING OF TRASH WITH A 12–INCH BY 12–INCH EXFILTRATION OPENING AT THE BASE OF THE CONCRETE BOX TO RELEASE THE STORMWATER HELD IN THE SUMP. FOR THE DESIGNED SUMP DEPTH OF 24–INCHES THE BOX INLET WILL RETAIN 130 GALLONS WHICH IS ADEQUATE FOR ANY MAJOR FUEL SPILL/S THAT MAY OCCUR DURING OPERATIONS AT THE SITE. DURING REGULAR SITE MAINTENANCE THE INLET SHALL BE CLEANED OF DEBRIS AND SEDIMENT THAT ACCUMULATES OVER TIME IN THE SUMP.

A 12–INCH STORM DRAIN IS CONNECTED TO THE INLET BOX AND DISCHARGES THE TREATED STORMWATER DIRECTLY TO THE FIRST FLUSH POND LOCATED AT THE NORTH EAST CORNER OF THE PARCEL. THE WATER QUALITY POND #3 WILL RETAIN A VOLUME OF 800 CUBIC FEET BEFORE RELEASING THE ADDITIONAL FLOW TO COMANCHE ROAD RIGHT–OF–WAY THROUGH A CONCRETE WEIR AND A 2–FOOT CONCRETE RUNDOWN / SIDEWALK CULVERT CONFORMING TO THE S019 PERMIT. ALL OTHER SITE RUNOFF GENERATED FROM THE PERVIOUS AREAS (BASINS B2, B4 AND B5) WILL BE CONVEYED AS SURFACE FLOWS TO THE ON–SITE CURB AND GUTTERS AND BE RELEASED VIA CURB CUTS TO THE RESPECTIVE FIRST FLUSH PONDS.

THE POND #1 HAS THE CAPACITY TO RETAIN A VOLUME OF 660 CUBIC FEET. AT THE DESIGNED INLET ELEVATION ADDITIONAL FLOW SHALL ENTER THE PROPOSED NYLOPLAST 12–INCH DOME INLET AND DRAIN BASIN AND BE CONVEYED THROUGH AN 8–INCH HDPE STORM PIPE. THIS STORM PIPE IS CONNECTED TO THE NYLOPLAST 12–INCH DOME INLET PROPOSED AT THE WATER QUALITY POND #2. THIS POND IS ASSOCIATED WITH THE RUNOFF FROM BASIN B5 WHICH TOTALS 0.98 CFS. IN THE CASE OF A BLOCKAGE AT AN INLET, EMERGENCY OVERFLOW RIPRAP RUNDOWNS ARE PROPOSED. THE WATER QUALITY POND #2 HAS THE CAPACITY TO RETAIN A VOLUME OF 580 CUBIC FEET. AT THE DESIGNED INLET ELEVATION THE ADDITIONAL FLOW SHALL ENTER THE INLET AND INTO THE 12–INCH HDPE STORM DRAIN. THIS STORM DRAIN PASSES THE ADDITIONAL FLOWS FROM BASINS B2 AND B5, A TOTAL OF 2.44 CFS. ALL SITE RUNOFF GENERATED FROM THE LANDSCAPED SLOPE AREAS (BASINS B1 AND B6) WILL FREELY DISCHARGE TO THE NORTH AND WEST INTO THE RESPECTIVE RIGHT–OF–WAYS. A SMALL PORTION OF RUNOFF TOTALING 0.05 CFS DISCHARGES DIRECTLY INTO THE PRINCETON DRIVE RIGHT–OF–WAY AT THE DRIVEWAY ENTRANCES (BASINS B8 AND B9). NO OFFSITE DRAINAGE IMPROVEMENTS ARE PROPOSED IN THE DOT RIGHT–OF–WAY.

Basin Descriptions												100-Year, 6-Hr			10-Year, 6-Hr			Water Quality Volume	
Basin	Area	Area	Area	Treatment A		Treatment B		Treatment C		Treatment D		Weighted E	Volume	Flow	Weighted E	Volume	Flow	FF Pond	FF Pond
ID	(sf)	(acres)	(sq miles)	%	(acres)	%	(acres)	%	(acres)	%	(acres)	(in)	(ac-ft)	cfs	(in)	(ac-ft)	cfs	Required CF	Provided CF
1	4,793	0.11	0.00017	0%	0.000	100%	0.110	0%	0.000	0%	0.000	0.780	0.007	0.25	0.280	0.003	0.10	0	0
2	16,120	0.37	0.00058	0%	0.000	32%	0.118	0%	0.000	68%	0.252	1.691	0.052	1.45	1.001	0.031	0.90	255	660
3	1,477	0.03	0.00005	0%	0.000	100%	0.034	0%	0.000	0%	0.000	0.780	0.002	0.08	0.280	0.001	0.03	0	0
4	26,570	0.61	0.00095	0%	0.000	0%	0.000	0%	0.000	100%	0.610	2.120	0.108	2.87	1.340	0.068	1.92	619	800
5	9,939	0.23	0.00036	0%	0.000	16%	0.037	0%	0.000	84%	0.192	1.906	0.036	0.98	1.170	0.022	0.64	195	580
6	10,066	0.23	0.00036	0%	0.000	10%	0.023	90%	0.208	0%	0.000	1.095	0.021	0.71	0.496	0.010	0.38	0	0
7	1,440	0.03	0.00005	0%	0.000	100%	0.033	0%	0.000	0%	0.000	0.780	0.002	0.08	0.280	0.001	0.03	0	0
8	397	0.01	0.00001	0%	0.000	0%	0.000	0%	0.000	100%	0.009	2.120	0.002	0.04	1.340	0.001	0.03	9	0
9	135	0.00	0.00000	0%	0.000	0%	0.000	0%	0.000	100%	0.003	2.120	0.001	0.01	1.340	0.000	0.01	3	0
Total	**70,937**	**1.63**	**0.003**		**0.000**		**0.355**		**0.208**		**1.065**		**0.231**	**6.470**		**0.136**	**4.039**	**1,081**	**2,040**

CURRENT SITE DRAINAGE

NO OFFSITE FLOWS ENTER THE SITE. THE SITE IS BOUNDED BY DEVELOPED STREETS AND A BUILDING WAREHOUSE TO THE SOUTH. THE PROPERTY DRAINS TO PRINCETON DRIVE FROM THE EAST AND SOUTH SIDES; TO THE NORTH SIDE TO COMANCHE ROAD AND TO THE WEST TO THE I–25 FRONTAGE ROAD. THE ENTIRE SITE SHEET FLOWS TO THESE DISCHARGE LOCATIONS WITH NO DRAINAGE INFRASTRUCTURE INSTALLED. THE PEAK DISCHARGE CALCULATED FOR THE SITE MATCHES THE APPROVED PEAK DISCHARGE PRESENTED IN THE 1995 DRAINAGE REPORT FOR THE PARCEL OF 6.6 CFS FOR THE 100–YEAR 6 HOUR EVENT.

Excess Precipitation, E (in.)			Peak Discharge (cfs/acre)		
Zone 2	100-Year	10-Year	Zone 2	100-Year	10-Year
Ea	0.53	0.13	Qa	1.56	0.38
Eb	0.78	0.28	Qb	2.28	0.95
Ec	1.13	0.52	Qc	3.14	1.71
Ed	2.12	1.34	Qd	4.70	3.14

Water Quality Volume - "First Flush Pond" - Redevelopment Site

Total Impervious Area =	ΣArea in "Treatment D"	
Retainage depth = 0.28"	0.0233	foot
Retention Volume =	**=0.0233 x area**	CF

Pipe Capacity

Pipe	D	Slope	Area	R	Q Provided	Velocity	Q Required
	(in)	(%)	(ft^2)		(cfs)	(ft/s)	(cfs)
PVC	4	1.00	0.09	0.083	0.23	2.58	-
PVC	6	1.00	0.20	0.125	0.66	3.39	-
HDPE	8	1.50	0.35	0.167	1.48	4.25	1.45
HDPE	12	1.40	0.79	0.250	4.23	5.38	2.44
HDPE	12	1.85	0.79	0.250	4.86	6.19	2.87

Manning's Equation:

Q = 1.49/n * A * R^(2/3) * S^(1/2)

A = Area
R = D/4
S = Slope
n = 0.011 PVC
n = 0.013 HDPE

CAUTION:

ALL EXISTING UTILITIES SHOWN WERE OBTAINED FROM RESEARCH, AS–BUILTS, SURVEYS OR INFORMATION PROVIDED BY OTHERS. IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO CONDUCT ALL NECESSARY FIELD INVESTIGATIONS PRIOR TO AND INCLUDING ANY EXCAVATION, TO DETERMINE THE ACTUAL LOCATION OF UTILITIES AND OTHER IMPROVEMENTS, PRIOR TO STARTING THE WORK. ANY CHANGES FROM THIS PLAN SHALL BE COORDINATED WITH AND APPROVED BY THE ENGINEER.

N

GRAPHIC SCALE

20 10 0 10 20

SCALE: 1"=20'

ENGINEER'S SEAL	MAVERICK INC. STORE ALBUQUERQUE, NM	DRAWN BY pm
RONALD R. BOHANNAN NEW MEXICO 7868 REGISTERED PROFESSIONAL ENGINEER	DRAINAGE PLAN	DATE 10-28-18
		DRAWING 2018039-GR
	TIERRA WEST, LLC 5571 MIDWAY PARK PL NE ALBUQUERQUE, NEW MEXICO 87109 (505) 858-3100 www.tierrawestllc.com	SHEET # D1
RONALD R. BOHANNAN P.E. #7868		JOB # 2018039