

5.1.1 Public Facilities

The majority of the master planned storm drainage infrastructure presented in this Technical Report will be public facilities that will be owned, operated and maintained by the City of Tracy. The public facilities are considered to be integral to the function of the storm drainage system and generally serve more than one development project or sub-basin. Within the Cordes Ranch Specific Plan area, the public storm drainage infrastructure is shown on Figure 5-2. Public storm drainage infrastructure includes:

- Detention Basins
- Pump Stations (where needed to drain detention basins)
- Greenbelt Parkways
- Cross-Drainage Structures
- Storm Drains

These components of storm drainage infrastructure are described more fully in the following sub-sections.

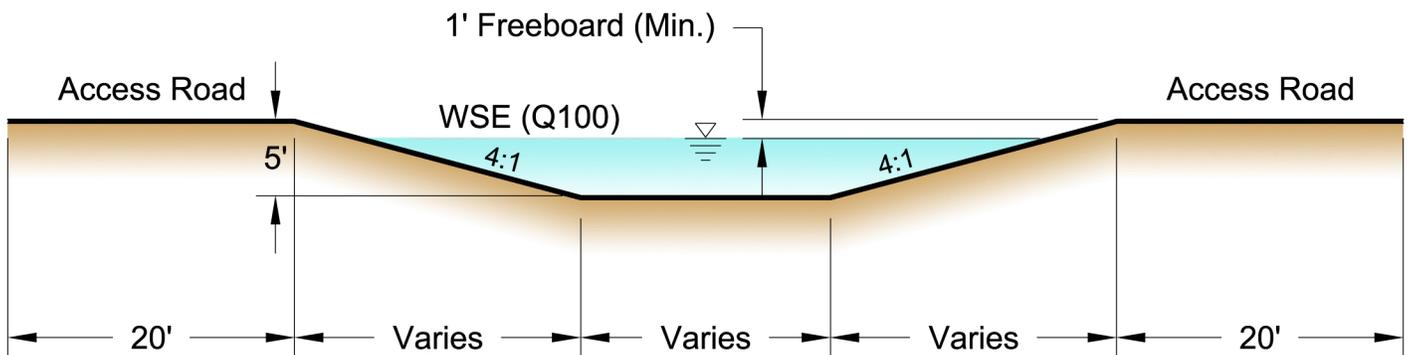
5.1.1.1 Detention Basins

Detention basins are a significant and necessary component of the proposed master plan facilities that will serve new development in the Lammers and Mountain House Watersheds. Though there are several important goals and benefits associated with the incorporation of detention basins as a storm drainage facility component, the primary driving factors that warrant detention basins are limitations in downstream outfalls and discharge capacities and the need to provide significant storm water quality enhancement. New detention basins will provide a significant amount of storage capacity and will provide significant attenuation of peak flows to meter downstream releases of storm water to reduced rates that are considered to be reasonable, acceptable, and environmentally sound. All proposed detention basins have been sized to accommodate the 100-year 24-hour storm under build-out development conditions for the sub-basins that drain to them, considering outflow discharge rates.

The surface areas of the proposed detention basins, including access roadways and appurtenant features, range from 3 acres to 48 acres. Detention basin depths have been typically assumed to be five feet as a general template for most proposed detention basins, including one foot of freeboard above the 100-year water surface elevation. An additional 20% has been added to the surface area of assumed excavation for the detention basins to account for setbacks and provision for vehicular access around them and to the lower areas to facilitate maintenance. Some detention basins have been sized based on a more specific evaluation of a given site. A detention basin typical cross-section is shown in Figure 5-3. The amount of storage

Notes:

1. This is the typical cross-section assumed in the SDMP to estimate surface area of most detention basins. Actual geometry and dimensions will vary based on topography and site specific requirements.
2. Joint-use elements (active and passive recreation) are encouraged with all new detention basins. Additional surface area will be required for joint-use areas to allow for creation of internal zones of differing flood risk via tiers and differential grading.
3. Components that promote percolation shall be incorporated into detention basins located in areas having permeable soils.



Detention Basin Typical Cross-Section

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Figure 5-3

Title
**Detention Basin
Typical Cross-Section**

December 2012
SWC File No. 2011-76



required in applicable detention facilities as presented in this Technical Report has not been reduced by a potential rate of percolation.

If berms are integrated into a given detention basin's design, spillways shall be provided above the 100-year water surface elevation in order to control any overflow and provide for emergency releases should the design storm be exceeded.

The City encourages the integration of aesthetic treatments, including active or passive joint-use recreational components, into the design of detention basins where feasible and appropriate. With regard to integrating recreation elements as a joint-use into detention facilities, there are several fundamental guidelines that must be followed. They are:

- Low flow must be accommodated in a manner that confines the frequent inundations to areas that will create minimal nuisance or disruption of recreational uses and will characteristically require only limited maintenance.
- Contouring (differential grading) within detention facilities is recommended to create internal elevation variations (or tiers) that have differing frequencies and depths of inundation and differing flood risk.
- Internal drainage within detention facilities must provide for positive flow across elevated tiers, to the lowest lying areas of the facilities and to the detention basin outlet.
- Internal slopes must be flat enough (6:1 or flatter) to allow for mowing of turf areas and to allow other routine recreation-related maintenance activities to occur.
- Hydraulic design components need to be included as required for proper flood control function (inflow structures, outflow structures, pump stations, sediment basins, spillways, surcharge structures, etc.).
- Other requirements may need to be satisfied as dictated by jurisdictional regulations and policies, local site conditions or additional functional uses.

In general, passive recreational elements should be incorporated in portions of detention basins having the greatest potential flood risk and frequency. Active recreation elements are more suitable in areas within detention facilities having lesser degrees of flood risk and frequency.

An additional benefit of detention basins is improved storm water quality. Detention basins provide attenuation storage and opportunities for pollutants to settle and be retained within the basin prior to the storm water being discharged to downstream conveyance elements, other detention basins and/or receiving waters. In general, a properly designed and maintained detention basin (that holds storm water for a prescribed period of time) will reduce the concentration of pollutant constituents discharged into receiving waters by providing for volatilization, settlement and subsequent absorption by vegetative matter and the soil. Suspended solids, heavy metals, hydrocarbons, sediments and possibly some organic

compounds are the most predominant constituents that would be expected to have reduced levels of concentrations after detention storage.

Detention basins proposed within upland areas that have subsurface soils that are found to be suitable for percolation and other locations deemed feasible shall incorporate low-lying components (such as gravel beds) that promote percolation as a supplementary terminal drainage component to gravity or pumping facility outflows. The inclusion of percolation facilities is intended to aid in achieving sustainability by further reducing downstream impacts of land development on runoff production, improving storm water quality and promoting recharge, where feasible. The volume of detention storage required for applicable detention basins as presented in this Technical Report has not been reduced to account for any assumed percolation capabilities and rates. In some specific locations and instances where high percolation rates and capabilities are well documented and supported, the City may consider accepting a degree of reduction in the ultimate required volume for individual detention basins. If a volume reduction is accepted by the City, it will only account for a portion of the assumed percolation rates given that there are inherent uncertainties associated with the long-term function and effectiveness of percolation facilities.

For individual detention basins having very low design outflow rates, site-specific conditions may warrant the incorporation of additional measures to satisfy mosquito vector control requirements. These measures may include additional design components to promote accelerated draining by percolation, aeration, treatment and/or additional pumping.

5.1.1.2 Greenbelt Parkways

Greenbelt parkways are proposed in a few locations within the Lammers Watershed and the Cordes Ranch Specific Plan area. A typical greenbelt parkway detail is provided on Figure 5-4. Greenbelt parkways are shown on the typical detail to have an average width of 200 feet, though it is expected that the actual width will undulate and be variable based on function and aesthetics. Greenbelt parkways are a linear storm water conveyance component of the storm drainage facility master plan and are intended to provide flood control conveyance capacity, water quality treatment, and recreational and aesthetic amenities.

5.1.1.3 Cross-Drainage Structures

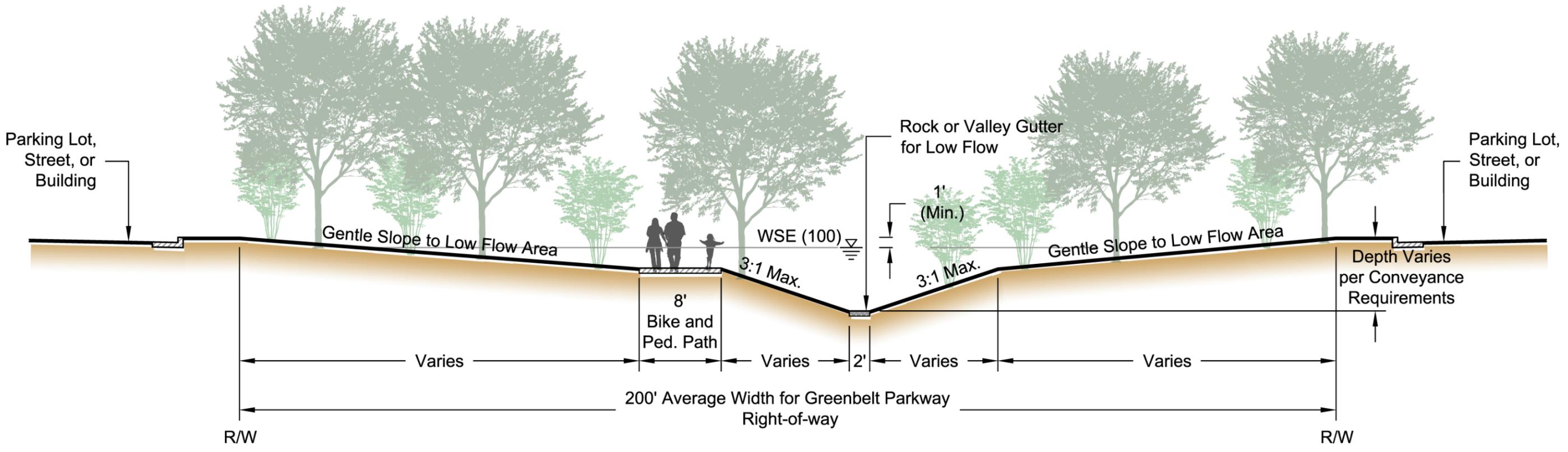
At locations where existing and proposed roadway alignments will cross over surface flow conveyance features, such as greenbelt parkways or open channels, cross-drainage culverts will be required to convey the 100-year 24-hour peak rate of runoff underneath the roadway.

5.1.1.4 Program Storm Drains

An interconnected system of underground storm drains has been incorporated into the storm drainage facility plan to serve as an outfall system for proposed detention basin discharges. For the most part, underground storm drains are proposed to be aligned within the public right-of-

Notes:

1. Low flow area will consist of natural channel through Cordes Ranch planning area where jurisdictional habitat and Waters of the United States are present.
2. Greenbelt Parkway width will vary and be a function of site specific design approved by the City.
3. Landscape and parkway amenities will be established on a site specific basis and subject to City approval



Greenbelt Parkway Typical Cross-Section

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Figure 5-4
 Title
**Greenbelt Parkway
 Typical Cross-Section**

December 2012
 SWC File No. 2011-76



way for streets. For alignments that do not follow streets, it has been assumed that a 20' wide drainage easement will need to be acquired by the City.

Storm drains that convey runoff from new development to proposed detention basins are considered to be onsite facilities that will be designed according to City Standards. A preliminary design layout for the onsite storm drains that will be aligned in future public streets is provided in Section 5.4 of this Technical Report.

5.1.2 Private Facilities

In some instances, the City will allow certain future detention basins and storm drains to be privately constructed, owned and maintained as a component of the storm drainage facility plan. These private facilities, though part of the overall drainage plan, are limited to facilities that drain smaller local development areas and are depicted on Figure 5-2. In instances where private ownership is deemed to be acceptable by the City, the City will establish appropriate governing requirements on a case-by-case basis via development agreements or other appropriate mechanisms. The City's SWQC Manual includes provisions, requirements and sample agreements pertaining to private ownership of onsite storm water quality measures, and some of this information may be pertinent when considering requirements for retaining private ownership for applicable drainage facilities.

5.1.3 Funding

The funding for program storm drainage facilities included in the storm drainage infrastructure plan will primarily be derived from storm drainage impact fees. In many instances, private funds may be used to front the construction of specific components of the storm drainage infrastructure and these funds may be subject to storm drainage impact fee credits or future reimbursements at the discretion of the City. It is assumed that roughly 25% of the cost of DET OFF2 will be funded by storm drainage impact fees and the remaining 75% of the cost of DET OFF2 will be funded by a Federal or State Grant Program or other funding sources.

The funding of onsite storm drains and cross-drainage structures aligned in public streets is proposed to be derived as a component of transportation impact fees.

Private detention basins will be funded by private parties (developers), subject to review and approval of the design by the City and City acceptance upon completion of construction.

5.1.4 Maintenance Responsibilities

Public storm drainage facilities will be owned, operated and maintained by the City.

Private storm drainage facilities will be owned, operated and maintained by private entities. The City will reserve the right to require the responsible private entity to correct deficiencies when they are identified.

5.2 LAMMERS WATERSHED/CORDES RANCH DRAINAGE PLAN

The Lammers Watershed is proposed to include significant future development associated with the Cordes Ranch Specific Plan; Gateway, West Side Industrial, and Bright future service areas; the larger portion of the Catellus future service area residing to the south of Byron Road; the west portions of the Westside Residential future service area (along Lammers Road); and other limited existing and proposed development areas within the City's Sphere of Influence. Presently, there are no downstream storm drainage facilities that have the capacity to accommodate any significant rates of runoff generated from future development within the Lammers Watershed.

In 2010, the City negotiated an updated drainage agreement with WSID that will authorize the discharge of up to 30 cfs of storm water to the WSID Sub-Main Drain at the location where it crosses Lammers Road in a 60" irrigation pipeline south of Byron Road. This updated drainage agreement was negotiated for the purpose of creating a drainage outfall for existing and new development within the Lammers Watershed. The WSID Board of Directors approved the 2010 Drainage Agreement that authorizes the Lammers Watershed discharge of up to 30 cfs to WSID facilities, subject to the payment of fees and other requirements, in November 2010. The Tracy City Council adopted the 2010 Drainage Agreement at a City Council public meeting in December 2010.

New development in the Lammers Watershed, including the Cordes Ranch Specific Plan area, will include significant attenuation of storm runoff generated by future development through the construction of several detention basins having metered outflow rates. Existing development and new development will be allowed a maximum composite metered discharge of up to 25 cfs during a 100-year 24-hour storm. The remaining 5 cfs allowed per the 2010 Drainage Agreement will be allocated to runoff generated by Sub-basin OFF2 (5 cfs is the outflow rate for DET OFF2, an upstream offsite detention basin that is proposed to provide flood control attenuation in the future for the benefit of downstream development). Detention basins serving development areas will limit outflows to rates ranging between 0.5 cfs and 10 cfs, depending upon the size of the sub-basins contributing to them. Discharge pipes ranging in diameter between 12" (minimum) and 36" (maximum) are proposed to collect, consolidate and convey detention basin outflows to the WSID Sub-Main Drain crossing of Lammers Road for discharge. This discharge will only occur after significant storm water quality treatment has occurred via: a) implementation of onsite measures associated with City requirements and policies pertaining to storm water quality management and sustainability practices, including provisions of the SWQC Manual; b) conveyance within designated greenbelt parkways, and; c) attenuation in storm water detention facilities.

In order to complete the storm drainage infrastructure needed to serve the future buildout of the Lammers Watershed, the following program storm drainage facilities will be constructed as the need arises, subject to available funding:

**CORDES RANCH SPECIFIC PLAN
STORM DRAINAGE TECHNICAL REPORT**Proposed Drainage Plan
December 2012

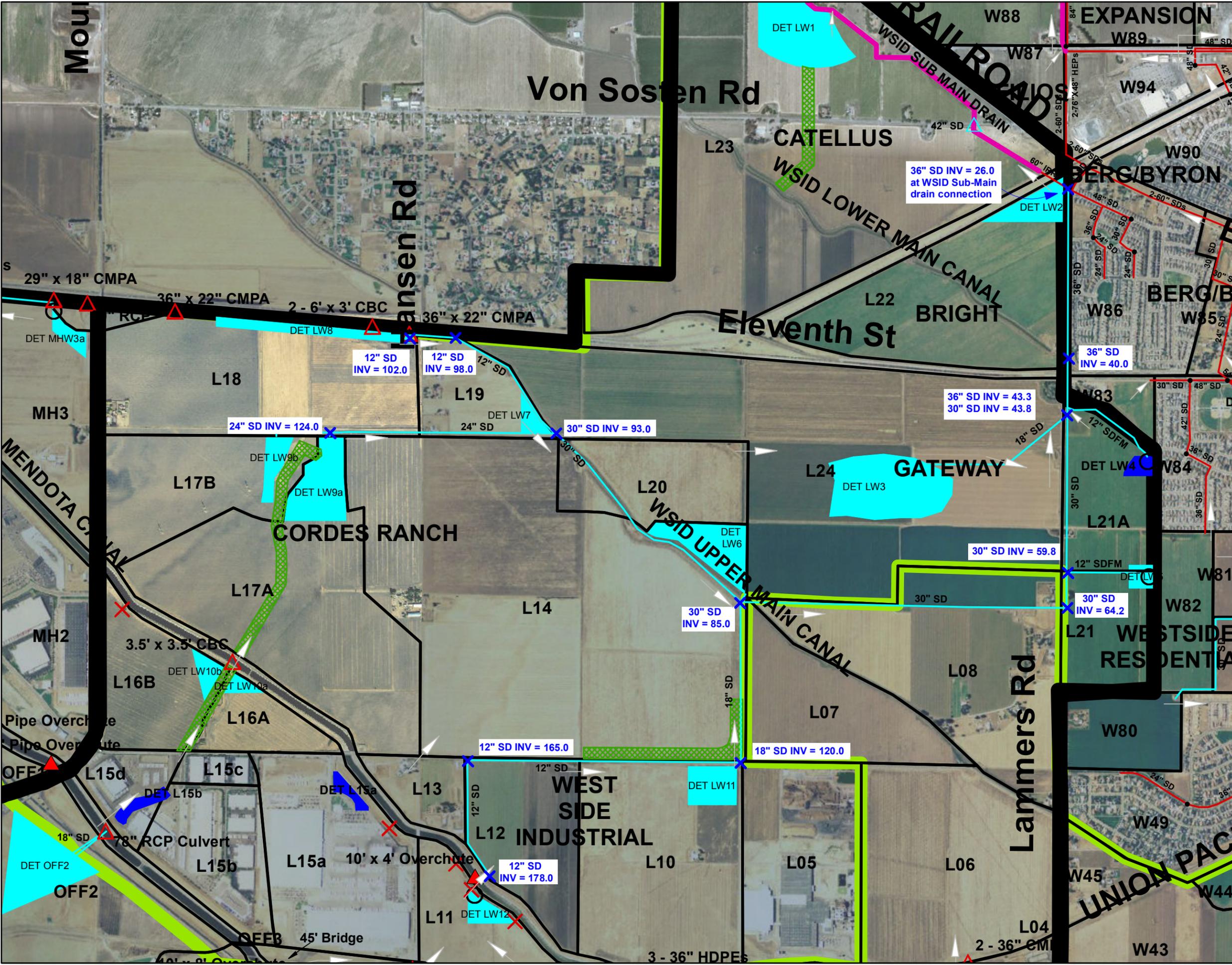
- Detention basins (DET LW6, LW7, LW8, LW9a, LW9b and LW10a/10b) serving future development of the majority of the Cordes Ranch Specific Plan area (Sub-basins L14, L16, L17, L18, and L19), as well as runoff from the westernmost portion of the West Side Industrial future service area (Sub-basin L13) and excess runoff discharged from the existing Patterson Pass Business Park (east of Mountain House Parkway) and Safeway Distribution Center developments (Sub-basin L15). Within the Cordes Ranch Specific Plan area, DET LW8 will be separated into four (4) smaller linear detention basins (8a, 8b, 8c, and 8d) as shown on Figure 5-2.
- Future detention basin (DET OFF2) to remove Sub-basin OFF2 as a flooding source that impacts the western portion of the Lammers Watershed (existing development areas and the Cordes Ranch Specific Plan area) and downstream existing residential and agricultural properties north of I-205 outside of the Sphere of Influence. DET OFF2 is proposed to have a maximum gravity discharge of 5 cfs during a 100-year 24-hour storm.
- Detention basin (DET LW3) serving the Gateway future service area and the northeast corner of the Cordes Ranch Specific Plan area (Sub-basin L20).
- Detention basin (DET LW11) serving the majority of the currently undeveloped portions of the West Side Industrial future service area (Sub-basins L10 and L12).
- Detention basin (DET LW12) serving Sub-basin L11.
- Detention basin (DET LW5) serving a western portion of the Westside Residential future service area (Sub-basin L21).
- Detention basin (DET LW2) serving the Bright future service area (Sub-basin L22).
- Detention basin (DET LW1) serving the majority of the Catellus future service area (Sub-basin L23), located south of Byron Road.
- Various storm drains (SDs) serving as outflow pipes for detention basins, ranging in diameter from 12" to 36", that will convey and consolidate flows for delivery to the WSID Sub-Main Drain at Lammers Road south of Byron Road. Proposed invert elevations are shown at key locations for these outflow pipes on Figure 5-5.
- Installation of gates that will provide for an SD interflow crossover connection between the 2-60" SDs that are part of the Westside Channel Outfall System (at the Byron Road/Lammers Road intersection) and the WSID Sub-Main Drain 60" SD in Lammers Road south of Byron Road. These two systems are currently connected by a City 48" SD in Lammers Road, but the entrance to the WSID 60" pipe is plugged. This interflow crossover could be used to facilitate maintenance activities in downstream facilities or to manage flows in the event of an emergency.



Legend

- X **36" SD INV = 40.0**
Proposed Invert Elevation
- **30" SD**
Proposed Storm Drain

NOTE: All elevations are at NAVD 88.



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Figure 5-5
 Proposed Invert Elevations For
 Outfall Storm Drains At Selected
 Locations (Lammers Watershed)

December 2012
 SWC File No. 2011-76



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- Greenbelt parkways within portions of the Cordes Ranch Specific Plan area (along an existing linear wetland and at the southeast corner of specific plan area that is impacted by an offsite flow) and within a portion of the Catellus future service area.

The proposed system improvements include capacity to capture, attenuate and convey existing storm runoff generated by the Safeway Distribution Center and the east portion of Patterson Pass Business Park to the proposed outfall for the Lammers Watershed at the WSID Sub-Main Drain during the 100-year 24-hour storm.

Table 5-1 provides a summary of all existing and proposed detention basins serving the Lammers Watershed, including pertinent physical and hydraulic characteristics.

Table 5-1: Lammers Watershed Detention Basins						
Detention Basin	Status	Surface Area (acres)	100-Year Peak Volume (acre-feet)	Type of Outlet	100-Year Peak Inflow (cfs)	100-Year Peak Outflow (cfs)
DET LW1	Proposed	35	90	Gravity	158	3.0
DET LW2	Proposed	11	27	Gravity	60	2.0
DET LW3	Proposed	48	87	Gravity	124	4.0
DET LW4	Existing	4	11	Pump	25	0.5
DET LW5	Proposed	3	7	Pump	18	0.5
DET LW6	Proposed	21	101	Gravity	218	4.0
DET LW7	Proposed	4	10	Gravity	27	0.5
DET LW8*	Proposed	13	34	Gravity	91	1.5
DET LW9a	Proposed	25	89	Gravity	202	10.0***
DET LW9b	Proposed	7	18	Gravity	52	1.0
DET LW10a/10b**	Proposed	9	20	Gravity	67	1.0
DET LW11	Proposed	12	30	Gravity	61	2.5
DET LW12	Proposed	6	13	Pump	44	0.5
DET OFF2	Proposed	25	182	Gravity	387	5.0

* DET LW8 will consist of four (4) smaller linear detention basins (8a, 8b, 8c, and 8d)

** Discharge is to a proposed greenbelt parkway and DET LW10a/10b outflows will also enter DET LW9a to the north.

*** Includes a discharge allocation of 5 cfs from Sub-basin OFF2 and 1 cfs from DET LW10a/10b.

**CORDES RANCH SPECIFIC PLAN
STORM DRAINAGE TECHNICAL REPORT**

Proposed Drainage Plan
December 2012



The drainage plan for the portions of the Cordes Ranch Specific Plan area within the Lammers Watershed includes the following components:

1. Installation of onsite source and treatment control measures as prescribed and required per the City's SWQC Manual.
2. Public and private storm water detention basins to store and attenuate storm runoff generated by new development within the Specific Plan area, plus storm runoff generated by the existing Patterson Pass Business Park (east) and the Safeway Distribution Center on the south side of Schulte Road (Sub-basin L15) and the westernmost portion of the West Side Industrial future service area (Sub-basin L13) that are located off-site. The Cordes Ranch Specific Plan area will be allocated a maximum composite discharge rate of 12 cubic feet per second (cfs) during a 100-year 24-hour storm event. Where practical and feasible, detention basins will incorporate features that encourage percolation of storm water. Also, detention basins will incorporate active and/or passive recreation or aesthetic elements as a joint-use where practical and feasible.
3. Storm drain outfall pipes ranging in diameter from 12" to 36" that will collect attenuated discharges from detention basins serving the Specific Plan area and certain specified off-site areas within the overall Lammers Watershed and convey these attenuated discharges east to Lammers Road then north along Lammers Road to the WSID Sub-Main Drain south of Byron Road. The discharge connection to the WSID Sub-Main Drain will be via a single 36" storm drain pipe at this location and is facilitated by a drainage agreement between the City of Tracy and WSID. Recommended invert elevations for these storm drain pipes are shown at key locations on Figure 5-5.
4. A future offsite detention basin (DET OFF2) to be located upstream on the south side of I-580 to store the 100-year 24-hour storm runoff generated by Sub-basin OFF2 and to reduce the outflow discharge rate to 5 cfs, thus reducing the flood potential for the Cordes Ranch Specific Plan area and other downstream properties.
5. A greenbelt parkway to be provided along the existing linear wetland that extends through the central portion of the Specific Plan area between Schulte Road and Capital Parks Drive.
6. Cross-drainage structures sized to convey the 100-year 24-hour storm discharge for the existing linear wetland (future greenbelt parkway) underneath proposed street crossings.
7. An inlet structure and a 48" SD extending from north of Capital Parks Drive (north of DET LW9a) to DET LW8 at I-205 to convey approximately ½ of the 100-year discharge for the existing linear wetland (future greenbelt parkway) prior to the upstream construction of DET OFF2.

**CORDES RANCH SPECIFIC PLAN
STORM DRAINAGE TECHNICAL REPORT**Proposed Drainage Plan
December 2012

8. A greenbelt parkway or other means of conveyance to be provided at the southeast corner of the Specific Plan area to provide overland flow conveyance for sheet flow conditions that would occur across this location as derived from offsite Sub-basin OFF3 during a 100-year 24-hour storm.
9. Temporary retention basins constructed in conformance with City Standards to store runoff from new development areas within the Specific Plan area on an interim basis until the permanent detention basins and the downstream outfall system are constructed and become operational. Temporary retention basins will have capacities to store runoff generated by 2 times the 10-year 48-hour storm, which is a greater volume than runoff generated by the 100-year 24-hour storm, in accordance with applicable City Standards.
10. Onsite storm drains to serve new development and street systems.
11. Appropriate provision for overland release shall be also provided with all new development, including detention basins.

5.2.1 Provisions for Offsite Drainage (Lammers Watershed)

With the exception of DET OFF2 and DET LW9a (that will accommodate a future “pass through” outflow discharge from DET OFF2), detention basins serving the Cordes Ranch Specific Plan area are only proposed to accommodate runoff derived from new development areas within the Specific Plan area and existing development areas north of the California Aqueduct that drain into the Specific Plan area. However, as development occurs within the Cordes Ranch Specific Plan area prior to the construction of DET OFF2 capacity must be incorporated for offsite runoff to be conveyed along and through master planned facilities without causing flooding of buildings in development areas. Prior to the construction of DET OFF2, excess runoff generated from Sub-basin OFF2 will be discharged to an existing 2-cell 6' x 3' CBC crossing of I-205 just west of Hansen Road and released into existing downstream drainage facilities in essentially the same manner as occurs under existing conditions. *In the condition that exists prior to the construction of DET OFF2 in the future, discharges to the 2-cell 6' x 3' CBC crossing of I-205 will be reduced when compared to existing conditions as new development areas (in Sub-basins L16, L17, and L18) and existing industrial developments on the south side of Schulte Road (Sub-basins L15a through d) will no longer discharge to this CBC crossing. New development will not contribute to downstream flooding and will reduce downstream flooding, but it will not eliminate the existing potential for downstream flooding derived from Sub-basin OFF2 prior to the construction of DET OFF2.*

Upon completion of DET OFF2, downstream areas within Sub-basins L15, L16, L17, and L18 will no longer be subjected to flooding from offsite runoff generated within upstream Sub-basin OFF2 during a 100-year 24-hour storm and will only require a conveyance corridor with a capacity to accommodate onsite runoff (including existing runoff from Sub-basin L15) plus an outflow discharge rate of 5 cfs from DET OFF2.

**CORDES RANCH SPECIFIC PLAN
STORM DRAINAGE TECHNICAL REPORT**Proposed Drainage Plan
December 2012

Flood control improvements are not proposed to relieve existing shallow flooding conditions at the southeast corner of the Cordes Ranch Specific Plan area and across other applicable properties in the City's Sphere of Influence as derived from Sub-basin OFF3. This flooding source will need to be accounted for throughout the site development design process.

Site development areas impacted by offsite runoff generated by upstream Sub-basins OFF2 and OFF3 will be required to submit a hydrologic and hydraulic analysis to the City that determines 100-year 24-hour storm water surface elevations. Building finished floor elevations must be set a minimum of 1 foot above these elevations. The areas impacted by this requirement are shown on Figure 5-6.

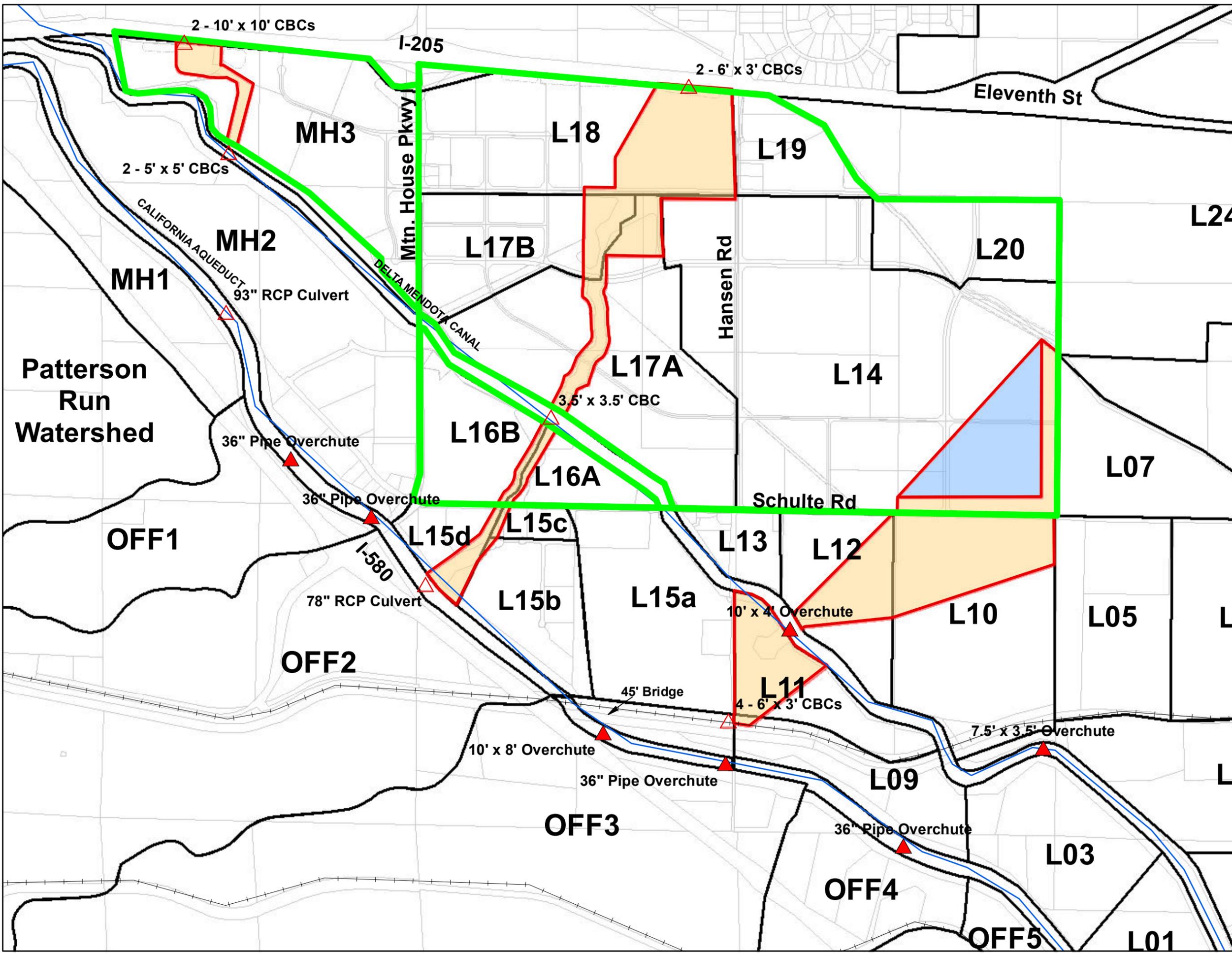
5.2.1.1 Central Wetland Corridor (Greenbelt Parkway)

The greenbelt parkway along the existing linear wetland that extends through the central portion of the Specific Plan area shall provide adequate capacity to convey the full, unattenuated 100-year 24-hour storm discharge generated by Sub-basin OFF2 plus applicable onsite flows and discharges from existing development areas on the south side of Schulte Road until such time as DET OFF2 is funded and constructed.

Prior to the construction of DET OFF2, the existing 3.5' x 3.5' CBC crossing of the Delta Mendota Canal (DMC) at the linear wetland produces a restriction in the drainage conveyance capacity of the linear wetland. During a 100-year 24-hour storm, a discharge of 355 will concentrate on the upstream (south) side of the DMC at this location. The DMC is elevated above natural grade and creates a flood storage area on the upstream side of the canal (within Sub-basins L16A and L16B) during the 100-year storm. This storage volume of this flood storage area is 16.4 acre-feet at a 100-year water surface elevation of 190.1 feet. *Until upstream DET OFF2 is constructed, new development within Sub-basins L16A and L16B must be implemented in a manner that retains the existing volume of available storage upstream of the DMC (16.4 acre-feet) at a water surface elevation of 190.1 feet or lower. Also, finished floor elevations for new buildings within Sub-basins L16A and L16B will need to be set a minimum of 1 foot above elevation 190.1 feet.*

The 3.5' x 3.5' CBC and available flood storage upstream of the DMC also has the effect of reducing (attenuating) the inflow of 355 cfs to an outflow of 244 cfs at the culvert. The 100-year outflow of 244 cfs shall be used to size culvert crossings of the proposed greenbelt parkway (existing linear wetland) between the DMC and Capital Parks Drive (including Capital Parks Drive). These culvert crossings shall consist of 2- 60" RCPs (or culverts having equivalent capacities) at each crossing.

Prior to the future construction of upstream DET OFF2, site development areas adjacent to the central wetland corridor will be required to submit a hydrologic and hydraulic analysis to the City that determines 100-year 24-hour storm water surface elevations. Building finished floor elevations must be set a minimum of 1 foot above these elevations. The areas impacted by this requirement are shown on Figure 5-6.



- Legend**
- L14 Sub-basins
 - Cordes Ranch Specific Plan Boundary
 - Canals and Creeks
 - ▲ Overchutes
 - Culverts
 - Areas Where New Development Will be Required to Submit a Hydrologic and Hydraulic Analysis that Determines 100-yr 24-hr Storm WSE's. Building Finished Floor Elevations (FFE's) Must be a Minimum of 1-foot Higher than Applicable WSE's.
 - Areas Where New Development Will be Required to Set Building FFE's a Minimum of 1.5 feet Above Highest Adjacent Grade (or) 1-foot Above 100-yr 24-hr Storm WSE's if Known.

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 STORM DRAINAGE TECHNICAL
 REPORT

FIGURE 5-6
 Title
**AREAS REQUIRING SPECIAL
 HYDROLOGIC & HYDRAULIC
 CONSIDERATION DUE TO
 INFLOWS FROM OFFSITE
 WATERSHEDS**
 DECEMBER 2012
 SWC File No. 2011-76
 SCALE 1" = 1500'



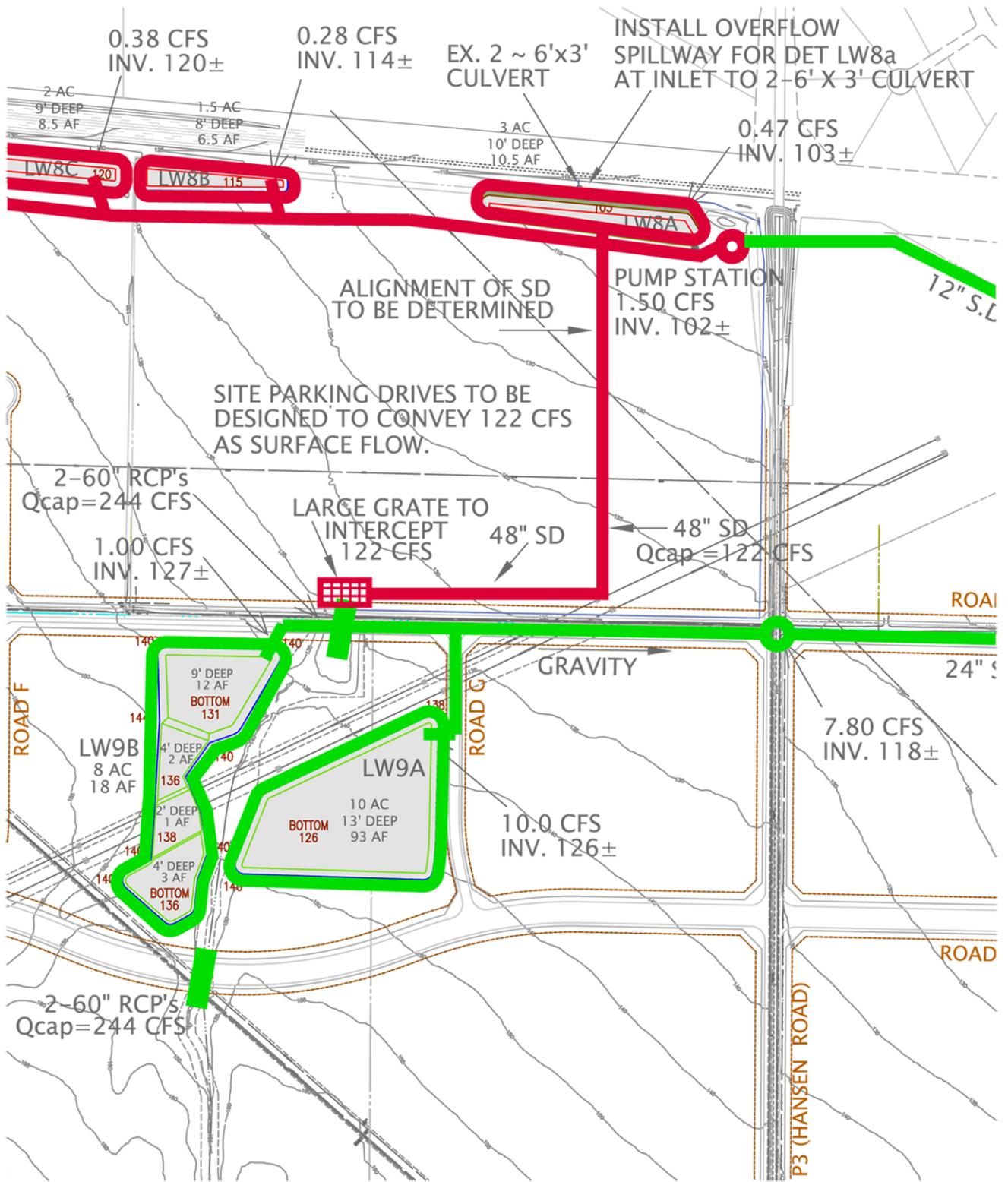
5.2.1.2 Development Area North of Capital Parks Drive, West of Hansen Road

In the interim condition prior to the construction of upstream DET OFF2, the capacity of DET LW9a which will provide storage for new development and existing development south of Schulte Road plus an outflow allocation of 5 cfs for runoff generated by offsite Sub-basin OFF2 will be exceeded. Excess flow of up to 244 cfs that may occur during a 100-year 24-hour storm will need to spill to the north and into development areas within the Cordes Ranch Specific Plan area between Capital Parks Drive and I-205 and be delivered to the existing 2 cell 6' x 3' CBC crossing of I-205 west of Hansen Road as occurs under existing conditions. A culvert crossing with a capacity of 244 cfs will be required under Capital Parks Drive (2-60" RCPs or equivalent). On the north side of Capital Parks Drive, a large grate inlet will need to be installed with new development to intercept $\frac{1}{2}$ of the excess flow (or 122 cfs) and discharge this flow rate to an underground storm drain (48" SD or equivalent) that will convey 122 cfs within development areas to DET LW8a (at the south side of the 2 cell 6' x 3' CBC). The remaining 122 cfs of excess flow will be allowed to be conveyed as surface flow along the parking drives between buildings to DET LW8a. A spillway will be provided at the north end of DET LW8a to allow the combined excess flow of 244 cfs to spill into the 2 cell 6' x 3' CBC as occurs under existing conditions during the 100-year 24-hour storm. These proposed storm drainage improvements are shown schematically on Figure 5-7. Buildings in new development areas on the west side of Hansen Road north of Capital Parks Drive will be required to have finished floors that are elevated a minimum of 1 foot above the adjacent 100-year 24-hour storm water surface elevation for the surface flow of 122 cfs. The 100-year 24-hour storm water surface elevations will need to be determined by a hydraulic analysis during the site improvement design process. The areas impacted by this requirement are shown on Figure 5-6.

The above conditions and requirements will be eliminated after future construction of upstream DET OFF2, the onsite permanent detention basins and the outfall to the WSID Sub-Main Drain.

5.2.1.3 Southeast Corner Cordes Ranch

The Citywide Storm Drainage Master Plan currently depicts a greenbelt parkway extending around the southeast corner of Cordes Ranch. The purpose of this greenbelt parkway is to provide conveyance capacity for sheet flooding that would pass through this portion of the Specific Plan area during a 100-year storm. The sheet flooding would result from runoff generated by offsite Sub-basin OFF3 and discharged from a 10' x 4' overchute across the DMC south of Schulte Road east of the alignment of Hansen Road. Previous studies have indicated that the capacity of the overchute across the DMC restricts the downstream discharge rate to 420 cfs. The proportional amount of sheet flooding in the area that would pass through the southeast corner of the Cordes Ranch Specific Plan area during a 100-year storm will be limited to a maximum of approximately 100 cfs, with the majority of sheet flow occurring across other properties on the south side of Schulte Road adjacent to Cordes Ranch. Development at the southeast corner of the Cordes Ranch Specific Plan area will need to provide a capacity to convey this proportional discharge as surface flow across the site for downstream release in a similar manner as occurs under existing conditions.



Legend

- Public Drainage Facilities
- Private Drainage Facilities

NOTE: "Overflow" storm drainage facilities are intended to convey excess flow from upstream sub-basin OFF2 during a 100-year storm prior to construction of upstream DET OFF2. Q for total excess flow is 244 cfs, as regulated by upstream DMC culvert.

Client/Project
 CORDES RANCH SPECIFIC PLAN
 STORM DRAINAGE TECHNICAL REPORT

Figure 5-7

Title
"Overflow" Storm Drainage Facilities North of Capital Parks Drive

December 2012
 SWC File No. 2011-76



Any buildings in new development areas at the southeast corner of the Specific Plan area that are adjacent to the potential sheet flow flooding area will be required to have finished floors that are elevated a minimum of 1 foot above the adjacent 100-year 24-hour storm water surface elevation or 1 foot above the average sheet flow depth average of 0.5 feet. The 100-year storm water surface elevations will need to be determined by a hydraulic analysis during the site improvement design process. The areas impacted by these requirements are shown in Figure 5-6.

5.3 MOUNTAIN HOUSE WATERSHED/CORDES RANCH DRAINAGE PLAN

In order to complete the storm drainage infrastructure needed to serve the future buildout of the Mountain House Watershed, for which new development will primarily consist of the west portion of Cordes Ranch, the following master plan storm drainage facilities are recommended for construction as the need arises, subject to available funding:

- Detention basins (DET MHW3a/3b/3c) serving future development of the portion of the Cordes Ranch planning area residing on the west side of Mountain House Parkway (Sub-basin MH3). Areas on the west side of Patterson Run will be served by DET MHW3c and will discharge to Patterson Run, consistent with existing conditions. Areas on the east side of Patterson Run will drain to DET MHW3b and DET MHW3a. DET MHW3a may either discharge to an existing low flow cross culvert underneath I-205 just west of Mountain House Parkway consistent with existing conditions, or discharge to Patterson Run to the west via a pump station and force main. If storm drainage from DET MHW3a is proposed to discharge to Patterson Run, additional approvals will be required from the Mountain House CSD that operates, manages and maintains existing and future downstream storm drainage facilities to the north. Future costs associated with requirements set forth by the Mountain House CSD to accommodate runoff discharges to their facilities will be borne by new development in the Mountain House Watershed. In any event, DET MHW3a, MHW3b and MHW3c will be required to provide a significant amount of detention storage and attenuation in order to mitigate the downstream impacts of new development on runoff production.
- Sub-basin MH1 is within the City's Sphere of Influence and is represented in the City's General Plan as having a future industrial use. However, there are severe limitations with regard to the feasibility and availability of access to any new development within this sub-basin that will need to be resolved prior to development becoming possible. In the event that these issues are able to be resolved at some point in the future, new development within this sub-basin will need to provide storm drainage facilities and detention basin(s) that will serve to mitigate its impacts on storm runoff production and discharge.

New development within the Mountain House Watershed will be required to provide the City with documentation and facilitate an agreement between the Mountain House CSD and the City that states that the Mountain House CSD will accept future runoff discharges as proposed

herein within their downstream storm drainage facilities. All City costs involved in finalizing this agreement will be paid for by said new development. New development within the Mountain House Watershed will not be allowed by the City prior to execution of said agreement.

Table 5-2 provides a summary of existing and proposed detention basins serving the Mountain House Watershed along with pertinent physical and hydraulic characteristics.

Table 5-2: Mountain House Watershed Detention Basins						
Detention Basin	Status	Surface Area (acres)	100-Year Peak Volume (acre-feet)	Type of Outlet	100-Year Peak Inflow (cfs)	100-Year Peak Outflow (cfs)
DET MHW2	Existing	10	68	Gravity	200	7.0
DET MHW3a/3b/3c	Proposed	10	37	Gravity and Pump	144	5.0

The drainage plan for the portions of the Cordes Ranch Specific Plan area west of Mountain House Parkway within the Mountain House Watershed includes the following components:

1. Installation of onsite source and treatment control measures as prescribed and required per the City's SWQC Manual.
2. Onsite permanent storm water detention basins to store and attenuate storm runoff generated by new development within the Specific Plan area. This portion of the Cordes Ranch Specific Plan area will be allocated a maximum composite discharge rate of 5 cfs during a 100-year 24-hour storm event. Where practical and feasible, detention basins will incorporate features that encourage percolation of storm water. Also, detention basins will incorporate active and/or passive recreation or aesthetic elements as a joint-use where practical and feasible.
3. All attenuated runoff from new development within this portion of the Specific Plan area will be discharged to Patterson Run, eliminating certain existing condition onsite flow discharges to existing small culvert crossings of I-205 west of Hansen Road, subject to approval of the Mountain House CSD. If this approach is not approved by the Mountain House CSD, storm runoff from the eastern ¾ of this portion of the Specific Plan area will discharge to the existing small culvert crossings of I-205 west of Hanson Road, consistent with existing conditions.
4. Patterson Run will be retained as a primarily open space corridor having adequate capacity to convey the 100-year 24-hour storm discharge generated by the Patterson Run Watershed, although a portion of this corridor will likely be crossed with roads, culverts and pipes, as otherwise permitted by the appropriate regulatory agencies.

5. Onsite storm drains to serve new development and street systems.
6. Temporary retention basins will be constructed in conformance with City Standards to store runoff from new development areas on an interim basis until permanent downstream facilities having capacity to convey discharges from the Patterson Run watershed are completed by the Mountain House CSD. Temporary retention basins will have capacities to store runoff generated by 2 times the 10-year 48-hour storm, which is a greater volume than runoff generated by the 100-year 24-hour storm, in accordance with City Standards.
7. Appropriate provision for overland release shall be also provided with all new development, including detention basins.

5.3.1 Provisions for Offsite Drainage (Mountain House Watershed)

As previously described, Patterson Run is a channel and conveyance corridor that serves a large offsite watershed and extends through the Cordes Ranch Specific Plan area between an existing 2 cell 5' x 5' CBC crossing of the DMC and a 2 cell 10' x 10' CBC crossing of I-205. Much of Patterson Run as it extends through the Specific Plan area is a well-defined channel located within right-of-way owned by the San Luis and Delta Mendota Water Authority. However, as it approaches I-205 at the end of the right-of-way, the channel loses definition and confined flows will spread across a wider area as they are conveyed to the I-205 culvert. This produces a shallow flooding condition at this location under existing conditions.

New development within the Specific Plan will be required to maintain Patterson Run as an unobstructed drainage corridor within the San Luis and Delta Mendota Water Authority right-of-way. Downstream of this right-of-way, new development will be required to maintain conveyance for the existing condition 100-year 24-hour storm discharge of 546 cfs for Patterson Run while limiting excess conveyance in any parking areas to a depth of 0.5 feet during the 100-year 24-hour storm. Any buildings in new development areas that are within the existing shallow flooding area for Patterson Run will be required to have finished floors that are elevated a minimum of 1 foot above the adjacent 100-year 24-hour storm water surface elevation. The 100-year storm water surface elevations will need to be determined by a hydraulic analysis during the site improvement design process. The area impacted by this requirement is shown on Figure 5-6.

5.4 ONSITE DRAINAGE FACILITIES SERVING PUBLIC STREETS

5.4.1 Public Street Storm Drainage Facilities

Storm drains that are not a part of the outfall drainage system (the program storm drains that will provide discharge from proposed permanent detention basins) are considered to be "onsite" facilities. The onsite street system storm drains will collect storm runoff from individual development areas and streets and convey it for discharge to the proposed permanent

**CORDES RANCH SPECIFIC PLAN
STORM DRAINAGE TECHNICAL REPORT**Proposed Drainage Plan
December 2012

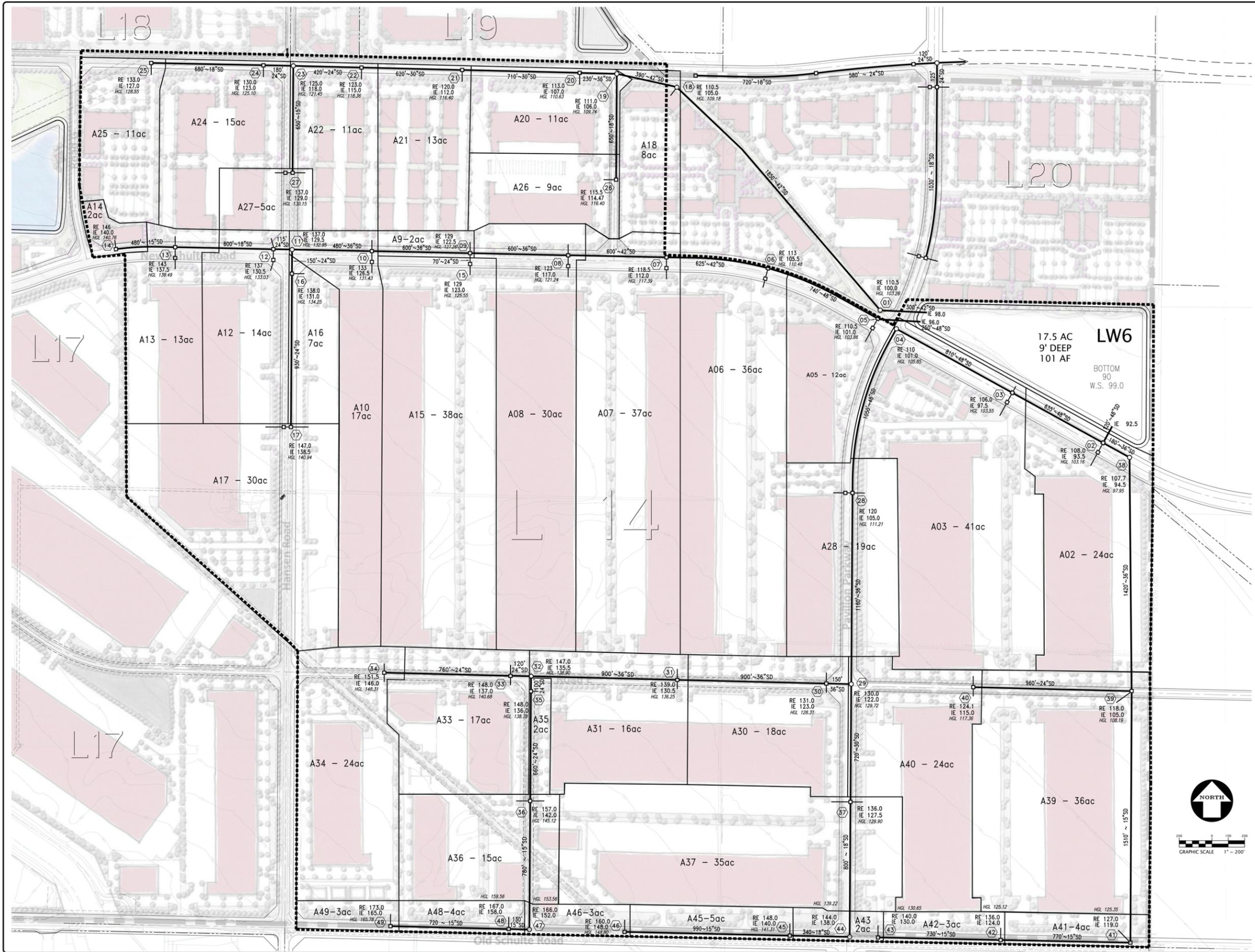
detention basins (or temporary retention basins in the absence of permanent detention basins). Consistent with City policy, these onsite facilities are to be sized using City Standards.

As a part of providing engineering services pertinent to the Cordes Ranch Specific Plan, Kier & Wright has prepared a preliminary design for the network of onsite storm drains that will be aligned in the proposed public street system. The preliminary design has utilized City Standards and was reviewed and accepted by Storm Water Consulting, Inc. The proposed storm drains range in size from 15" to 48" in diameter and also include several 12" diameter laterals connecting to existing storm drains at the southwest corner of the Specific Plan area along Mountain House Parkway and Schulte Road. These onsite storm drains are shown on Figure 5-8, Sheets 1 through 3 prepared by Kier & Wright.

In addition, there are cross-drainage culverts required at proposed street crossings of the central wetland corridor (greenbelt parkway). These cross-drainage culverts are shown on Figure 5-2 and shall consist of 2-60" RCPs or equivalent capacity culverts at the three (3) street crossings shown. Each culvert crossing will be required to pass a minimum discharge rate of 244 cfs under the streets, which is the 100-year 24-hour storm "regulated" flow discharging from an existing 3.5' x 3.5' CBC crossing of the DMC upstream of the street crossings.

Table 5-3 provides an Opinion of Probable Cost for Onsite Storm Drainage Facilities Serving Public Streets. It includes the cross-drainage structures at proposed street crossings of the central wetland corridor (greenbelt parkway) and the proposed 48" diameter overflow storm drain and inlet structure north of Capital Parks Drive described in Section 5.2.1.2 and shown on Figure 5-7.

The proposed onsite storm drains serving public streets, cross-drainage structures, and overflow storm drain and inlet north of Capital Parks Drive are to be funded as a component of the transportation impact fee program.



STORM DRAIN SYSTEM STUDY CORDES RANCH		CALIFORNIA	
KIER & WRIGHT CIVIL ENGINEERS & SURVEYORS, INC. Livermore, California 94551 Fax (925) 245-8796		TRACY	
DATE	07/30/2012	REVISION	
SCALE	1" = 200'	NO.	1
DESIGNER	M.F.B.	BY	1
JOB NO.	A09500	REVISION	
SHEET	HYD1	NO.	1
OF	SHEETS	BY	1

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**CORDES RANCH SPECIFIC PLAN
 STORM DRAINAGE TECHNICAL
 REPORT**

FIGURE 5-8 Sheet 1 of 3

Title
**PROPOSED ONSITE STORM
 DRAINS IN STREETS**

DECEMBER 2012
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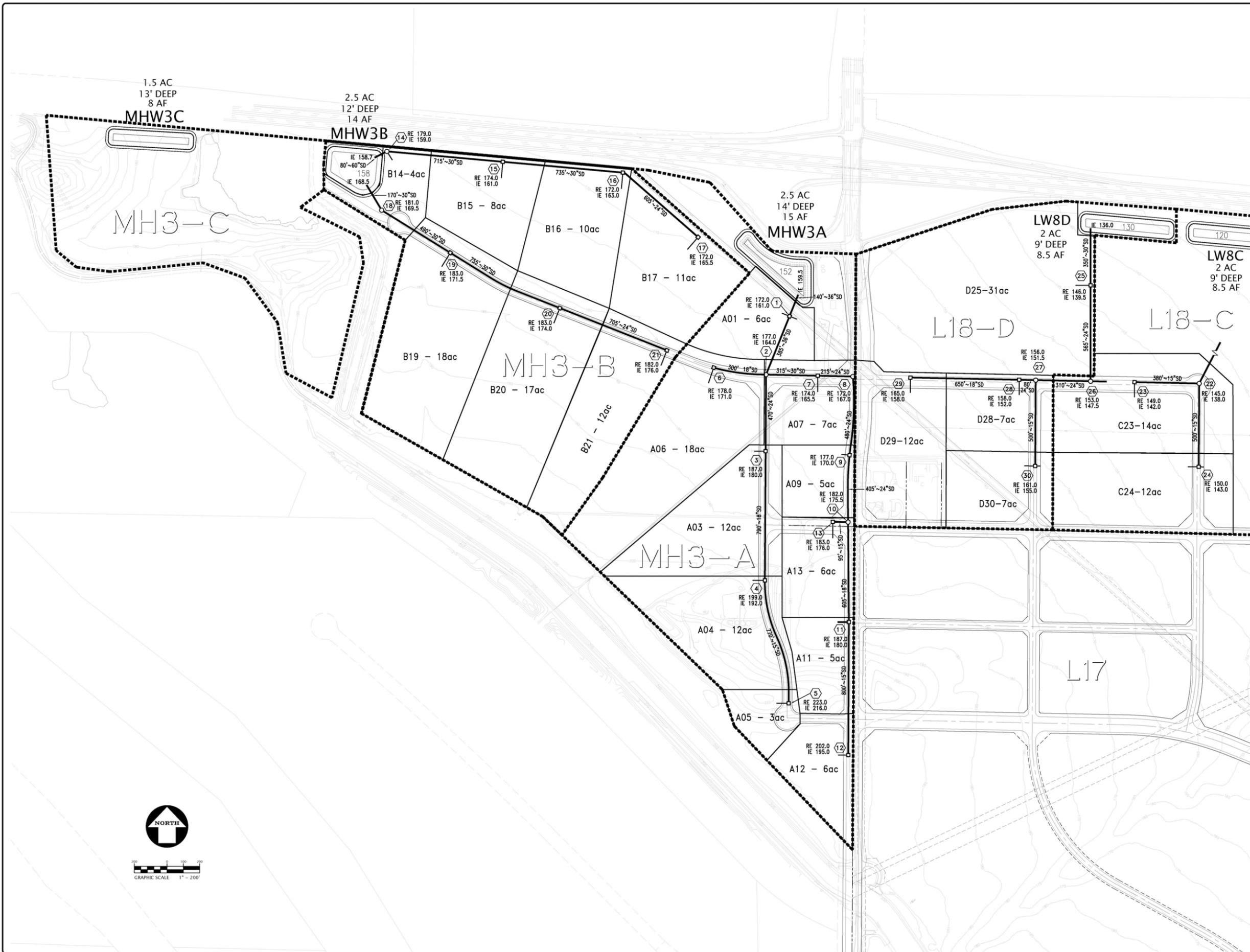
Stantec



*Storm Water
 Consulting Inc.*



GRAPHIC SCALE 1" = 200'



DATE	07/30/2012
SCALE	1" = 200'
DESIGNER	M.F.B.
JOB NO.	A09500
SHEET	HYD3
OF	SHEETS

NO.	BY	NO.	REVISION
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KIER & WRIGHT CIVIL ENGINEERS & SURVEYORS, INC. 2850 Collier Canyon Road Livermore, California 94551 (925) 245-8788 Fax: (925) 245-8796	
CALIFORNIA	TRACY

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FIGURE 5-8 Sheet 3 of 3

**PROPOSED ONSITE STORM
 DRAINS IN STREETS**

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 SWC File No. 2011-76



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 Consulting Inc.*

**Table 5-3
Opinion of Probable Cost for Onsite Storm Drainage Facilities
Cordes Ranch Specific Plan (Entire Specific Plan Area)**

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL COST
CORDES RANCH SPECIFIC PLAN				
Construction of Storm Drains In Roadways				
15" SD	13,125	LF	\$ 75	\$ 984,375
18" SD	9,475	LF	\$ 100	\$ 947,500
24" SD	11,360	LF	\$ 150	\$ 1,704,000
30" SD	10,750	LF	\$ 200	\$ 2,150,000
36" SD	8,995	LF	\$ 300	\$ 2,698,500
42" SD	6,630	LF	\$ 350	\$ 2,320,500
48" SD	4,165	LF	\$ 400	\$ 1,666,000
Dl's/Laterals, Mountain House Parkway & Schulte Road	12	EA	\$ 8,000	\$ 96,000
Central Drainage Corridor for OFF 2 Flows				
2-60" RCP Cross-Drainage Structures (3 crossings)	300	LF	\$ 600	\$ 180,000
Inlet Structure North of Capital Parks Drive	1	LS	\$ 50,000	\$ 50,000
48" SD North of Capital Parks Drive	3,000	LF	\$ 400	\$ 1,200,000
Subtotal of Construction				\$ 13,996,875
Design & Planning @ 10% of Construction Subtotal				\$ 1,399,688
Construction Management @ 10% of Construction Subtotal				\$ 1,399,688
General Contingency @ 15% of Construction Subtotal				\$ 2,099,531
Program Administration @ 5% of Construction Subtotal				\$ 699,844
Land Acquisition				
48" SD Easement North of Capital Parks Drive	1.4	AC	\$ 50,000	\$ 70,000
Subtotal of Land Acquisition				\$ 70,000
TOTAL ESTIMATED COST				\$ 19,665,625

5.4.2 Storm Water Quality Provisions for Streets

The public street system serving the Cordes Ranch Specific Plan area will need to include storm water quality treatment provisions that conform to the City's SWQC Manual. This may include storm water quality measures incorporated into the street system such as storm water planter inlets, porous pavements, infiltration trenches and vaults or other measures that provide storm water quality treatment for the flow rates and volumes required by the SWQC Manual.

As an alternative to this approach, street drainage could discharge directly to storm water quality facilities to be retrofitted into permanent detention basins. These retrofitted storm water quality facilities would be required to be sized for the storm water quality flow rates and volumes generated by the relevant contributing street systems and may consist of grass swales, extended detention basins, infiltration basins or other retrofitted measures. Storm water quality storage requirements will be in addition to flood control volume storage requirements set forth for the permanent detention basins shown in this Technical Report and the Citywide SDMP. As described in the SWQC Manual, the storm water quality storage volume required to be treated will be dependent upon a number of factors, including the contributing drainage area requiring

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**CORDES RANCH SPECIFIC PLAN
STORM DRAINAGE TECHNICAL REPORT**

Proposed Drainage Plan
December 2012



treatment, the drawdown time period assigned to the treatment measure utilized, and the design impervious percentage for the contributing area requiring treatment.

Individual development projects will be required to provide measures that comply with the City's SWQC Manual within their project sites regardless of which approach is utilized to provide storm water quality treatment for the proposed street system.