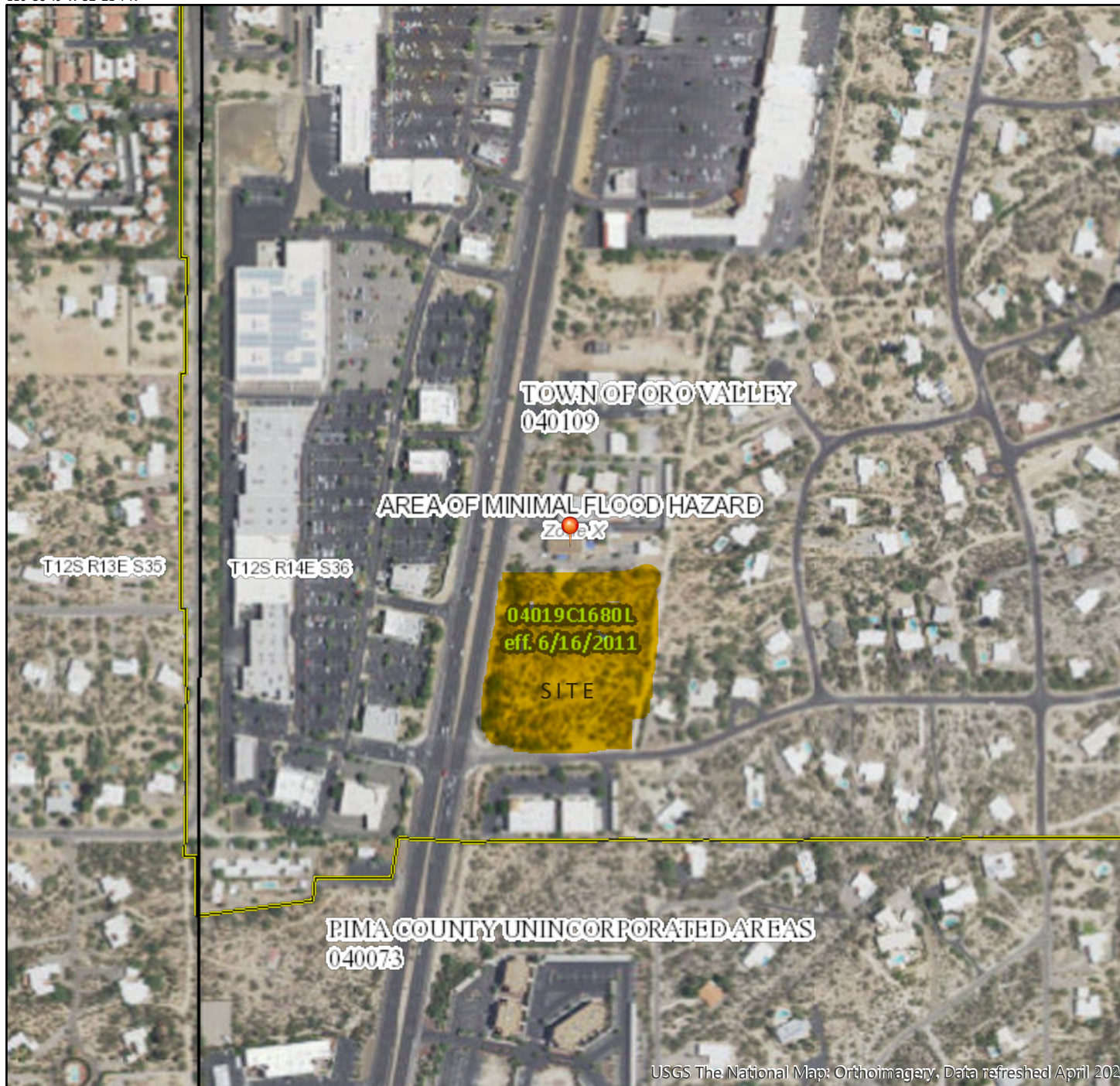


National Flood Hazard Layer FIRMette



110°58'49"W 32°21'4"N



0 250 500 1,000 1,500 2,000 Feet

USGS The National Map: Orthoimagery. Data refreshed April 2020

1:6,000

110°58'12"W 32°20'33"N

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
MAP PANELS		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/20/2020 at 10:11 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

PRE-DEVELOPMENT HYDROLOGY

A. Offsite Watershed

There are several offsite watersheds impacting the project site. The largest offsite watershed, denoted E1.3 on the Offsite Watershed Map, arrives onsite at the midpoint of the eastern boundary as a natural watercourse through a low density, suburban neighborhood. This watershed is 77 acres in size and generates up to 400cfs during a 100-year event. Once the stormwater enters the site it flows southwest and is directed toward an existing 6' x 5' reinforced concrete box culvert RCBC located at the northeast quadrant of the intersection of Oracle Road with Suffolk Drive. A berm along the left bank directs the flow directly to the culvert. Offsite watershed E1.1 is 2.4 acres in size and generates up to 19.2cfs from Suffolk Drive and surrounding terrain including the commercial development to the south. This runoff arrives onsite at the south and southeast corner of the site, at multiple low points in the roadway. Offsite watershed E 1.2 is 1 acre in size with an estimated 7.8cfs during a 100-year event. Stormwater runoff from this watershed arrives at the eastern boundary at a dip section within the dirt road/easement. This runoff flows westward, on the south side of the berm toward a 24" culvert at the northeast corner of Oracle Road with Suffolk Drive. Offsite watershed E1.4 is runoff from the north, adjacent commercial development. A total runoff of 10cfs arrives at 5 different points along the northern boundary, at low points and/or curb openings (*see Offsite Watershed Map and Existing Conditions Watershed Map for E1.4 sub-watershed locations*).

B. Basin Designation

Per Section 11.3 of the Oro Valley Drainage Criteria Manual, "all basins within the Town of Oro Valley shall be considered Critical Basins." As a result of this Critical Basin designation, the 100-year flood stormwater flows exiting the site in the proposed condition are required to match the existing condition flows, or be reduced by means of detention and/or other rainwater harvesting techniques.

C. Offsite Features

There are no significant off-site features, other than the wash that passes through the site, with watersheds that are affected by or that affect the site.

D. Offsite Regulatory Watercourse

The wash that passes through the site has been determined to as have a 100-year peak discharge of 400cfs where it arrives at the center of the eastern site boundary.

E. Well Sites

According to the Arizona Department of Water Resources (ADWR), there are no wells registered on or within 100 feet of the project site.

F. Onsite Hydrology

The Parcel lies within an area of predominantly desert brush and cactus ground cover vegetation and dense mature trees. The northern 2/3 of the site (north of the watercourse) is on a gentle hillside that slopes from north and east/southwest with an average slope of 4 %. The lower 1/3 of the site (south of the watercourse) slopes from east to west with an average slope of 2.5%. Soils within the site are 100% hydrologic soil group "D", as classified by the Natural Resource Conservation Service (NRCS).

According to the Federal Emergency Management Agency Flood Insurance Rate Map Panel FM04019C1680L, dated June 16, 2011, the Parcel is located in un-shaded Zone X, which is an area determined to be outside the 500-year floodplain.

The site was analyzed as a single watershed since all runoff reports to the culvert just outside of the southwest corner of the site. This site is 4.5acres and generates up to 31cfs during a 100-year event.

The following table summarizes the existing conditions hydrology for the project site;

Rainfall Event	Flow rate (cfs)
2-Year	7.1
10-Year	15.9
25-Year	21.4
50-Year	25.8
100-Year	30.6

Total onsite runoff from the site is 30.6cfs (*see Existing Onsite Watershed Map*), excluding the aforementioned 400cfs conveyed through the site in the un-named watercourse.

G. Drainage Conditions Downstream

All runoff from onsite and offsite, a combined total of 468cfs arrives at the Culvert(s) as previously described. The box culvert has the capacity to convey to convey 300cfs. The remaining stormwater overtops Suffolk Drive, which is in a sump condition just east of the intersection, where some pooling occurs within the street as it flows south across the street and into the road-side ditch within the Oracle Road corridor and continues south. Flow through the box culvert is conveyed under Oracle Road, outlets briefly on the west side of Oracle Road and immediately enters into another box culvert under a commercial development and continues westward.

POST-DEVELOPMENT HYDROLOGY

A. Development Plan Hydrology

In the developed condition, the offsite watersheds remain primarily unchanged. Offsite flow entering the site from the northern end of the site will be accepted onto the site and allowed to exit the site unrestricted. Runoff from the south will be accepted onto the site through a shallow channel and directed to the existing culvert as it currently does. The watercourse that enters the site midway along the eastern boundary will be collected into a 2-cell 8'x5' RCBC with the outlet at the southwest corner of the site where up to 300cfs will flow through the existing box culvert with excess flow overtopping and flowing southward as it currently does as described above.

The proposed onsite runoff will closely match existing conditions. There will multiple points of discharge along the western property boundary. All runoff will be directed to a detention basin or water-harvesting basin that will be designed to detain runoff such that the outflow is less than or equal to existing conditions runoff. Outflow from these basins will flow to the southwest corner of the site and exit following the current drainage pattern.

In addition to the western detention basins, there will water harvesting throughout the site. All stormwater will flow through a "first flush" filtering system before exiting the site.

Total developed runoff from the site in the developed condition will be 47.8cfs prior to being detained (*see Proposed Condition Drainage Map*).

B. Modification to Drainage Patterns

Developed runoff from the site remains much like existing conditions. Exit points are at similar locations and detention basins detain the flow to less-than existing conditions. Developed runoff still combines and is conveyed downstream through the existing box culvert that restricts runoff to 300cfs for a 100-year event.

C. Drainage Impact to Off-site Land Uses

Runoff leaving the project site maintains existing flow rates, existing flow patterns, and is conveyed downstream through the existing box culvert that restricts runoff to 300cfs for a 100-year event. The 168cfs that overtops Suffolk Drive follows existing patterns southward in the Oracle Road channel.

D. Drainage Mitigation

As a result of the Critical Basin designation for the Parcel, the 100-year flood stormwater flows exiting the site in the proposed condition are required to match the existing condition flows, or be reduced by means of detention and/or other rainwater harvesting techniques. This will be achieved by means of stormwater harvesting (4" maximum depth) in landscaped areas as described below and by means of detention basins.

To satisfy detention/retention requirements, multiple (9) detention basins have been incorporated into the drainage scheme. Refer to Proposed Conditions Drainage Map for potential areas where basins will be incorporated. At this stage in analysis it is predicted that 20,400 cubic feet of stormwater storage will be required to reduce developed conditions runoff to less-than existing conditions. Basin size and location are subject to change during the design process. The information is to provide a perception of parameters that may be encountered.

The total site imperviousness in the developed condition has been calculated to be 119,539 sf, representing 61% of the site. In conformance with the Town of Oro Valley's Drainage Criteria Manual and Rainwater Harvesting Plan requirements, the site is required to have 8,100 gallons, or 1082 cubic feet, of available volume for rainwater harvesting purposes (based on the requirement of 3,000 gallons per acre of imperviousness).

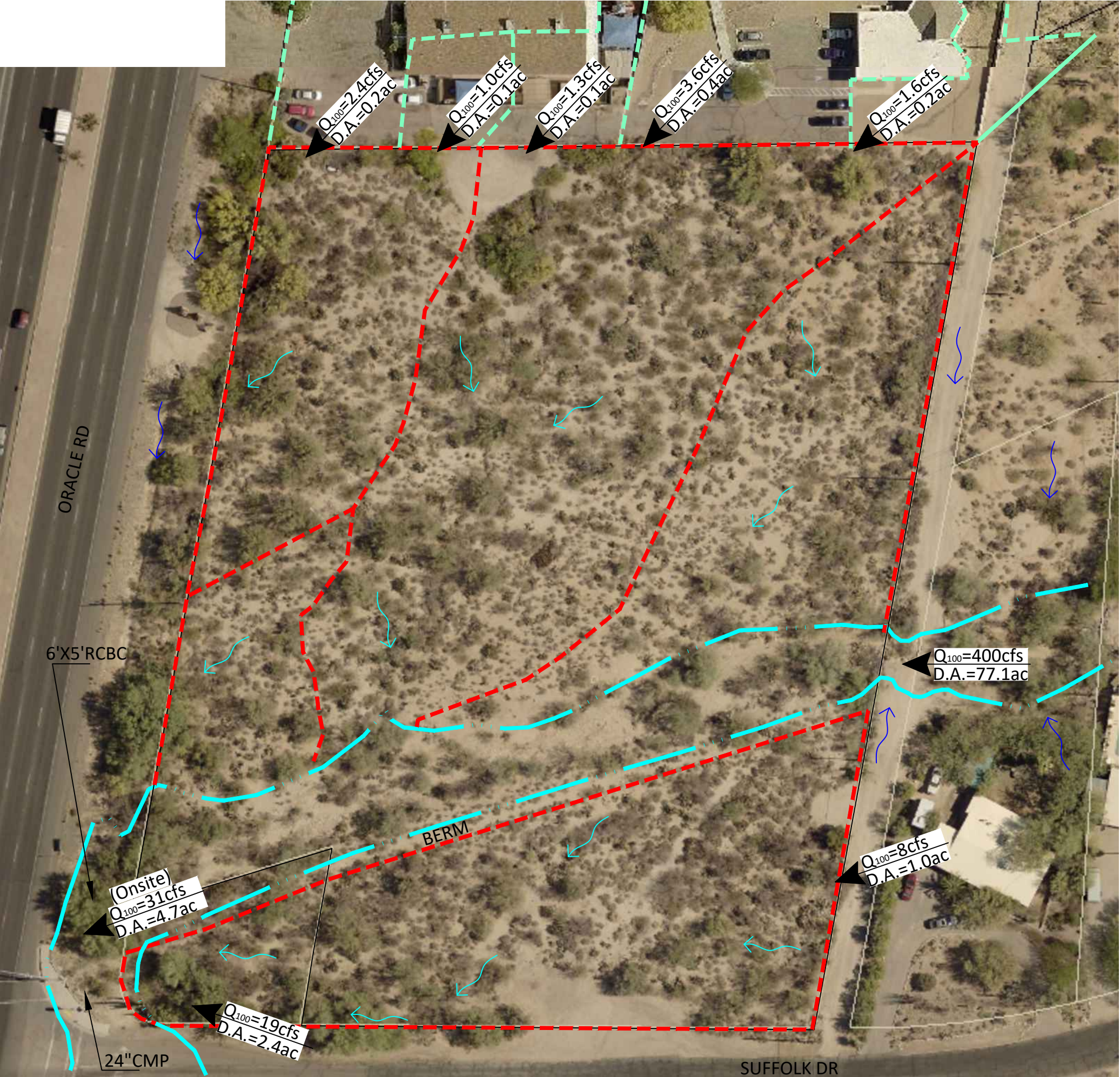
This project is also subject to First Flush (FF) requirements. Runoff from the site directed through filtering systems, whether it be through natural vegetation and/or filter systems installed at the curb opening(s) and/or catchbasins. The filtering systems will have oils and other pollutants

associated with developed surfaces to be filtered and/or settled out before the stormwater exits the site.

E. Tentative Development

Development of this site conforms to the Town policies and stormwater management plans by:

1. Incorporating detention into the Tentative Development Plan to reduce stormwater runoff to less than existing conditions to minimize potential for flooding downstream of the site.
2. Providing water harvesting into the development to maintain and preserve natural desert landscape surrounding the site and benefiting the proposed landscape.
3. Incorporate First Flush to minimize pollutants within stormwater improving environmental impacts to floodplains and streams.
4. Erosion Control to dissipate energy and restore stormwater to existing velocities. Riprap fill slopes to protect from erosion and dissipate energy from stormwater runoff.



SCALE 1"=60'
C.I. = 1 ft

LEGEND

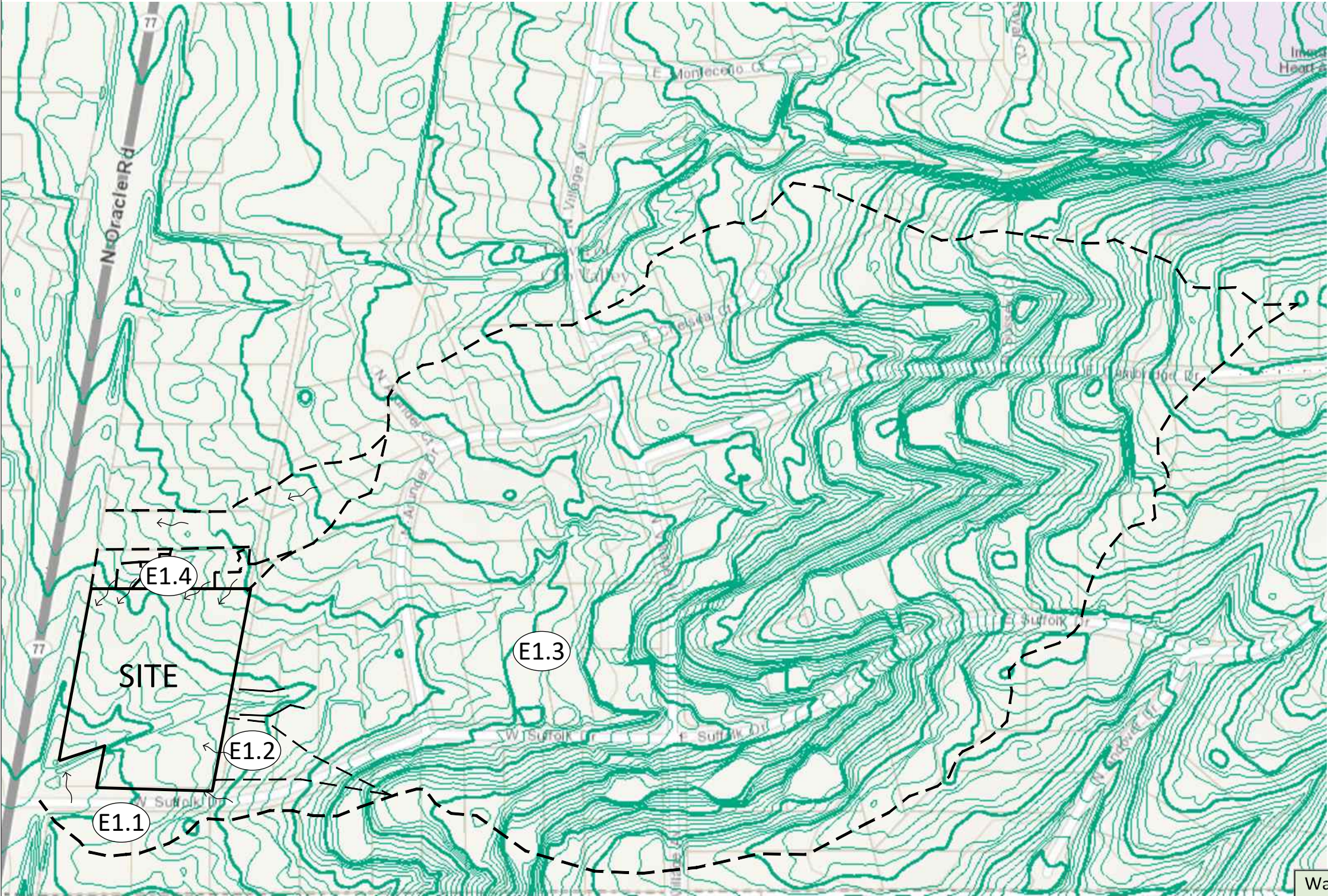
- $Q_{100}=1.0\text{cfs}$
D.A.=1.0ac → CONCENTRATION POINT
- 100-YEAR FLOOD LIMITS
- WATERSHED DIVIDE
- OFFSITE WATERSHED DIVIDE
- PROJECT AREA
- FLOW DIRECTION

CYPRESS PROJECT NO: 20.031

2030 east speedway boulevard
suite #110
tucson, arizona 85719
ph: 520.499.2456
cypresscivil.com



EXHIBIT I.5.F.ii
EXISTING CONDITIONS
WATERSHED MAP for
SEC ORACLE RD & SUFFOLK DR



SCALE 1"=300'
C.I. = 2 ft

LEGEND

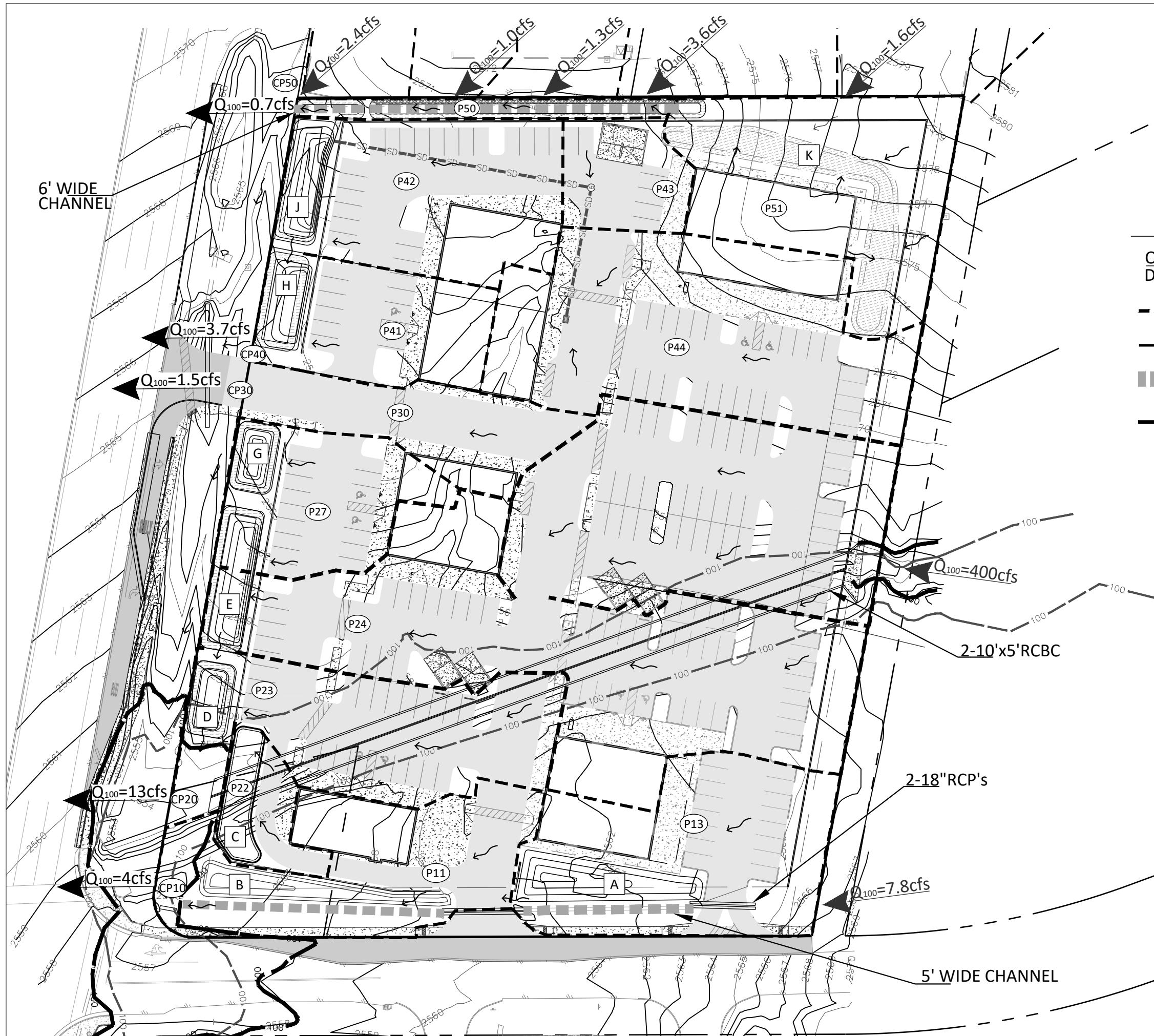
- 100-YEAR FLOOD LIMITS
- WATERSHED DIVIDE
- PROJECT AREA
- FLOW DIRECTION
- WATERSHED DESIGNATOR

Watershed ID	Drainage Area (ac)	100-Year Peak Discharge (cfs)
E1.1	2.4	19.2
E1.2	1.0	7.8
E1.3	77.1	400
E1.4	1.1	10.0

EXHIBIT I.5.A
OFFSITE WATERSHED MAP for
NEC ORACLE RD & SUFFOLK DR



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tucson, arizona 85719
ph: 520.499.2456
cypresscivil.com



SCALE 1"=60'
C.I. = 1 ft

LEGEND

- $Q_{100}=1.0\text{cfs}$
D.A.=1.0ac → CONCENTRATION POINT
- WATERSHED BOUNDARY
- PROJECT AREA
- ▨ CHANNEL
- 100-YEAR LIMITS
- FLOW DIRECTION
- (P60) WATERSHED DESIGNATOR
- (CP60) CONCENTRATION POINT FOR WATERSHED
- [A] DETENTION BASIN ID

CYPRESS PROJECT NO: 20.031

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EXHIBIT ii.6.A PROPOSED CONDITIONS DRAINAGE MAP for NEC ORACLE RD & SUFFOLK DR