PHASE I DRAINAGE REPORT

FOR

PINE CANYON

CASTLE ROCK, COLORADO

Located in parts of Section 34, 35 & 36, Township 7 South, Range 67 West of the 6th Principal Meridian, and part of Section 1, Township 8 South, Range 67 West of the 6th Principal Meridian

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I. GENERAL LOCATION AND DESCRIPTION

A. Site Location

This Phase I Drainage Report provides a preliminary design for the Pine Canyon development located in parts of Section 34, 35 & 36, Township 7 South, Range 67 west of the 6th Principal Meridian, and part of Section 1, Township 8 South, Range 67 west of the 6th Principal Meridian and will be referred herein as the "site". The site is located on both the east and west side of I-25 between the Wilcox Street/Wolfensberger and Founders Parkway exit. The eastern portion of the site, referred to as the eastern parcels, is bounded by Founders Parkway to the east, the Scott property, undeveloped to the north, Front Street/I-25 to the west, and The Woodlands Filing 9 and 10 and Scott II – Filing 2 subdivisions to the south. The western portion of the site, referred to as the western parcels, is bounded by I-25 to the east, undeveloped land to the south, Metzler Ranch Filing No. 2 to the north, and East Plum Creek to the west. See the Vicinity Map located within Appendix A.

B. Description of Property

The overall property consists of approximately 540 acres of currently undeveloped land with slopes ranging from 2% to 45% covered in native vegetation, various species of trees, and the Castle Rock Ridgeline contributing to various rock outcroppings across the site.

The National Resource Conservation Service (NRCS) Web Soil Surveys were relied upon to determine the soil types and characteristics located on-site. Soil maps are provided in Appendix A. The soils vary throughout the site and include Bresser Sandy Loam (BrB), Bresser Sandy Loam (BrD), Fondis Clay Loam (FoD), Fondis-Kutch (Fu), Kutch Sandy Loam (KtE), Stapelton Loamy Sand (SsE). The soil types located on-site are a part of Type A, B, C, and D hydrologic soil groups. The Castle Rock Ridgeline extends through the eastern portion of the site, defining the soil characteristics of the eastern parcels. Hydrologic Soil Group D is predominantly located west of the ridgeline, while Hydrologic Soil Group C is predominantly located east of the ridgeline. The western parcels hydrologic soil group is predominantly Hydrologic Soul Group B with Hydrologic Soil Group D encompassing East Plum Creek that traverses the western parcels. Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups (A, B, C, and D) according to the rate of water infiltration. Soil group A has the most infiltration and produces the least runoff and group D has the least infiltration and produces the most runoff. See the NRCS Soil Survey Maps located within Appendix A.

East Plum Creek, a major drainageway, traverses the western border of the site. There are three (3) tributaries to East Plum Creek that convey stormwater flows through the site. Walker Tributary #1 conveys stormwater flows from the eastern parcels underneath I-25, Liggett Road, and the Union Pacific Railroad and discharges into East Plum Creek. Walker Tributary #2 conveys stormwater flows from the eastern parcels to the southern edge of the site where they are conveyed through The Woodlands Filing No. 9 and Scott II Filing No. 3 existing developments. Scott Tributary conveys stormwater flows from the eastern parcels to the north edge of the site where they are conveyed through vacant land then to Metzler Ranch Filing 1 existing development. There are no other major drainageways, existing irrigation ditches, or canals located on the site. Piping of major drainageways is typically not permissible in the Town of Castle Rock, thus if piping is required a variance will be requested.

FEMA Firm Panel Map No. 08035C0189G, Revised March 16th, 2016 and Map No. 08035C0188G, Revised March 16, 2016, were used to determine the floodplain areas located on-site. For the eastern parcels, the Walker Tributary #2 is located within a shaded region of Zone X, which are areas of moderate flood hazard having either a 0.2 percent annual chance flood risk or areas of 1% annual chance flood risk with average depths of less than 1 foot or with drainage areas less than 1 square mile. The western boundary of the project is located within the East Plum Creek floodplain, Floodway zone AE, which are areas subject to a one percent or greater annual chance of flooding (100-Year storm event) in any given year with Base Flood Elevations determined. The lower reach of Walker Tributary #2 is classified as a Major Drainageway in accordance with TOCR Floodplain Regulations. Floodplain delineations will be established at the time of site development in accordance with local Floodplain Regulations. The floodplain has been depicted on the attached drainage maps located in Appendix A.

Significant geologic features located on-site include the Castle Rock Ridgeline that contributes to various rock outcroppings located east of I-25, bisecting the eastern parcels and East Plum Creek drainageway located west of I-25, traversing across the western parcels.

The western parcels will consist of mixed-use development including, but not limited to, residential lots, multi-family areas, commercial areas that include office space and` business district, open spaces, parks, trails, roadways, utility infrastructure, a water treatment facility, and wells. The eastern parcels will consist of multi-family, school, residential, a designated commercial area, open space, parks, trails, roadways, and utility infrastructure.

II. DRAINAGE BASINS AND SUB-BASINS

A. Major Drainage Basins

The Castle Rock Ridgeline bisects the eastern portion of the site, dividing the existing historic drainage pattern between two major drainage basins. Portions of the site situated west of the ridgeline are located within the East Plum Creek Basin and portions of the site situated east of the ridgeline are located with the Cherry Creek Basin. No major basin transfers are proposed. There may be transfers between minor basins, but flows will not exceed historic rates. See the Drainage Maps located within Appendix E for additional detail.

Cherry Creek Basin

Portions of the site situated east of the ridgeline are located within the Cherry Creek Basin. These portions of the project within Cherry Creek Basin are subject to Department of Public Health and Environment Water Quality Control Commission Cherry Creek Reservoir Control Regulation 5 CCR 1002-72. This portion of the site is currently undeveloped and will consist of multi-family and single-family residential developments. Flows from this portion of the site flow from the ridgeline to the east and are conveyed through the Castle Oaks Estates (Terrain) Planned Development, into McMurdo Gulch, and ultimately into Cherry Creek. There are no other major drainageways, existing irrigation ditches, or canals located on this portion of the project. No major basin transfers are proposed. There may be transfers between minor basins, but flows will not

exceed historic rates. Piping of major drainageways is typically not permissible in the Town of Castle Rock, thus if piping is required a variance will be requested.

East Plum Creek Basin

Portions of the site situated west of the ridgeline are located within the East Plum Creek Basin. This portion of the site is currently undeveloped and will consist of multi-family, single-family residential, school, commercial mixed-use, and business district. Flows from this portion of the site flow from ridgeline to the west where they are then conveyed under I-25, Front Street, Liggett Road, and the Union Pacific Railroad via existing culvert crossings and are channelized in three tributary drainageways, Walker Tributary #1, Walker Tributary #2, and Scott Tributary. These flows are then conveyed into East Plum Creek which traverses the western border of the site. East Plum Creek flows from south to north, conveying all flows from this portion of the site ultimately to the South Platte River. Walker Tributary #1, Walker Tributary #2, and Scott Tributary are located onsite. There are no other major drainageways, existing irrigation ditches, or canals located on the site. No major basin transfers are proposed. There may be transfers between minor basins, but flows will not exceed historic rates. Piping of major drainageways is typically not permissible in the Town of Castle Rock, thus if piping is required a variance will be requested. A summary of the various outfalls and their tributary areas is provided below:

Summary of Tributary Areas					
Overall Watershed	Tributary	Existing Tributary Area	Proposed Tributary Area	Δ	Δ
		(Ac)	(Ac)	(Ac)	%
East Plum Creek	Drains Directly to Plum Creek	41.3	40.7	-0.6	-1.5%
	Walker Tributary #1	346.2	384.0	37.8	10.9%
	Walker Tributary #2	114.6	101.8	-12.8	-11.2%
	Walker Tributary #2 via The Woodlands	12.4	26.1	13.8	111.4%
	Hangman's Gulch via Front St	90.5	56.0	-34.5	-38.2%
	Hangman's Gulch via The Woodlands	32.9	25.3	-7.6	-23.2%
	Scott Tributary	106.0	111.9	5.9	5.6%
Cherry Creek	McMurdo Gulch	63.1	63.1	0.0	-0.1%

The site is currently undeveloped and will be developed to have various commercial, mixed-use, municipal, and residential land uses. Offsite flows will be routed through the site and will maintain their historic drainage patterns. No improvements or development is anticipated within East Plum Creek.

B. Minor Drainage Basins

The proposed drainage basins delineated within this report generally reflect historical drainage patterns of the site. Proposed detention ponds will control discharge into existing drainageways or existing drainage infrastructure at historic, or below historic,

flow rates to comply with stormwater requirements of Castle Rock, Douglas County, and Cherry Creek Basin Water Quality Authority. Offsite flows will be conveyed through the site to maintain their historic drainage patterns. Fully developed conditions are assumed for offsite flows if this information is available, otherwise offsite flows are based on existing conditions.

Several minor basins discharge detained flows into off-site drainageways or existing drainage infrastructure of previously developed areas. Basins G, I, and K discharge directly to the Woodlands development, Basins L and M discharge directly to the Castle Oaks Estates development, Basins J and H discharge indirectly to the Metzler Ranch development via Scott's Tributary drainageway, and Basin E discharges directly to Hangman's Gulch drainageway. Further details relative to these discharges will be provided in future Phase II and Phase III reports.

The Drainage Maps included in the Appendix show sub-basin boundaries and acreages. The proposed basins are described as below:

East Plum Creek Basin

Basin A (15.77 Ac)

Basin A is currently undeveloped and drains directly to East Plum Creek, which traverses the basin. This basin appears to convey offsite flows to East Plum Creek from an existing industrial area to the east (Hier Drilling), although this drainage design cannot be confirmed through existing construction documents or reports. This basin is anticipated to be open space and includes portions of the existing Union Pacific Railroad. This basin is comprised of a portion of existing Basin EX1.

Basin B (16.99 Ac)

Basin B is currently undeveloped and conceptually consists of open channel, undeveloped open space, and portions of the existing Union Pacific Railroad. Walker Tributary #1 is located in the northern portion of Basin B and discharges directly into East Plum Creek. This basin is comprised of a portion of existing Basin EX1.

Basin C (18.10 Ac)

Basin C is currently undeveloped and is tributary to the Walker Tributary #1, which bisects the center of the site and flows west underneath the railroad in an existing culvert. This basin is comprised of existing Basin EX5. Basin C will consist of a commercial/business park and a small portion of dedicated open space. Stormflows from the eastern parcels as well as from Basin D will be routed through the Basin. Runoff from Basin C will be detained in Pond C and released into the Walker Tributary #1 drainageway at historic rates. Walker Tributary #1 will likely be relocated or piped along the western edge (railroad) to accommodate the proposed land plan. Piping of major drainageways is typically not permissible in the Town of Castle Rock, thus if piping is required a variance will be requested.

Basin D (51.63 Ac)

Basin D is currently undeveloped and is tributary to the Walker Tributary #1, which traverses the southern edge of the basin and flows west underneath Liggett Road in existing culverts. Basin D will consist of a commercial/business park and a small portion of dedicated open space. Storm flows from the eastern parcels will be routed through the

Basin. Runoff from Basin D will be detained in Pond D and released into the existing culverts below Liggett Road and ultimately to the Walker Tributary #1 drainageway at historic rates. The tributary will be piped or will remain in its existing state along the southern edge of the basin and discharge into an existing culvert located underneath Liggett Road, to be determined with future phases. Piping of major drainageways is typically not permissible in the Town of Castle Rock, thus if piping is required a variance will be requested. Offsite flows from northeast of Basin D will be piped through the northern portion of the basin consistent with the existing drainage pattern. This basin is comprised of portions of existing basins EX6 and EX8.

Basin E (25.27 Ac)

Basin E is currently undeveloped. In the existing condition, the majority of the basin is tributary to Walker Tributary #1 and a minor portion is tributary to Hangman's Gulch via the Scott II Filing No. 3 and Castle Terrace developments. In the proposed condition, this basin will be tributary to Hangman's Gulch. This basin is comprised of existing basins EX9, EX10, and EX28. Basin E will consist of multi-family units and parks. Stormflows from Basin O and F will be routed through the eastern portion of the Basin. The majority of the runoff from Basin E will be detained in Pond E and released into the existing Front Street storm sewer system to Hangman's Gulch at historic rates.

Basin F (38.19 Ac)

Basin F is currently undeveloped. In its existing condition, this basin is tributary to both Walker Tributary #1 and Hangman's Gulch via the Scott II Filing No. 3 and Castle Terrace developments. In the proposed condition this basin is tributary to Walker Tributary #1. This basin is comprised of existing basins EX9 and EX28. Basin F will consist of open-space and single-family residential units. Runoff from Basin F will be detained in Pond F and released into a proposed stormwater system that will discharge to Walker Tributary #1 at historic rates.

Basin G (101.79 Ac)

Basin G is currently undeveloped and located in the south central portion of the site. This basin is comprised of existing basin EX15, as well as portions of EX11 and EX18. The basin historically drains to the Walker Tributary #2 which is tributary to Hangman's Gulch. Basin G will consist of dedicated open-space and single-family development. Runoff from Basin G will be conveyed to Walker Tributary #2 which will generally remain a natural drainageway that drains into Pond G. Flows from Pond G will then be released at historic rates into Hangman's Gulch.

Basin H (67.28 Ac)

Basin H is currently undeveloped and drains to Scott's Tributary. The basin consists of runoff from the north-central portion of the site that historically drains to Scott's Tributary and is conveyed to a storm sewer within Metzler Ranch Filing No. 1. This basin is comprised of portions of existing basins EX11, EX12, and EX13. Basin H will consist of single-family units and a park area. Runoff from Basin J will be routed through the basin. Runoff from Basin H will be conveyed to Pond H where flows will be released at historic rates into the existing Scott's Tributary drainageway.

Basin I (26.11 Ac)

Basin I is currently undeveloped and is tributary to Hangman's Gulch. This basin is comprised of existing basin EX18, as well as portions of EX15 and EX20. The basin consists of runoff from the southeastern portion of the site that historically drains to the Woodlands Filing No. 9 drainageway where it is conveyed to Hangman's Gulch. Basin I will consist of single-family units and open space. Runoff from Basin I will be conveyed to Pond I where flows will be released at historic rates into the Woodlands Filing No. 9 development.

Basin J (44.57 Ac)

Basin J is currently undeveloped and drains to Scott's Tributary. This basin is comprised of portions of existing basins EX11, EX12, EX13, and EX15. Basin J will consist of single-family units, open space, and a resort. Runoff from Basin J will be conveyed to Pond J where flows will be released at the historic rate and conveyed through Basin H to the existing Scott's Tributary drainageway. From there, runoff is conveyed to a storm sewer within Metzler Ranch Filing No. 1, consistent with historic drainage patterns.

Basin K (25.30 Ac)

Basin K is currently undeveloped and is tributary to Hangman's Gulch. This basin consists of existing basin EX19. This basin is located in the southeastern portion of the site that historically drains to the Woodlands Filing No. 10 & 12 storm sewer, and eventually Hangman's Gulch. Basin K will consist of single-family units and open space. Runoff from Basin K will be conveyed to Pond K where flows will be released at historic rates into the Woodlands development.

Basin N (18.78 Ac)

Basin N is currently undeveloped and drains directly to East Plum Creek, which traverses the basin. This basin consists of portions of existing basin EX1. This basin appears to convey offsite flows to East Plum Creek from an existing industrial area to the east (Hier Drilling), although this drainage design cannot be confirmed through existing construction documents or reports. This basin is anticipated to be open space - development is not anticipated within the basin.

Basin O (43.86 Ac)

Basin O is currently undeveloped. In its existing condition it is tributary to both Walker Tributary #1 and Hangman's Gulch via Scott II Filing No. 3. When developed, this basin will be tributary to Walker Tributary #1. This basin consists of portions of existing basins EX9 and EX28. Basin O will consist of a school, open space, and single-family units. Stormflows from Basin F will be routed through the northern portion of the basin. Runoff from Basin O will be detained in Pond O and released into Walker Tributary #1 at historic rates.

Cherry Creek Basin

Basin L (28.76 Ac)

Basin L is currently undeveloped and is tributary to McMurdo Gulch which eventually discharges to Cherry Creek. This basin consists of existing basins EX14, EX16 and EX25. The basin consists of runoff from the northeast portion of the site which historically drains

to the existing culvert underneath Founders Parkway. Basin L will consist of open space and residential units. Runoff from Basin L will be conveyed to Pond L where flows will be released at historic rates into the Founders Parkway roadside ditch and the culvert that crosses into the Castle Oaks Estates development. No major basin transfers are proposed.

Basin M (34.31 Ac)

Basin M is currently undeveloped and is tributary to McMurdo Gulch which eventually discharges to Cherry Creek. This basin consists of portions of existing basins EX14, EX16, and EX25. The basin consists of runoff from the southeast portion of the site which historically drains to existing culverts underneath Founders Parkway. Basin M will consist of residential units. Runoff from Basin M will be conveyed to Pond M where flows will be released at historic rates into the Founders Parkway culverts that cross into the Castle Oaks Estates development.

Off-Site Basins

Basin OS1 (10.71 Ac)

Basin OS1 is currently undeveloped and drains to Walker Tributary #1 through Basin B. This basin consists of a portion of existing basin EX4. Runoff from this Basin will be conveyed through Basin B to Walker Tributary #1 consistent with the historic flow pattern. The zoning for this basin is public land.

Basin OS2 (29.10 Ac)

Basin OS2 is an existing agricultural property with associated buildings and a residence. It drains to Walker Tributary #1 through Basin D. This basin consists of a portion of existing basin EX8. Runoff from this Basin will be conveyed within Walker Tributary #1 to the existing culverts under Liggett Road consistent with the historic flow pattern. The zoning for this basin is general industrial.

Basin OS3 (23.57 Ac)

Basin OS3 is currently undeveloped and is tributary to Walker Tributary #1. This basin consists of existing basin EX9. The basin consists of off-site runoff from the unplatted Scott parcel to the north of Basin E. Runoff from this Basin will be conveyed within Walker Tributary #1 and the existing culverts under Front Street and I-25. The future land use for this basin is unknown.

Basin EX2 (18.16 Ac)

Basin EX2 is currently developed and consists of I-25, Front St, and a portion of Hazen Moore Filing No. 1. This basin drains to an existing culvert under I-25 and eventually to Walker Tributary #1. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

Basin EX3 (26.84 Ac)

Basin EX3 is currently developed and consists of Metzler Ranch Filing No. 2 and a detention pond to serve the development. The pond discharges to Walker Tributary #1. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

Basin EX7 (19.90 Ac)

Basin EX7 is currently developed and consists of Castle Lock Self Storage and a detention pond to serve the development. The pond appears to discharge to Walker Tributary #1. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

Basin EX21 (6.53 Ac)

Basin EX21 is currently developed and consists of commercial development. This basin appears to discharge via sheet flow to open space onsite and then East Plum Creek. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

Basin EX22 (6.73 Ac)

Basin EX22 is currently developed and consists of Storquest Self Storage and a detention pond to serve the development. The pond discharges to open space onsite and then East Plum Creek. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

Basin EX23 (35.20 Ac)

Basin EX23 is currently developed and consists of Metzler Ranch Filing No. 8, Hazen Moore Filing No. 1, and a detention pond to serve both developments. The pond discharges to an existing storm sewer crossing underneath Front Street and I-25. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

Basin EX24 (51.70 Ac)

Basin EX24 is currently developed and consists of Hazen Moore Filing No. 2, open space, and a detention pond to serve the development. The pond discharges to a storm sewer that travels through Hazen Moore Filing No. 1 to Walker Tributary #1. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

Basin EX26 (12.30 Ac)

Basin EX26 is currently developed and consists of Scott II Castle Terrace and a detention pond to serve the development. The pond discharges to Hangman's Gulch via existing storm sewer in Front Street. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

Basin EX27 (18.41 Ac)

Basin EX27 is currently developed and consists of Scott II Filing No. 3 and a detention pond to serve the development. The pond discharges onsite and is routed to Hangman's Gulch via existing storm sewer in Front Street. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

III. EXISTING STORMWATER CONVEYANCE AND STORAGE FACILITIES

A. Existing Stormwater Conveyance Facilities

Numerous existing stormwater conveyance facilities will be maintained or modified within the overall site stormwater design. All improvements to existing drainageways and tributaries will be discussed in further detail within subsequent drainage reports.

The general alignment of Walker Tributary #1 drainage will be maintained, and it is anticipated that it will be replaced with proposed storm sewer infrastructure or open channel within each planning area based on land uses and site layouts. Smaller drainageways that contribute to the Walker Tributary #1 on-site will be rerouted due to the proposed development and conveyed to proposed stormwater storage facilities. Natural drainageways may require additional stabilization and will be determined in subsequent detailed drainage reports. No major basin transfers are proposed. There may be transfers between minor basins, but flows will not exceed historic rates. Piping of major drainageways is typically not permissible in the Town of Castle Rock, thus if piping is required a variance will be requested.

The general alignment of Walker Tributary #2 drainage will be maintained. It is anticipated that it will be replaced with proposed storm sewer infrastructure or open channel within the planning area based on land use and site layout. Smaller drainageways that contribute to the Walker Tributary #2 on-site will be rerouted due to the proposed development and conveyed to a proposed stormwater storage facility. Walker Tributary #2 is included in the Hangman's Gulch and Parkview Tributary Drainageway Master Plan, prepared for the Town of Castle Rock, that requires stability improvements within the drainageway. The final configuration of the drainage infrastructure associated with the development of the property, and any stability improvements within the project boundary, will be determined in subsequent detailed drainage reports. A map excerpt from the master plan is included in Appendix D.

The existing culverts located underneath Founders Parkway, I-25, Front Street, Liggett Road, and the Union Pacific Railroad will be utilized in the final design for the proposed pond release and rerouting of off-site flows. Ponds will release flows at the historic flow rates.

The off-site existing drainageways to the north and south of the development will remain and convey stormwater runoff from the development.

East Plum Creek will remain undisturbed to reduce development impacts to the floodplain and no improvements are anticipated at this time.

B. Existing Stormwater Storage Facilities

There are minimal existing stormwater storage facilities located on the site. A small agricultural pond is located on the northeast corner of Basin D and it is believed this pond currently detains stormwater runoff from I-25 and the adjacent roadside ditch. This pond is situated in the upper reach of Basin D and due to elevation constraints will not be utilized to detain developed flows from Basin D and may be removed during the development of this Planning Area.

IV. PROPOSED STORMWATER CONVEYANCE AND STORAGE FACILITIES

A. Proposed Stormwater Conveyance Facilities

The site will generally follow the historic drainage pattern with some minor rerouting due to the proposed development in each planning area respectively. Proposed detention ponds will be utilized and are generally located on the Drainage Map. The detention pond

locations are conceptual and are subject to adjustments through the design of each Planning Area. It is noted, that utilizing grading and stormwater conveyance measures that there may be the opportunity during final design to consolidate detention facilities. This will create an opportunity for an urban environment that will preserve natural drainage patterns. Off-site runoff entering the site will be routed through the site to generally maintain the historical drainage pattern, except for Walker Tributary #1 will be piped and routed through the western parcels to accommodate final land plan, and a portion of Basin E will be routed to the culverts crossing under Front Street and I-25 rather than flowing through the Scott II Filing No. 3 development. Piping of major drainageways is typically not permissible in the Town of Castle Rock, thus if piping is required a variance will be requested.

No drainage conveyance problems are anticipated with this project, as stormwater flows will generally be conveyed within each Planning Area to localized detention facilities where flows will be discharged to the existing adjacent drainageways. All drainage conveyance facilities will be designed with suitable access and maintenance that will meet the requirements of the Town of Castle Rock Storm Drainage Design and Technical Criteria Manual.

The proposed site will utilize a combination of curb/gutter, inlets, swales/channels, and storm pipe to convey stormwater to the proposed staging facilities. Any additional information regarding the specific conveyance elements or designs will be discussed in subsequent detailed studies. All public conveyance elements will be owned and maintained by the Town. All private conveyance elements will be owned and maintained by a metropolitan district, HOA, or private entity. The Site will be graded to minimize drainage through lots. A subsurface storm sewer will be provided to collect runoff.

A grass swale or constructed wetland channel are included in additional water quality treatment measures under consideration for the Walker Tributary #1 reach from the Union Pacific Railroad to the confluence with East Plum Creek. These measures also provide conveyance and are discussed further in Section V. B. of this report.

B. Proposed Stormwater Storage Facilities

The site will utilize extended detention ponds for water quality and storage. The proposed development will either have a new detention pond or will be able to utilize and reconfigure the existing agricultural ponds. The ponds and outlet structures will be designed as Extended Detention Basins (EDB) that provide storage for the Water Quality Capture Volume (WQCV), Excess Urban Runoff Volume (EURV), and the 100-year storm event that will release at the historic rates. The EDBs provide full spectrum detention meaning they utilize capture and slow release of the EURV. The WQCV represents runoff from frequent storm events such as the 80th percentile runoff-producing event. The EURV represents the difference between the developed and pre-developed runoff volume for the range of storms that produce runoff (generally greater than the 2-year event). Detention pond volumes for each basin will be calculated using the Mile High Flood District (MHFD) spreadsheet for full-spectrum detention. A maintenance access road, per Town of Castle Rock design criteria, shall be provided for access to each outlet structure. Maintenance of the ponds will be provided by the Metropolitan District or HOA. The final layout and location of the proposed ponds are subject to change and will be detailed in subsequent reports as the ponds have been preliminarily located based on the historic

flow paths. The ponds may also be split into multiple smaller ponds to accommodate final land plans.

Efforts during final design of the detention facilities will be made to locate the ponds in areas that will allow the preservation of existing slopes, trees, vegetation, and other natural features. In addition, the detention facilities shall be designed within the existing natural drainage corridors to promote natural design and aesthetics of the drainage facilities.

V. WATER QUALITY AND BEST MANAGEMENT PRACTICES

A. Non-Structural Best Management Practices

The drainage design for the Pine Canyon development will incorporate the non-structural Best Management Practices (BMP's) as outlined in Volume 3 of the MHFD Drainage Criteria Manual. A BMP is a method used to prevent or control stormwater runoff and the discharge of pollutants, including sediment, into local waterbodies. Silt fences, inlet protection, and site-stabilization techniques are typical BMPs on a construction site. Individual BMP's will be determined for each site within the development during final design. The major runoff pollutant generated from lawns will be phosphorus contained in fertilizers. Paved areas will generate pollutants such as oil, gasoline, etc. The concept of pollutant removal as recommended in Volume 3 of the MHFD Drainage Criteria Manual will be implemented in this development.

B. Structural Best Management Practices

The developer is considering Low Impact Design (LID) for stormwater discharge principles in the drainage design of the Pine Canyon development. The drainage design for Pine Canyon will incorporate several different types of structural Best Management Practices (BMP's) as outlined in Volume 3 of the MHFD Drainage Criteria Manual. Such structural BMP's may include Extended Detention Basins (EDB), Grass Swales (GS), Grass Buffers (GB), and Porous Landscape Detention (PLD). The design and location of these BMP's will be determined in subsequent reports. For this report, detention ponds have been conceptually located as shown on the drainage plan. Ponds are designed to collect, and detain, runoff and discharge at historic rates. Regular maintenance will occur to ensure that the BMP's function properly. Maintenance access will also be designed for each BMP in subsequent reports. Water quality measures have been included in the design of the proposed extended detention basins. The basins are designed to incorporate structures that release flows for the Water Quality Capture Volume (WQCV), Excess Urban Runoff Volume (EURV), and the 100-year storm event. Engineered Grass Swale, Constructed Wetland Pond, or Constructed Wetland Channel, as outlined in Volume 3 of the MHFD Drainage Criteria Manual, may be included to reduce the sediment and pollutants in the discharged stormwater.

MHFD describes the above-mentioned Treatment BMPs as follows:

Grass Swale

Grass swales are densely vegetated trapezoidal or triangular channels with low-pitched side slopes designed to convey runoff slowly. Grass swales have low longitudinal slopes and broad cross-sections that convey flow in a slow and shallow manner, thereby

facilitating sedimentation and filtering (straining) while limiting erosion. Berms or check dams may be incorporated into grass swales to reduce velocities and encourage settling and infiltration.

Grass swales are well suited for sites with low to moderate slopes. Drop structures or other features designed to provide the same function as a drop structures (e.g., a driveway with a stabilized grade differential at the downstream end) can be integrated into the design to enable use of this BMP at a broader range of site conditions.

Constructed Wetland Pond

A constructed wetlands pond is a shallow retention pond designed to permit the growth of wetland plants such as rushes, willows, and cattails. Constructed wetlands slow runoff and allow time for sedimentation, filtering, and biological uptake.

Constructed wetlands ponds differ from "natural" wetlands, as they are artificial and are built to enhance stormwater quality. Do not use existing or natural wetlands to treat stormwater runoff. Stormwater should be treated prior to entering natural or existing wetlands and other environmentally sensitive areas. Allowing untreated stormwater to flow into existing wetlands will overload and degrade the quality of the wetland. Sometimes, small wetlands that exist along ephemeral streams on Colorado's high plains can be enlarged and incorporated into the constructed wetland system. Such actions, however, require the approval of federal and state regulators.

Regulations intended to protect natural wetlands recognize a separate classification of wetlands, constructed for water quality treatment. Such wetlands generally are not allowed to be used to mitigate the loss of natural wetlands but are allowed to be disturbed by maintenance activities. Therefore, the legal and regulatory status of maintaining a wetland constructed for the primary purpose of water quality enhancement is separate from the disturbance of a natural wetland. Nevertheless, any activity that disturbs a constructed wetland should be cleared through the U.S. Army Corps of Engineers to ensure it is covered by some form of an individual, general, or nationwide 404 permit.

A constructed wetland pond requires a positive net influx of water to maintain vegetation and microorganisms. This can be supplied by groundwater or a perennial stream. An ephemeral stream will not provide adequate water to support this BMP. A constructed wetland pond is best used as a follow-up BMP in a watershed, although it can serve as a stand-alone facility.

Constructed Wetland Channel

A constructed wetland channel is a conveyance BMP that is built, in part, to enhance stormwater quality. Constructed wetland channels use dense vegetation to slow down runoff and allow time for both biological uptake and settling of sediment.

Constructed wetlands differ from natural wetlands, as they are artificial and are built to enhance stormwater quality. Do not use existing or natural wetlands to treat stormwater runoff. Stormwater should be treated prior to entering natural or existing wetlands and other environmentally sensitive areas. Allowing untreated stormwater to flow into existing wetlands will overload and degrade the quality of the wetland.

The relationship with existing wetlands, regulations, and permitting for constructed wetland ponds also apply to constructed wetland channels.

Constructed wetland channels provide conveyance of stormwater similar to a grass swale; however, this BMP is appropriate when a baseflow can be anticipated. A constructed wetland channel requires a net influx of water to maintain vegetation and microorganisms. This can be supplied by groundwater or a perennial stream. An ephemeral stream may not provide adequate water. In addition to water supply, loamy soils are needed in the wetland bottom to permit plants to take root. Wetland channels also require a near-zero longitudinal slope; drop structures can be used to create and maintain a flat grade.

VI. FLOODPLAIN MODIFICATIONS

A. Major Drainageway – Undesignated Floodplain

During preliminary and final design, the un-delineated major drainageway floodplains will be identified and delineated. Efforts will be made to protect and preserve the natural drainageways that traverse the site. Impacts will be limited to improvements in the areas of discharges from the proposed detention facilities and will conform to the TOCR drainage criteria. These improvements will be designed to mitigate erosion and preserve the natural character and historical drainage patterns to the greatest extent feasible.

B. Major Drainageway – Designated Floodplain

Potential modifications to both Walker Tributary #1 and Walker Tributary #2, shaded zone X as defined by the FEMA Flood Insurance Rate Maps (FIRM), may include realignment, piping, and channel stabilization. No floodplain modifications for East Plum Creek are anticipated, and the area adjacent to the floodplain is anticipated to mainly remain open space.

Design measures will help minimize the adverse effects due to the increase in runoff within the drainageways. The impact of proposed development on the area will be well mitigated and the steps taken for water quality control will exceed the usually required measures by Town of Castle Rock and MHFD. Impacts and stability analysis to the Major Drainageways will be further studied and analyzed during the subsequent detailed drainage studies.

If modifications to the existing floodplains are required, then they will result in a revision to the FIRM map. This is done by submitting a Conditional Letter of Map Revision (CLOMR). A CLOMR outlines the reasoning for the change and defines the new floodplain. After improvements to the drainageways are complete, a Letter of Map Revision (LOMR) is submitted to show that the channel improvements were constructed to the specifications outlined in the CLOMR and that the floodplain is accurately mapped.

VII. POTENTIAL PERMITTING REQUIREMENTS

Additional permitting through the State of Colorado and/or Army Corps of Engineers may be required if wetlands are disturbed or created. No significant impacts to wetlands are expected. Additional permitting through FEMA may be required if floodplain modifications are made. As discussed in the previous section, no floodplain modifications are needed for East Plum Creek, although Walter Tributary may be modified.

VIII. CONCLUSIONS

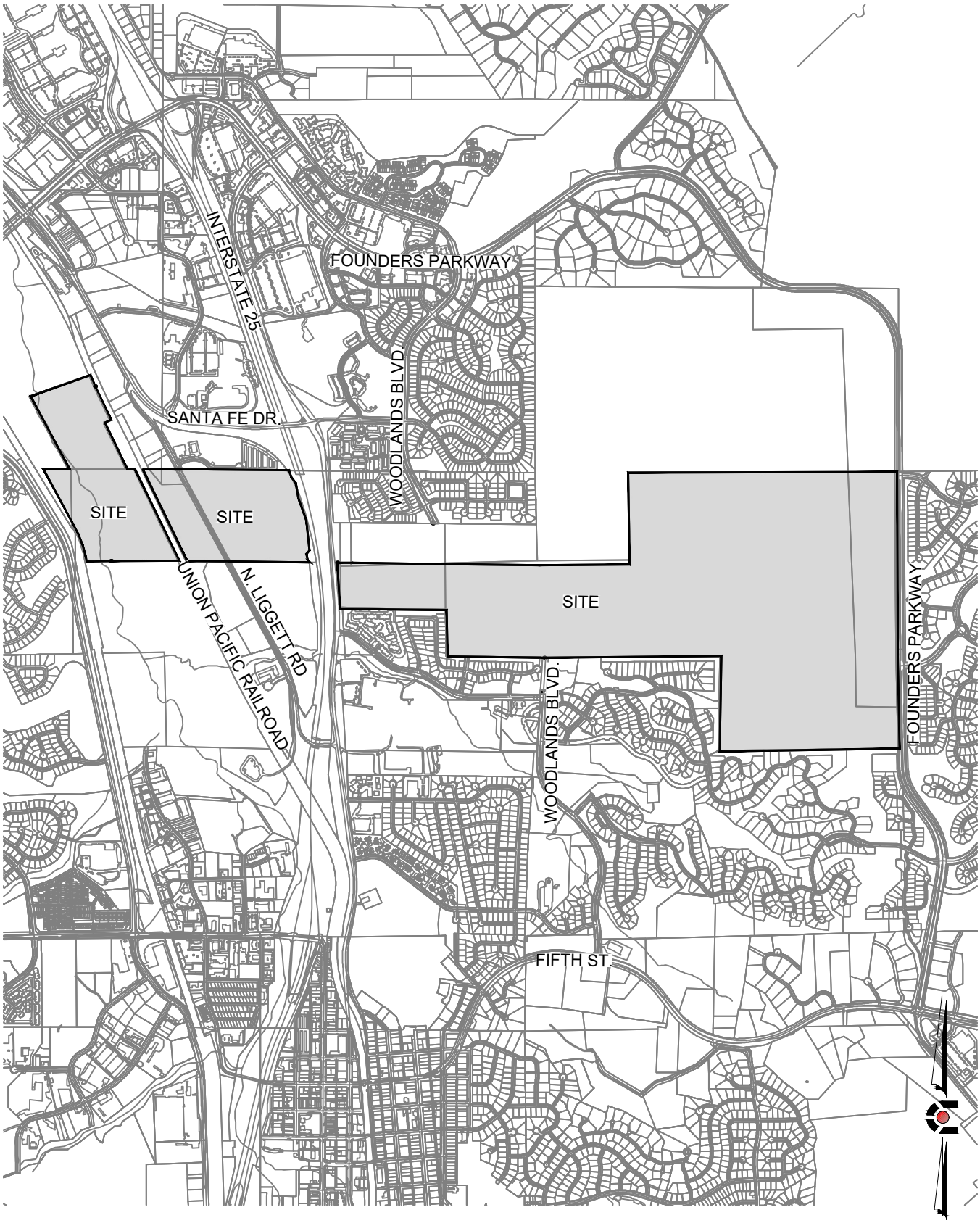
In conclusion, the drainage for Pine Canyon will be designed such that existing drainage patterns are improved or maintained. Drainage infrastructure across the Site will provide water quality and flood control for runoff produced by the development as well as offsite flows. There will be no negative drainage impacts to adjacent infrastructure including CDOT highways, roads, and neighborhoods due to the Pine Canyon development.

IX. REFERENCES

1. Town of Castle Rock, Colorado. February 2025. Storm Drainage Design And Technical Criteria Manual.
2. MHFD (Mile High Flood District). Revised March 2024. Urban Storm Drainage Criteria Manual. Volume 1.
3. MHFD (Mile High Flood District). Revised September 2017. Urban Storm Drainage Criteria Manual. Volume II.
4. MHFD (Mile High Flood District). Revised March 2024. Urban Storm Drainage Criteria Manual. Volume III.
5. FEMA (Federal Emergency Management Agency). Revised March 16, 2016. Flood Insurance Rate Map (FIRM) No. 08035C0189G and No. 08035C0188G.
6. Final Drainage Report for Metzler Ranch Filing No. 1; Rocky Mountain Consultants, Inc.; February 1998.
7. Final Drainage Report for Scott II Filing No. 3; Rocky Mountain Consultants, Inc.; May 1994.
8. Final Drainage Report for Castle Terrace; Rocky Mountain Consultants, Inc.; September 1996.
9. The Woodlands Filing No. 9 Phase III Drainage Report; Merrick & Company; November 20, 1998.
10. Phase III Drainage Report for The Woodlands Filing No. 10; Peak Civil Consultants, Inc.; August 2000.
11. Phase III Drainage Report for The Woodlands Filing No. 12; Peak Civil Consultants, Inc.; June 2000.
12. Castle Oaks Estates Filing No. 1 Phase III Drainage Report; Nolte & Associates; September 25, 2003.
13. Castle Oaks Estates Filing No. 1 – Amendment No. 2 Phase III Drainage Report; Nolte & Associates; June 2006.
14. Hangman's Gulch and Parkview Tributary Drainageway Master Plan; Hartwig & Associates and Stephen W. Rogers Consulting; Adopted February 23, 2013.

APPENDIX A

VICINITY MAP
FIRM MAP
NCRS SOIL CLASSIFICATION MAP



CORE CONSULTANTS

0 2000'

1 inch = 2000 ft.

PINE CANYON
VICINITY MAP

CREATED BY: MJG DATE: 03/31/2020

SHEET NUMBER 1 OF 1 SHEETS

JOB NUMBER 19-160

3/29/2020 1:33 PM - X:\19-160 PINE CANYON\CIVIL\CAD\PLANS_OVERALL\VIP MAP\PINE CANYON VIP MAP.DWG;

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

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The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
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Silver Spring, Maryland 20910-3282
(301) 713-3242

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The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

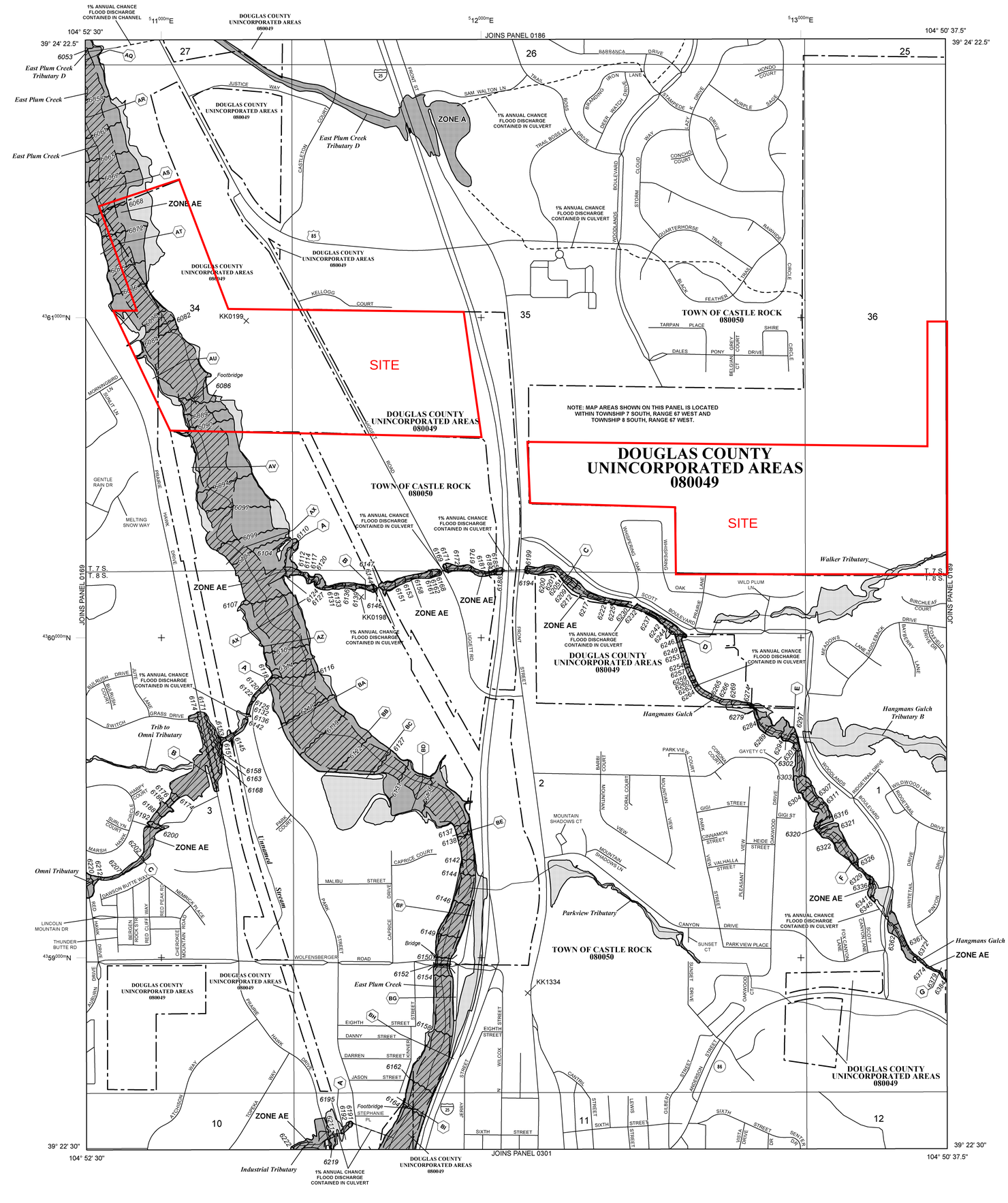
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LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
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- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
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- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
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- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

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Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

SEPTEMBER 30, 2005

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

MARCH 16, 2016: to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to update map format, to add roads and road names, to reflect updated topographic information, to incorporate previously issued letters of map revision.

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MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0188G

FIRM

FLOOD INSURANCE RATE MAP

DOUGLAS COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 188 OF 495
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CASTLE ROCK, TOWN OF	080050	0188	G
DOUGLAS COUNTY	080049	0188	G

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08035C0188G
MAP REVISED
MARCH 16, 2016

Federal Emergency Management Agency

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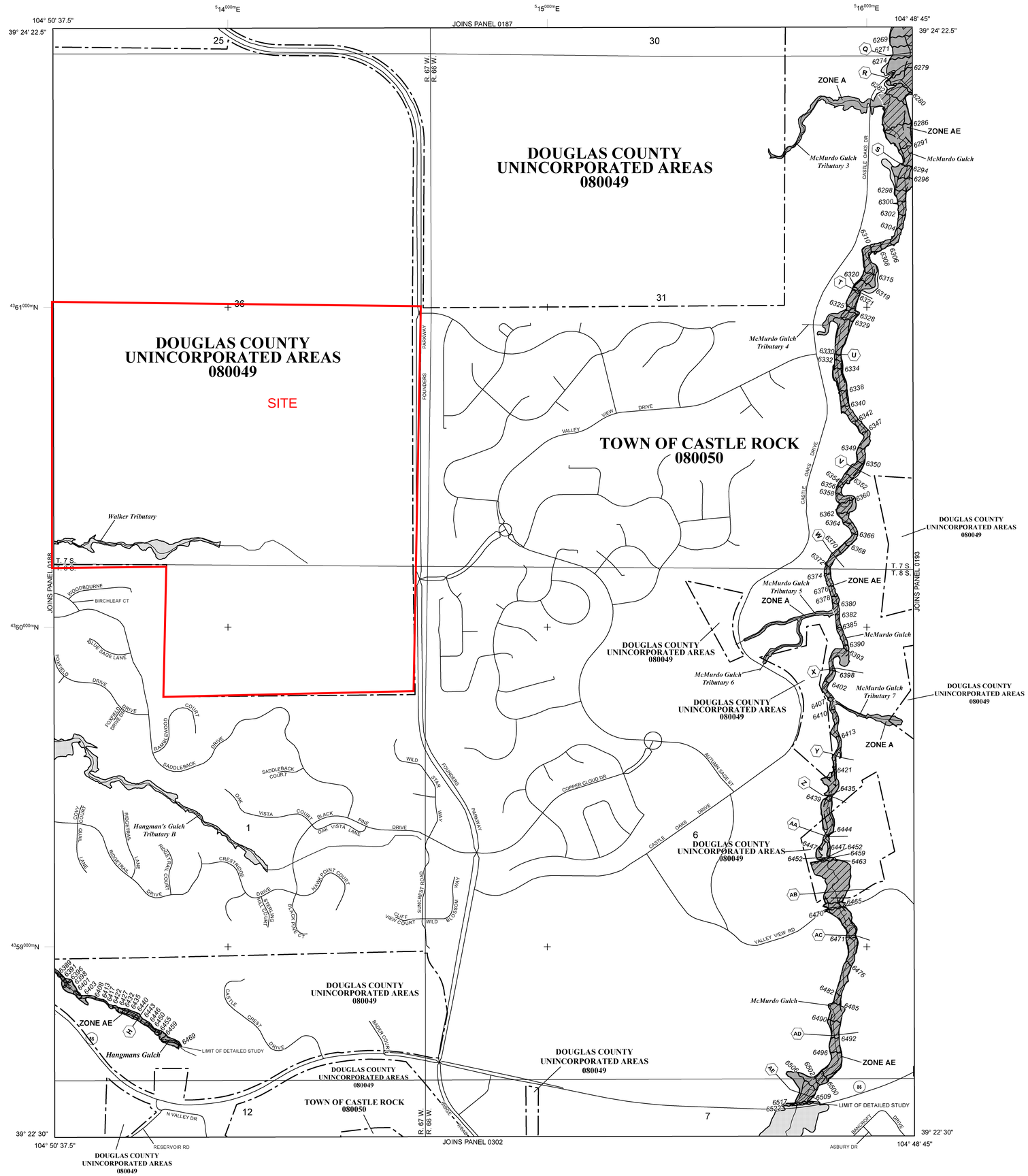
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NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0189G

FIRM

FLOOD INSURANCE RATE MAP

DOUGLAS COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 189 OF 495
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

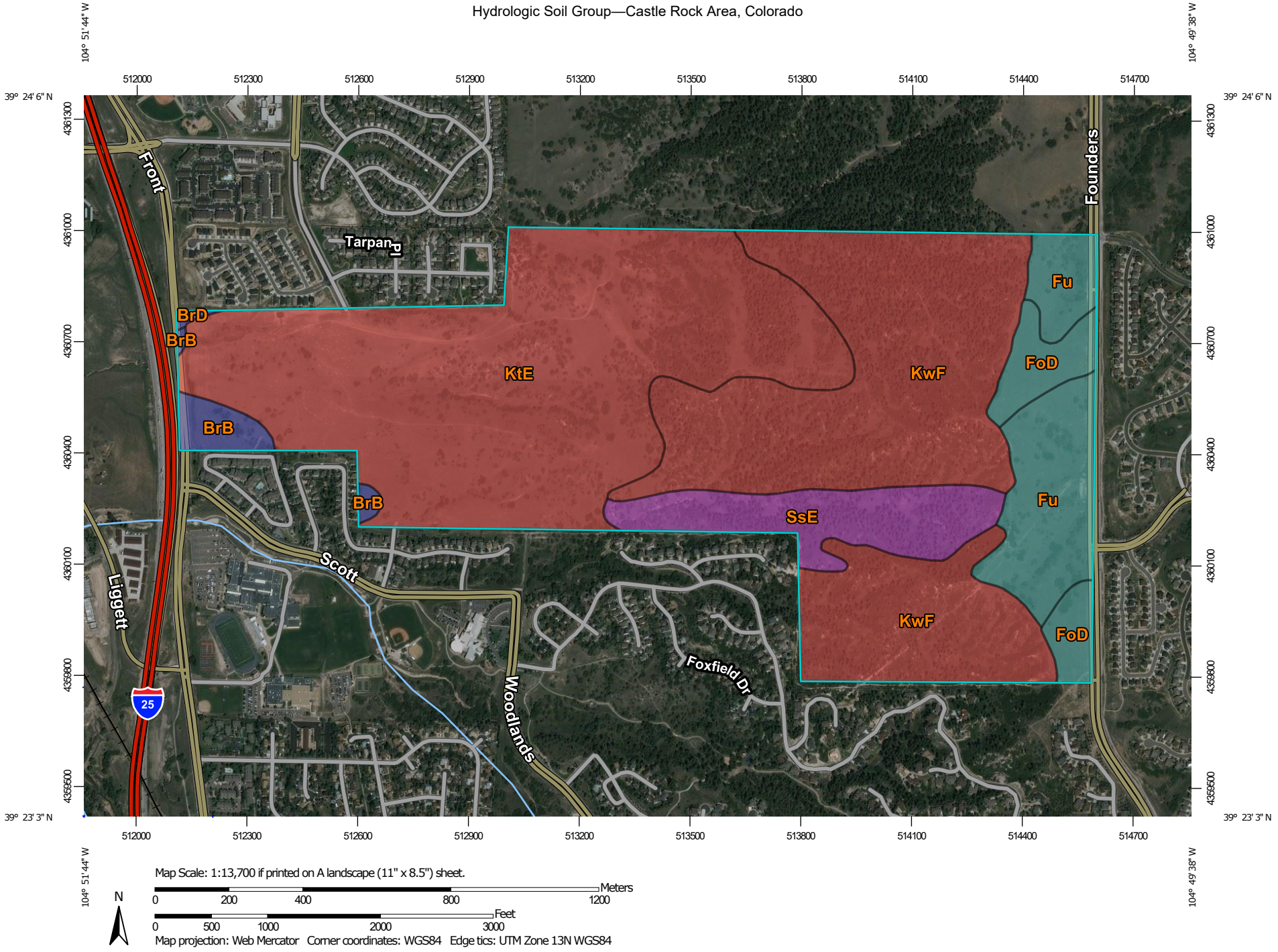
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CASTLE ROCK, TOWN OF	080050	0189	G
DOUGLAS COUNTY	080049	0189	G

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MAP NUMBER
08035C0189G
MAP REVISED
MARCH 16, 2016

Federal Emergency Management Agency


104° 51' 44" W
104° 49' 38" W
39° 24' 6" N
39° 23' 3" N
512000
512300
512600
512900
513200
513500
513800
514100
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514700
4361300
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4360400
4360100
4359800
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Founders
BrD
BrB
KtE
KwF
FoD
Fu
BrB
BrB
SsE
Fu
Scott
Liggett
KwF
FoD
Foxfield Dr
Woodlands
25
Map Scale: 1:13,700 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 200 400 800 1200
Feet
0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Castle Rock Area, Colorado
Survey Area Data: Version 12, Sep 13, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 24, 2018—Nov 19, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BrB	Bresser sandy loam, cool, 1 to 3 percent slopes	B	8.8	1.7%
BrD	Bresser sandy loam, cool, 5 to 9 percent slopes	B	0.7	0.1%
FoD	Fondis clay loam, 3 to 9 percent slopes	C	19.0	3.8%
Fu	Fondis-Kutch association	C	46.1	9.1%
KtE	Kutch sandy loam, 5 to 20 percent slopes	D	216.4	42.7%
KwF	Kutch-Newlin-Stapleton complex, 8 to 40 percent slopes	D	178.6	35.3%
SsE	Stapleton loamy sand, 6 to 30 percent slopes	A	36.7	7.2%
Totals for Area of Interest			**506.3**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

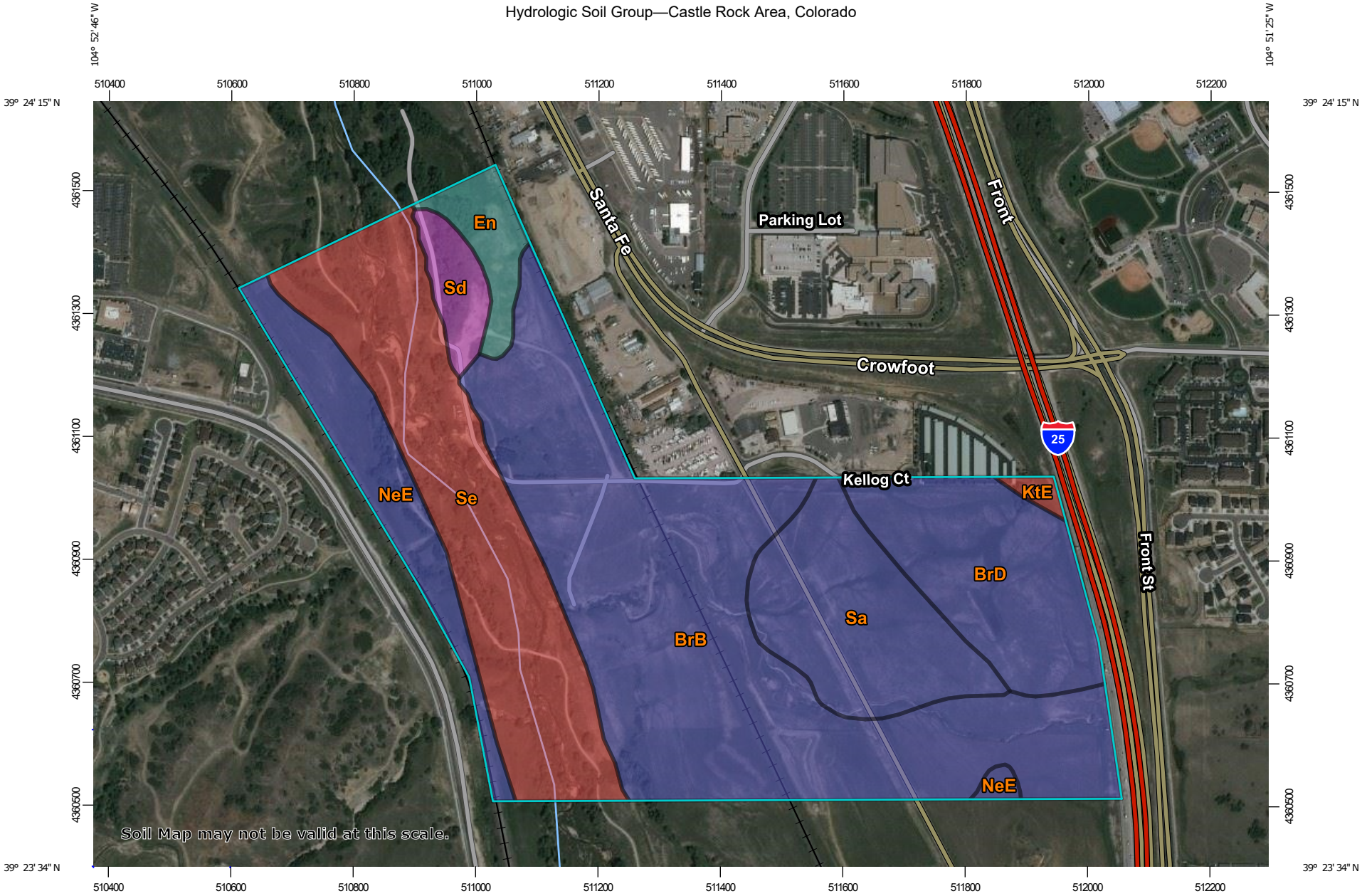
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



Map Scale: 1:8,780 if printed on A landscape (11" x 8.5") sheet.

N

0 100 200 400 600 Meters

0 400 800 1600 2400 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Castle Rock Area, Colorado
Survey Area Data: Version 12, Sep 13, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 24, 2018—Nov 19, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BrB	Bresser sandy loam, cool, 1 to 3 percent slopes	B	78.1	41.3%
BrD	Bresser sandy loam, cool, 5 to 9 percent slopes	B	22.4	11.9%
En	Englewood clay loam	C	5.6	3.0%
KtE	Kutch sandy loam, 5 to 20 percent slopes	D	0.9	0.5%
NeE	Newlin gravelly sandy loam, 8 to 30 percent slopes	B	14.9	7.9%
Sa	Sampson loam	B	22.2	11.7%
Sd	Sandy alluvial land	A	4.6	2.5%
Se	Sandy wet alluvial land	D	40.3	21.3%
Totals for Area of Interest			**189.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

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Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX B

HYDROLOGIC CALCULATIONS

Pine Canyon - Existing

CORE Project #: 25-004

Prepared By: RAS

IMPERVIOUS CALCULATIONS

-REFERENCE UDFCD Vol.1 RUNOFF Table 6-2 and 6-3

		Residential & Commercial							Lawns					Soil Type		
		Single Family			Multi-Unit				Clay/Sandy Soil							
		N/A	N/A	N/A	Commercial	Roof/ Concrete Walks & Drives	Streets: Paved	Gravel	2-7% Slope	>7% Slope	Historic			Soil Type A Area	Soil Type B Area	Soil Type C Area
% Imperv.		65.00%	65.00%	45.00%	85.00%	90.00%	100.00%	40.00%	5.00%	5.00%	2.00%					
	Design											Total	Percent			
BASIN	Point	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Impervious	Area	Area	
EX1	1	-	-	-	-	-	-	2.30	22.58	9.68	-	34.55	7.3%	-	-	34.55
EX2	2	-	-	-	-	-	9.18	-	3.06	5.92	-	18.16	53.0%	-	-	18.16
EX3	3	-	-	-	26.84	-	-	-	-	-	-	26.84	85.0%	-	26.84	-
EX4	4	-	-	-	-	-	-	2.91	17.50	2.30	-	22.70	9.5%	-	22.70	-
EX5	5	-	-	-	-	-	1.22	1.59	9.98	4.70	-	17.49	14.8%	-	17.49	-
EX6	6	-	-	-	-	-	3.44	-	22.96	15.42	-	41.82	12.8%	-	41.82	-
EX7	7	-	-	-	5.74	-	0.70	-	11.48	1.98	-	19.90	31.4%	-	19.90	-
EX8	8	-	-	2.30	-	-	3.44	-	25.95	7.22	-	38.91	15.8%	-	38.91	-
EX9	9	-	-	0.69	-	-	-	-	36.75	36.06	-	73.50	5.4%	-	-	73.50
EX10	10	-	-	-	-	-	-	-	9.28	9.28	-	18.57	5.0%	-	-	18.57
EX11	11	-	-	-	-	-	-	-	18.06	18.06	-	36.11	5.0%	-	-	36.11
EX12	12	-	-	-	-	-	-	-	22.28	22.28	-	44.57	5.0%	-	-	44.57
EX13	13	-	-	-	-	-	-	-	12.64	12.64	-	25.28	5.0%	-	-	25.28
EX14	14	-	-	-	-	-	-	-	9.70	9.70	-	19.39	5.0%	-	-	19.39
EX15	15	-	-	-	-	-	-	-	57.31	57.31	-	114.62	5.0%	-	-	114.62
EX16	16	-	-	-	-	-	-	-	3.11	3.11	-	6.22	5.0%	-	-	6.22
EX17	17	-	-	-	-	-	-	-	12.72	12.72	-	25.44	5.0%	-	-	25.44
EX18	18	-	-	-	-	-	-	-	6.18	6.18	-	12.35	5.0%	-	-	12.35
EX19	19	-	-	-	-	-	-	-	12.35	12.35	-	24.71	5.0%	-	-	24.71
EX20	20	-	-	-	-	-	-	-	4.12	4.12	-	8.24	5.0%	-	-	8.24
EX21	21	-	-	-	-	1.96	-	4.57	-	0.00	-	6.53	55.0%	-	6.53	-
EX22	22	-	-	-	6.73	-	-	-	-	-	-	6.73	85.0%	-	6.73	-
EX23	23	-	-	24.64	-	-	9.87	-	0.69	-	-	35.20	59.6%	-	-	35.20
EX24	24	-	-	36.19	-	-	13.22	-	2.30	-	-	51.70	57.3%	-	-	51.70
EX25	25	-	-	-	-	-	-	-	6.03	6.03	-	12.06	5.0%	-	-	12.06
EX26	26	-	12.30	-	-	-	-	-	-	-	-	12.30	65.0%	-	-	12.30
EX27	27	-	-	18.41	-	-	-	-	-	-	-	18.41	45.0%	-	-	18.41
EX28	28	-	-	-	-	-	-	-	8.37	8.37	-	16.73	5.0%	-	-	16.73
EX29	29	-	-	-	-	-	-	-	12.26	12.26	-	24.52	5.0%	-	-	24.52
TOTAL		**0.00**	**12.30**	**82.22**	**39.31**	**1.96**	**41.08**	**11.37**	**347.62**	**277.67**	**0.00**	**813.54**	**19.3%**			

Pine Canyon - Proposed

CORE Project #: 25-004

Prepared By: RAS

IMPERVIOUS CALCULATIONS

-REFERENCE UDFCD Vol.1 RUNOFF Table 6-2 and 6-3

		Residential							Landscape Area					Soil Type		
		Single Family			Multi-Family											
		Rural/Low Density	Medium Density (&Schools)	High Density	High Denisty	ROW/ Concrete	Asphalt/ Ponded Water	Packed Gravel	Open Space	Parks/ED Bs	Commercial /Industrial			Soil Type A Area	Soil Type B Area	Soil Type C/D Area
% Imperv.		45.00%	55.00%	65.00%	75.00%	95.00%	100.00%	40.00%	10.00%	25.00%	90.00%					
BASIN	Design Point	Area (ac)	Area (ac)	Area (ac)	Area (ac)	Area (ac)	Area (ac)	Area (ac)	Area (ac)	Area (ac)	Area (ac)	Total Area (ac)	Percent Impervious	Area (ac)	Area (ac)	Area (ac)
A	A	-	-	-	-	-	-	-	15.77	-	-	15.77	10.0%	-	-	15.77
B	B	-	-	-	-	-	-	-	16.99	-	-	16.99	10.0%	-	16.99	-
C	C	-	-	-	-	2.82	-	1.88	1.23	0.69	11.48	18.10	77.7%	-	18.10	-
D	D	-	-	-	-	4.59	-	-	10.42	1.56	35.05	51.63	72.3%	-	51.63	-
E	E	-	-	-	15.80	4.59	-	0.24	5.71	3.52	-	25.27	70.3%	-	5.74	19.53
F	F	-	20.66	-	-	3.55	-	0.35	12.82	0.80	-	38.19	42.9%	-	-	38.19
G	G	30.48	34.70	-	-	7.35	-	2.05	16.80	10.42	-	101.79	44.1%	-	29.27	72.53
H	H	-	41.32	-	-	3.90	-	1.39	10.68	9.99	-	67.28	45.4%	-	-	67.28
I	I	17.60	-	-	-	3.21	-	0.66	4.63	0.71	-	26.11	45.5%	-	4.66	21.45
J	J	-	13.22	-	-	2.18	-	0.14	5.91	1.72	21.40	44.57	66.6%	-	-	44.57
K	K	16.44	-	-	-	2.64	-	0.60	4.52	1.10	-	25.30	43.0%	-	-	25.30
L	L	-	16.07	-	-	6.20	-	0.91	5.59	-	-	28.76	54.4%	-	-	28.76
M	M	-	20.66	-	-	5.05	-	0.78	7.82	-	-	34.31	50.3%	-	-	34.31
N	N	2.20	-	-	-	1.84	-	-	14.74	-	-	18.78	22.4%	-	18.78	-
O	O	-	34.30	-	-	5.05	-	0.55	3.96	-	-	43.86	55.4%	-	-	43.86
OS1	36	-	-	-	-	-	-	1.17	9.54	-	-	10.71	13.3%	-	10.71	-
OS2	37	2.30	-	-	-	3.44	-	-	23.36	-	-	29.10	22.8%	-	29.10	-
OS3	38	0.80	-	-	-	-	-	-	22.77	-	-	23.57	11.2%	-	-	23.57
TOTAL		**69.82**	**180.94**	**0.00**	**15.80**	**56.42**	**0.00**	**10.71**	**193.25**	**30.52**	**67.93**	**620.09**	**46.6%**			

APPENDIX C

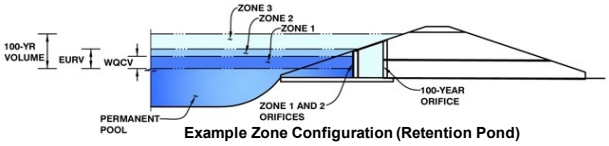
DETENTION POND CALCULATIONS

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: **Pine Canyon - Phase 1 Drainage Report**

Basin ID: **Basin C**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	18.10	acres
Watershed Length =	1,250	ft
Watershed Length to Centroid =	650	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	77.70%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.474	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.557	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	1.171	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	1.698	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	2.033	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.69 in.) =	2.118	acre-feet		inches
50-yr Runoff Volume (P1 = 2.26 in.) =	2.986	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	3.537	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	4.377	acre-feet		inches
Approximate 2-yr Detention Volume =	1.096	acre-feet		
Approximate 5-yr Detention Volume =	1.549	acre-feet		
Approximate 10-yr Detention Volume =	1.921	acre-feet		
Approximate 25-yr Detention Volume =	1.834	acre-feet		
Approximate 50-yr Detention Volume =	2.265	acre-feet		
Approximate 100-yr Detention Volume =	2.461	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.474	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.083	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	1.140	acre-feet
Total Detention Basin Volume =	2.698	acre-feet
Initial Surcharge Volume (ISV) =	62	ft^3
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H_{total}) =	6.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.005	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	
Initial Surcharge Area (A_{ISV}) =	188	ft^2
Surcharge Volume Length (L_{ISV}) =	13.7	ft
Surcharge Volume Width (W_{ISV}) =	13.7	ft
Depth of Basin Floor (H_{FLOOR}) =	0.90	ft
Length of Basin Floor (L_{FLOOR}) =	197.3	ft
Width of Basin Floor (W_{FLOOR}) =	103.7	ft
Area of Basin Floor (A_{FLOOR}) =	20,462	ft^2
Volume of Basin Floor (V_{FLOOR}) =	6,783	ft^3
Depth of Main Basin (H_{MAIN}) =	4.27	ft
Length of Main Basin (L_{MAIN}) =	231.5	ft
Width of Main Basin (W_{MAIN}) =	137.9	ft
Area of Main Basin (A_{MAIN}) =	31,911	ft^2
Volume of Main Basin (V_{MAIN}) =	110,915	ft^3
Calculated Total Basin Volume (V_{total}) =	**2.706**	acre-feet

Depth Increment = 0.50 ft

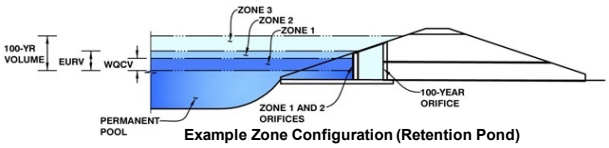
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		13.7	13.7	188		0.004		
ISV	0.33		13.7	13.7	188		0.004	62	0.001
	0.50		13.7	13.7	188		0.004	94	0.002
	1.00		48.4	30.7	1,486		0.034	281	0.006
	1.50		150.4	80.7	12,137		0.279	3,262	0.075
Floor	1.73		197.3	103.7	20,462		0.470	6,970	0.160
	2.00		199.5	105.9	21,117		0.485	12,583	0.289
Zone 1 (WQCV)	2.38		202.5	108.9	22,054		0.506	20,784	0.477
	2.50		203.5	109.9	22,354		0.513	23,449	0.538
	3.00		207.5	113.9	23,623		0.542	34,942	0.802
	3.50		211.5	117.9	24,925		0.572	47,077	1.081
	4.00		215.5	121.9	26,258		0.603	59,872	1.374
Zone 2 (EURV)	4.30		217.9	124.3	27,073		0.622	67,871	1.558
	4.50		219.5	125.9	27,623		0.634	73,341	1.684
	5.00		223.5	129.9	29,021		0.666	87,500	2.009
	5.50		227.5	133.9	30,450		0.699	102,367	2.350
Z3 (100+1/2WQCV)	5.99		231.4	137.8	31,882		0.732	117,637	2.701
	6.00		231.5	137.9	31,911		0.733	117,956	2.708
	6.50		235.5	141.9	33,405		0.767	134,283	3.083
	7.00		239.5	145.9	34,930		0.802	151,366	3.475
	7.50		243.5	149.9	36,487		0.838	169,218	3.885
	8.00		247.5	153.9	38,077		0.874	187,858	4.313
	8.50		251.5	157.9	39,698		0.911	207,300	4.759
	9.00		255.5	161.9	41,351		0.949	227,561	5.224
	9.50		259.5	165.9	43,037		0.988	248,657	5.708
	10.00		263.5	169.9	44,754		1.027	270,603	6.212
	10.50		267.5	173.9	46,503		1.068	293,416	6.736
	11.00		271.5	177.9	48,285		1.108	317,112	7.280
	11.50		275.5	181.9	50,098		1.150	341,706	7.844
	12.00		279.5	185.9	51,943		1.192	367,215	8.430
	12.50		283.5	189.9	53,821		1.236	393,655	9.037
	13.00		287.5	193.9	55,730		1.279	421,041	9.666
	13.50		291.5	197.9	57,671		1.324	449,390	10.317
	14.00		295.5	201.9	59,644		1.369	478,717	10.990
	14.50		299.5	205.9	61,650		1.415	509,040	11.686
	15.00		303.5	209.9	63,687		1.462	540,372	12.405
	15.50		307.5	213.9	65,756		1.510	572,732	13.148
	16.00		311.5	217.9	67,858		1.558	606,134	13.915
	16.50		315.5	221.9	69,991		1.607	640,595	14.706
	17.00		319.5	225.9	72,156		1.656	676,131	15.522
	17.50		323.5	229.9	74,354		1.707	712,757	16.363
	18.00		327.5	233.9	76,583		1.758	750,490	17.229
	18.50		331.5	237.9	78,844		1.810	789,345	18.121
	19.00		335.5	241.9	81,138		1.863	829,340	19.039
	19.50		339.5	245.9	83,463		1.916	870,488	19.984
	20.00		343.5	249.9	85,820		1.970	912,808	20.955
	20.50		347.5	253.9	88,210		2.025	956,314	21.954
	21.00		351.5	257.9	90,631		2.081	1,001,023	22.980
	21.50		355.5	261.9	93,084		2.137	1,046,951	24.035
	22.00		359.5	265.9	95,570		2.194	1,094,113	25.117
	22.50		363.5	269.9	98,087		2.252	1,142,526	26.229
	23.00		367.5	273.9	100,636		2.310	1,192,205	27.369
	23.50		371.5	277.9	103,218		2.370	1,243,167	28.539
	24.00		375.5	281.9	105,831		2.430	1,295,428	29.739
	24.50		379.5	285.9	108,476		2.490	1,349,004	30.969
	25.00		383.5	289.9	111,154		2.552	1,403,910	32.229
	25.50		387.5	293.9	113,863		2.614	1,460,163	33.521
	26.00		391.5	297.9	116,604		2.677	1,517,778	34.843

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: **Pine Canyon - Phase 1 Drainage Report**

Basin ID: **Basin D**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	51.63	acres
Watershed Length =	1,600	ft
Watershed Length to Centroid =	1,000	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	72.30%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.230	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	4.110	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	3.142	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	4.620	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	5.566	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.69 in.) =	5.843	acre-feet		inches
50-yr Runoff Volume (P1 = 2.26 in.) =	8.329	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	9.931	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	12.357	acre-feet		inches
Approximate 2-yr Detention Volume =	2.870	acre-feet		
Approximate 5-yr Detention Volume =	4.082	acre-feet		
Approximate 10-yr Detention Volume =	5.106	acre-feet		
Approximate 25-yr Detention Volume =	4.883	acre-feet		
Approximate 50-yr Detention Volume =	6.036	acre-feet		
Approximate 100-yr Detention Volume =	6.615	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.230	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.880	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	3.120	acre-feet
Total Detention Basin Volume =	7.230	acre-feet
Initial Surcharge Volume (ISV) =	161	ft^3
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H_{total}) =	6.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.004	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	
Initial Surcharge Area (A_{ISV}) =	487	ft^2
Surcharge Volume Length (L_{ISV}) =	22.1	ft
Surcharge Volume Width (W_{ISV}) =	22.1	ft
Depth of Basin Floor (H_{FLOOR}) =	1.30	ft
Length of Basin Floor (L_{FLOOR}) =	352.3	ft
Width of Basin Floor (W_{FLOOR}) =	184.6	ft
Area of Basin Floor (A_{FLOOR}) =	65,017	ft^2
Volume of Basin Floor (V_{FLOOR}) =	30,823	ft^3
Depth of Main Basin (H_{MAIN}) =	3.87	ft
Length of Main Basin (L_{MAIN}) =	383.2	ft
Width of Main Basin (W_{MAIN}) =	215.5	ft
Area of Main Basin (A_{MAIN}) =	82,596	ft^2
Volume of Main Basin (V_{MAIN}) =	284,953	ft^3
Calculated Total Basin Volume (V_{total}) =	**7.259**	acre-feet

Depth Increment = 0.50 ft

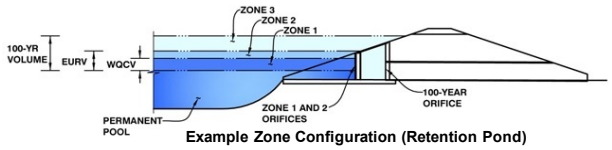
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		22.1	22.1	487		0.011		
ISV	0.33		22.1	22.1	487		0.011	161	0.004
	0.50		22.1	22.1	487		0.011	243	0.006
	1.00		65.2	43.3	2,826		0.065	660	0.015
	1.50		192.2	105.8	20,343		0.467	5,791	0.133
	2.00		319.2	168.3	53,735		1.234	23,649	0.543
Floor	2.13		352.3	184.6	65,017		1.493	31,356	0.720
Zone 1 (WQCV)	2.47		355.0	187.3	66,485		1.526	53,711	1.233
	2.50		355.2	187.5	66,615		1.529	55,707	1.279
	3.00		359.2	191.5	68,802		1.579	89,560	2.056
	3.50		363.2	195.5	71,021		1.630	124,514	2.858
	4.00		367.2	199.5	73,272		1.682	160,586	3.687
Zone 2 (EURV)	4.25		369.2	201.5	74,409		1.708	179,046	4.110
	4.50		371.2	203.5	75,555		1.735	197,792	4.541
	5.00		375.2	207.5	77,870		1.788	236,146	5.421
	5.50		379.2	211.5	80,217		1.842	275,667	6.328
Z3 (100+1/2WQCV)	5.99		383.1	215.4	82,548		1.895	315,543	7.244
	6.00		383.2	215.5	82,596		1.896	316,369	7.263
	6.50		387.2	219.5	85,007		1.951	358,268	8.225
	7.00		391.2	223.5	87,450		2.008	401,381	9.214
	7.50		395.2	227.5	89,925		2.064	445,723	10.232
	8.00		399.2	231.5	92,432		2.122	491,311	11.279
	8.50		403.2	235.5	94,971		2.180	538,161	12.354
	9.00		407.2	239.5	97,542		2.239	586,288	13.459
	9.50		411.2	243.5	100,145		2.299	635,708	14.594
	10.00		415.2	247.5	102,780		2.360	686,438	15.758
	10.50		419.2	251.5	105,447		2.421	738,493	16.953
	11.00		423.2	255.5	108,146		2.483	791,890	18.179
	11.50		427.2	259.5	110,877		2.545	846,645	19.436
	12.00		431.2	263.5	113,640		2.609	902,773	20.725
	12.50		435.2	267.5	116,435		2.673	960,290	22.045
	13.00		439.2	271.5	119,262		2.738	1,019,213	23.398
	13.50		443.2	275.5	122,121		2.804	1,079,558	24.783
	14.00		447.2	279.5	125,012		2.870	1,141,340	26.202
	14.50		451.2	283.5	127,935		2.937	1,204,575	27.653
	15.00		455.2	287.5	130,890		3.005	1,269,280	29.139
	15.50		459.2	291.5	133,877		3.073	1,335,471	30.658
	16.00		463.2	295.5	136,896		3.143	1,403,163	32.212
	16.50		467.2	299.5	139,947		3.213	1,472,372	33.801
	17.00		471.2	303.5	143,030		3.284	1,543,115	35.425
	17.50		475.2	307.5	146,145		3.355	1,615,408	37.085
	18.00		479.2	311.5	149,292		3.427	1,689,266	38.780
	18.50		483.2	315.5	152,471		3.500	1,764,706	40.512
	19.00		487.2	319.5	155,682		3.574	1,841,743	42.281
	19.50		491.2	323.5	158,925		3.648	1,920,393	44.086
	20.00		495.2	327.5	162,200		3.724	2,000,674	45.929
	20.50		499.2	331.5	165,507		3.800	2,082,599	47.810
	21.00		503.2	335.5	168,846		3.876	2,166,186	49.729
	21.50		507.2	339.5	172,217		3.954	2,251,451	51.686
	22.00		511.2	343.5	175,620		4.032	2,338,409	53.682
	22.50		515.2	347.5	179,055		4.111	2,427,077	55.718
	23.00		519.2	351.5	182,523		4.190	2,517,470	57.793
	23.50		523.2	355.5	186,022		4.270	2,609,605	59.908
	24.00		527.2	359.5	189,553		4.352	2,703,497	62.064
	24.50		531.2	363.5	193,116		4.433	2,799,162	64.260
	25.00		535.2	367.5	196,711		4.516	2,896,618	66.497
	25.50		539.2	371.5	200,338		4.599	2,995,878	68.776
	26.00		543.2	375.5	203,997		4.683	3,096,961	71.096

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: **Pine Canyon - Phase 1 Drainage Report**

Basin ID: **Basin E**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	25.27	acres
Watershed Length =	1,350	ft
Watershed Length to Centroid =	600	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	70.30%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	23.0%	percent
Percentage Hydrologic Soil Groups C/D =	77.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	Denver - Capitol Building	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.582	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.779	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	1.506	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	2.236	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	2.709	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.69 in.) =	2.822	acre-feet		inches
50-yr Runoff Volume (P1 = 2.26 in.) =	4.029	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	4.803	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	5.973	acre-feet		inches
Approximate 2-yr Detention Volume =	1.378	acre-feet		
Approximate 5-yr Detention Volume =	2.035	acre-feet		
Approximate 10-yr Detention Volume =	2.372	acre-feet		
Approximate 25-yr Detention Volume =	2.253	acre-feet		
Approximate 50-yr Detention Volume =	2.759	acre-feet		
Approximate 100-yr Detention Volume =	3.052	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.582	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.197	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	1.564	acre-feet
Total Detention Basin Volume =	3.343	acre-feet
Initial Surcharge Volume (ISV) =	76	ft^3
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H_{total}) =	6.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.005	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	
Initial Surcharge Area (A_{ISV}) =	230	ft^2
Surcharge Volume Length (L_{ISV}) =	15.2	ft
Surcharge Volume Width (W_{ISV}) =	15.2	ft
Depth of Basin Floor (H_{FLOOR}) =	1.03	ft
Length of Basin Floor (L_{FLOOR}) =	225.3	ft
Width of Basin Floor (W_{FLOOR}) =	118.2	ft
Area of Basin Floor (A_{FLOOR}) =	26,627	ft^2
Volume of Basin Floor (V_{FLOOR}) =	10,071	ft^3
Depth of Main Basin (H_{MAIN}) =	4.14	ft
Length of Main Basin (L_{MAIN}) =	258.4	ft
Width of Main Basin (W_{MAIN}) =	151.3	ft
Area of Main Basin (A_{MAIN}) =	39,100	ft^2
Volume of Main Basin (V_{MAIN}) =	135,229	ft^3
Calculated Total Basin Volume (V_{total}) =	**3.340**	acre-feet

Depth Increment = 0.50 ft

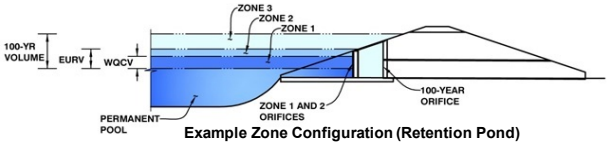
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		15.2	15.2	230		0.005		
ISV	0.33		15.2	15.2	230		0.005	76	0.002
	0.50		15.2	15.2	230		0.005	115	0.003
	1.00		49.9	32.2	1,605		0.037	331	0.008
	1.50		151.9	82.2	12,480		0.287	3,427	0.079
Floor	1.86		225.3	118.2	26,627		0.611	10,307	0.237
	2.00		226.4	119.3	27,013		0.620	14,062	0.323
Zone 1 (WQCV)	2.41		229.7	122.6	28,157		0.646	25,371	0.582
	2.50		230.4	123.3	28,411		0.652	27,917	0.641
	3.00		234.4	127.3	29,842		0.685	42,479	0.975
	3.50		238.4	131.3	31,305		0.719	57,764	1.326
	4.00		242.4	135.3	32,800		0.753	73,789	1.694
Zone 2 (EURV)	4.12		243.4	136.3	33,164		0.761	77,747	1.785
	4.50		246.4	139.3	34,327		0.788	90,570	2.079
	5.00		250.4	143.3	35,886		0.824	108,122	2.482
	5.50		254.4	147.3	37,477		0.860	126,461	2.903
	6.00		258.4	151.3	39,100		0.898	145,604	3.343
Z3 (100+1/2WQCV	6.01		258.5	151.4	39,132		0.898	145,995	3.352
	6.50		262.4	155.3	40,755		0.936	165,566	3.801
	7.00		266.4	159.3	42,441		0.974	186,364	4.278
	7.50		270.4	163.3	44,160		1.014	208,013	4.775
	8.00		274.4	167.3	45,911		1.054	230,529	5.292
	8.50		278.4	171.3	47,694		1.095	253,929	5.829
	9.00		282.4	175.3	49,509		1.137	278,229	6.387
	9.50		286.4	179.3	51,356		1.179	303,444	6.966
	10.00		290.4	183.3	53,235		1.222	329,590	7.566
	10.50		294.4	187.3	55,146		1.266	356,684	8.188
	11.00		298.4	191.3	57,089		1.311	384,741	8.832
	11.50		302.4	195.3	59,064		1.356	413,778	9.499
	12.00		306.4	199.3	61,070		1.402	443,810	10.188
	12.50		310.4	203.3	63,109		1.449	474,854	10.901
	13.00		314.4	207.3	65,180		1.496	506,925	11.637
	13.50		318.4	211.3	67,283		1.545	540,039	12.398
	14.00		322.4	215.3	69,418		1.594	574,213	13.182
	14.50		326.4	219.3	71,585		1.643	609,462	13.991
	15.00		330.4	223.3	73,784		1.694	645,803	14.826
	15.50		334.4	227.3	76,015		1.745	683,251	15.685
	16.00		338.4	231.3	78,278		1.797	721,823	16.571
	16.50		342.4	235.3	80,572		1.850	761,534	17.482
	17.00		346.4	239.3	82,899		1.903	802,401	18.421
	17.50		350.4	243.3	85,258		1.957	844,439	19.386
	18.00		354.4	247.3	87,649		2.012	887,665	20.378
	18.50		358.4	251.3	90,072		2.068	932,093	21.398
	19.00		362.4	255.3	92,527		2.124	977,742	22.446
	19.50		366.4	259.3	95,014		2.181	1,024,626	23.522
	20.00		370.4	263.3	97,533		2.239	1,072,761	24.627
	20.50		374.4	267.3	100,084		2.298	1,122,164	25.761
	21.00		378.4	271.3	102,666		2.357	1,172,850	26.925
	21.50		382.4	275.3	105,281		2.417	1,224,836	28.118
	22.00		386.4	279.3	107,928		2.478	1,278,137	29.342
	22.50		390.4	283.3	110,607		2.539	1,332,769	30.596
	23.00		394.4	287.3	113,318		2.601	1,388,749	31.881
	23.50		398.4	291.3	116,061		2.664	1,446,093	33.198
	24.00		402.4	295.3	118,836		2.728	1,504,815	34.546
	24.50		406.4	299.3	121,643		2.793	1,564,934	35.926
	25.00		410.4	303.3	124,482		2.858	1,626,464	37.338
	25.50		414.4	307.3	127,353		2.924	1,689,421	38.784
	26.00		418.4	311.3	130,255		2.990	1,753,821	40.262

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: **Pine Canyon - Phase 1 Drainage Report**

Basin ID: **Basin F**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	38.19	acres
Watershed Length =	1,732	ft
Watershed Length to Centroid =	850	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	42.90%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.597	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.531	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	1.496	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	2.526	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	3.229	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.69 in.) =	3.459	acre-feet		inches
50-yr Runoff Volume (P1 = 2.26 in.) =	5.292	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	6.539	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	8.328	acre-feet		inches
Approximate 2-yr Detention Volume =	1.194	acre-feet		
Approximate 5-yr Detention Volume =	1.966	acre-feet		
Approximate 10-yr Detention Volume =	2.235	acre-feet		
Approximate 25-yr Detention Volume =	2.176	acre-feet		
Approximate 50-yr Detention Volume =	2.689	acre-feet		
Approximate 100-yr Detention Volume =	3.216	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.597	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.935	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	1.983	acre-feet
Total Detention Basin Volume =	3.514	acre-feet
Initial Surcharge Volume (ISV) =	78	ft^3
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H_{total}) =	6.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.005	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	
Initial Surcharge Area (A_{ISV}) =	236	ft^2
Surcharge Volume Length (L_{ISV}) =	15.4	ft
Surcharge Volume Width (W_{ISV}) =	15.4	ft
Depth of Basin Floor (H_{FLOOR}) =	1.07	ft
Length of Basin Floor (L_{FLOOR}) =	233.7	ft
Width of Basin Floor (W_{FLOOR}) =	122.4	ft
Area of Basin Floor (A_{FLOOR}) =	28,592	ft^2
Volume of Basin Floor (V_{FLOOR}) =	11,209	ft^3
Depth of Main Basin (H_{MAIN}) =	4.10	ft
Length of Main Basin (L_{MAIN}) =	266.5	ft
Width of Main Basin (W_{MAIN}) =	155.2	ft
Area of Main Basin (A_{MAIN}) =	41,345	ft^2
Volume of Main Basin (V_{MAIN}) =	142,570	ft^3
Calculated Total Basin Volume (V_{total}) =	**3.535**	acre-feet

Depth Increment = 0.50 ft

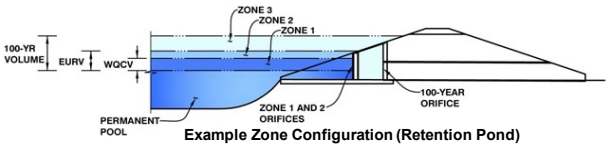
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		15.4	15.4	236		0.005		
ISV	0.33		15.4	15.4	236		0.005	78	0.002
	0.50		15.4	15.4	236		0.005	118	0.003
	1.00		50.1	32.4	1,620		0.037	337	0.008
	1.50		152.1	82.4	12,524		0.288	3,448	0.079
Floor	1.90		233.7	122.4	28,592		0.656	11,454	0.263
	2.00		234.5	123.2	28,877		0.663	14,327	0.329
Zone 1 (WQCV)	2.40		237.7	126.4	30,032		0.689	26,109	0.599
	2.50		238.5	127.2	30,324		0.696	29,126	0.669
	3.00		242.5	131.2	31,802		0.730	44,657	1.025
	3.50		246.5	135.2	33,313		0.765	60,934	1.399
Zone 2 (EURV)	3.68		247.9	136.6	33,864		0.777	66,980	1.538
	4.00		250.5	139.2	34,855		0.800	77,975	1.790
	4.50		254.5	143.2	36,430		0.836	95,795	2.199
	5.00		258.5	147.2	38,036		0.873	114,410	2.626
	5.50		262.5	151.2	39,675		0.911	133,836	3.072
Z3 (100+1/2WQCV)	5.98		266.3	155.0	41,278		0.948	153,264	3.518
	6.00		266.5	155.2	41,345		0.949	154,090	3.537
	6.50		270.5	159.2	43,048		0.988	175,187	4.022
	7.00		274.5	163.2	44,782		1.028	197,143	4.526
	7.50		278.5	167.2	46,549		1.069	219,974	5.050
	8.00		282.5	171.2	48,347		1.110	243,697	5.595
	8.50		286.5	175.2	50,178		1.152	268,327	6.160
	9.00		290.5	179.2	52,040		1.195	293,880	6.747
	9.50		294.5	183.2	53,935		1.238	320,372	7.355
	10.00		298.5	187.2	55,861		1.282	347,820	7.985
	10.50		302.5	191.2	57,820		1.327	376,239	8.637
	11.00		306.5	195.2	59,810		1.373	405,645	9.312
	11.50		310.5	199.2	61,833		1.419	436,054	10.010
	12.00		314.5	203.2	63,887		1.467	467,483	10.732
	12.50		318.5	207.2	65,973		1.515	499,946	11.477
	13.00		322.5	211.2	68,092		1.563	533,461	12.247
	13.50		326.5	215.2	70,242		1.613	568,044	13.040
	14.00		330.5	219.2	72,425		1.663	603,709	13.859
	14.50		334.5	223.2	74,639		1.713	640,474	14.703
	15.00		338.5	227.2	76,886		1.765	678,354	15.573
	15.50		342.5	231.2	79,164		1.817	717,365	16.468
	16.00		346.5	235.2	81,475		1.870	757,524	17.390
	16.50		350.5	239.2	83,817		1.924	798,845	18.339
	17.00		354.5	243.2	86,192		1.979	841,346	19.315
	17.50		358.5	247.2	88,598		2.034	885,043	20.318
	18.00		362.5	251.2	91,037		2.090	929,950	21.349
	18.50		366.5	255.2	93,507		2.147	976,085	22.408
	19.00		370.5	259.2	96,010		2.204	1,023,463	23.495
	19.50		374.5	263.2	98,544		2.262	1,072,100	24.612
	20.00		378.5	267.2	101,111		2.321	1,122,012	25.758
	20.50		382.5	271.2	103,709		2.381	1,173,216	26.933
	21.00		386.5	275.2	106,340		2.441	1,225,727	28.139
	21.50		390.5	279.2	109,002		2.502	1,279,561	29.375
	22.00		394.5	283.2	111,697		2.564	1,334,734	30.641
	22.50		398.5	287.2	114,423		2.627	1,391,263	31.939
	23.00		402.5	291.2	117,182		2.690	1,449,163	33.268
	23.50		406.5	295.2	119,972		2.754	1,508,450	34.629
	24.00		410.5	299.2	122,795		2.819	1,569,140	36.023
	24.50		414.5	303.2	125,649		2.885	1,631,250	37.448
	25.00		418.5	307.2	128,536		2.951	1,694,795	38.907
	25.50		422.5	311.2	131,454		3.018	1,759,791	40.399
	26.00		426.5	315.2	134,405		3.086	1,826,254	41.925

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: **Pine Canyon - Phase 1 Drainage Report**

Basin ID: **Basin G**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	101.79	acres
Watershed Length =	2,895	ft
Watershed Length to Centroid =	1,400	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	44.10%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	29.0%	percent
Percentage Hydrologic Soil Groups C/D =	71.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.617	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	4.363	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	3.992	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	6.691	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	8.544	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.69 in.) =	9.230	acre-feet		inches
50-yr Runoff Volume (P1 = 2.26 in.) =	14.098	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	17.455	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	22.286	acre-feet		inches
Approximate 2-yr Detention Volume =	3.245	acre-feet		
Approximate 5-yr Detention Volume =	5.171	acre-feet		
Approximate 10-yr Detention Volume =	6.158	acre-feet		
Approximate 25-yr Detention Volume =	6.012	acre-feet		
Approximate 50-yr Detention Volume =	7.443	acre-feet		
Approximate 100-yr Detention Volume =	8.802	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.617	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.746	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	5.248	acre-feet
Total Detention Basin Volume =	9.611	acre-feet
Initial Surcharge Volume (ISV) =	211	ft^3
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H_{total}) =	6.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.005	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	
Initial Surcharge Area (A_{ISV}) =	640	ft^2
Surcharge Volume Length (L_{ISV}) =	25.3	ft
Surcharge Volume Width (W_{ISV}) =	25.3	ft
Depth of Basin Floor (H_{FLOOR}) =	2.04	ft
Length of Basin Floor (L_{FLOOR}) =	441.5	ft
Width of Basin Floor (W_{FLOOR}) =	229.3	ft
Area of Basin Floor (A_{FLOOR}) =	101,229	ft^2
Volume of Basin Floor (V_{FLOOR}) =	74,745	ft^3
Depth of Main Basin (H_{MAIN}) =	3.13	ft
Length of Main Basin (L_{MAIN}) =	466.5	ft
Width of Main Basin (W_{MAIN}) =	254.3	ft
Area of Main Basin (A_{MAIN}) =	118,651	ft^2
Volume of Main Basin (V_{MAIN}) =	343,752	ft^3
Calculated Total Basin Volume (V_{total}) =	**9.620**	acre-feet

Depth Increment = 0.50 ft

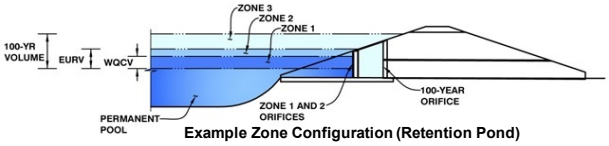
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		25.3	25.3	640		0.015		
ISV	0.33		25.3	25.3	640		0.015	211	0.005
	0.50		25.3	25.3	640		0.015	320	0.007
	1.00		60.0	42.3	2,537		0.058	785	0.018
	1.50		162.0	92.3	14,951		0.343	4,732	0.109
	2.00		264.0	142.3	37,565		0.862	17,436	0.400
	2.50		366.0	192.3	70,379		1.616	43,997	1.010
Zone 1 (WQCV)	2.82		431.3	224.3	96,733		2.221	70,624	1.621
Floor	2.87		441.5	229.3	101,229		2.324	75,573	1.735
	3.00		442.5	230.3	101,927		2.340	88,778	2.038
	3.50		446.5	234.3	104,635		2.402	140,417	3.224
Zone 2 (EURV)	3.97		450.3	238.1	107,209		2.461	190,199	4.366
	4.00		450.5	238.3	107,374		2.465	193,418	4.440
	4.50		454.5	242.3	110,145		2.529	247,796	5.689
	5.00		458.5	246.3	112,949		2.593	303,568	6.969
	5.50		462.5	250.3	115,784		2.658	360,750	8.282
Z3 (100+1/2WQCV)	6.00		466.5	254.3	118,651		2.724	419,358	9.627
	6.50		470.5	258.3	121,551		2.790	479,407	11.006
	7.00		474.5	262.3	124,482		2.858	540,914	12.418
	7.50		478.5	266.3	127,446		2.926	603,895	13.864
	8.00		482.5	270.3	130,441		2.995	668,365	15.344
	8.50		486.5	274.3	133,468		3.064	734,341	16.858
	9.00		490.5	278.3	136,528		3.134	801,839	18.408
	9.50		494.5	282.3	139,619		3.205	870,874	19.993
	10.00		498.5	286.3	142,743		3.277	941,463	21.613
	10.50		502.5	290.3	145,898		3.349	1,013,622	23.270
	11.00		506.5	294.3	149,085		3.423	1,087,366	24.962
	11.50		510.5	298.3	152,305		3.496	1,162,712	26.692
	12.00		514.5	302.3	155,556		3.571	1,239,676	28.459
	12.50		518.5	306.3	158,839		3.646	1,318,274	30.263
	13.00		522.5	310.3	162,155		3.723	1,398,521	32.106
	13.50		526.5	314.3	165,502		3.799	1,480,434	33.986
	14.00		530.5	318.3	168,882		3.877	1,564,029	35.905
	14.50		534.5	322.3	172,293		3.955	1,649,321	37.863
	15.00		538.5	326.3	175,736		4.034	1,736,327	39.861
	15.50		542.5	330.3	179,212		4.114	1,825,063	41.898
	16.00		546.5	334.3	182,719		4.195	1,915,544	43.975
	16.50		550.5	338.3	186,258		4.276	2,007,787	46.092
	17.00		554.5	342.3	189,830		4.358	2,101,808	48.251
	17.50		558.5	346.3	193,433		4.441	2,197,622	50.450
	18.00		562.5	350.3	197,069		4.524	2,295,246	52.692
	18.50		566.5	354.3	200,736		4.608	2,394,696	54.975
	19.00		570.5	358.3	204,435		4.693	2,495,988	57.300
	19.50		574.5	362.3	208,167		4.779	2,599,137	59.668
	20.00		578.5	366.3	211,930		4.865	2,704,160	62.079
	20.50		582.5	370.3	215,726		4.952	2,811,072	64.533
	21.00		586.5	374.3	219,553		5.040	2,919,891	67.031
	21.50		590.5	378.3	223,412		5.129	3,030,631	69.574
	22.00		594.5	382.3	227,304		5.218	3,143,308	72.160
	22.50		598.5	386.3	231,227		5.308	3,257,940	74.792
	23.00		602.5	390.3	235,182		5.399	3,374,541	77.469
	23.50		606.5	394.3	239,170		5.491	3,493,127	80.191
	24.00		610.5	398.3	243,189		5.583	3,613,716	82.959
	24.50		614.5	402.3	247,241		5.676	3,736,322	85.774
	25.00		618.5	406.3	251,324		5.770	3,860,962	88.635
	25.50		622.5	410.3	255,439		5.864	3,987,651	91.544
	26.00		626.5	414.3	259,587		5.959	4,116,406	94.500
	26.50		630.5	418.3	263,766		6.055	4,247,243	97.503

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: **Pine Canyon - Phase 1 Drainage Report**

Basin ID: **Basin H**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	67.28	acres
Watershed Length =	2,600	ft
Watershed Length to Centroid =	1,150	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	45.40%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.088	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	2.868	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	2.800	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	4.653	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	5.909	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.69 in.) =	6.307	acre-feet		inches
50-yr Runoff Volume (P1 = 2.26 in.) =	9.580	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	11.791	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	14.981	acre-feet		inches
Approximate 2-yr Detention Volume =	2.243	acre-feet		
Approximate 5-yr Detention Volume =	3.649	acre-feet		
Approximate 10-yr Detention Volume =	4.143	acre-feet		
Approximate 25-yr Detention Volume =	4.019	acre-feet		
Approximate 50-yr Detention Volume =	4.960	acre-feet		
Approximate 100-yr Detention Volume =	5.881	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.088	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.780	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	3.558	acre-feet
Total Detention Basin Volume =	6.425	acre-feet
Initial Surcharge Volume (ISV) =	142	ft^3
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H_{total}) =	6.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.004	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	
Initial Surcharge Area (A_{ISV}) =	431	ft^2
Surcharge Volume Length (L_{ISV}) =	20.8	ft
Surcharge Volume Width (W_{ISV}) =	20.8	ft
Depth of Basin Floor (H_{FLOOR}) =	1.21	ft
Length of Basin Floor (L_{FLOOR}) =	328.1	ft
Width of Basin Floor (W_{FLOOR}) =	172.0	ft
Area of Basin Floor (A_{FLOOR}) =	56,433	ft^2
Volume of Basin Floor (V_{FLOOR}) =	24,924	ft^3
Depth of Main Basin (H_{MAIN}) =	3.96	ft
Length of Main Basin (L_{MAIN}) =	359.8	ft
Width of Main Basin (W_{MAIN}) =	203.7	ft
Area of Main Basin (A_{MAIN}) =	73,280	ft^2
Volume of Main Basin (V_{MAIN}) =	256,108	ft^3
Calculated Total Basin Volume (V_{total}) =	**6.460**	acre-feet

Depth Increment = 0.50 ft

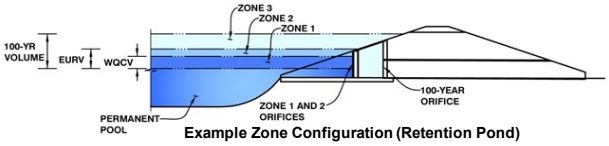
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		20.8	20.8	431		0.010		
ISV	0.33		20.8	20.8	431		0.010	142	0.003
	0.50		20.8	20.8	431		0.010	215	0.005
	1.00		63.9	42.0	2,685		0.062	596	0.014
	1.50		190.9	104.5	19,953		0.458	5,595	0.128
	2.00		317.9	167.0	53,096		1.219	23,196	0.532
Floor	2.04		328.1	172.0	56,433		1.296	25,386	0.583
Zone 1 (WQCV)	2.43		331.2	175.1	58,003		1.332	47,700	1.095
	2.50		331.8	175.7	58,287		1.338	51,770	1.188
	3.00		335.8	179.7	60,333		1.385	81,424	1.869
	3.50		339.8	183.7	62,411		1.433	112,109	2.574
Zone 2 (EURV)	3.71		341.5	185.4	63,293		1.453	125,308	2.877
	4.00		343.8	187.7	64,521		1.481	143,840	3.302
	4.50		347.8	191.7	66,663		1.530	176,635	4.055
	5.00		351.8	195.7	68,836		1.580	210,508	4.833
	5.50		355.8	199.7	71,042		1.631	245,477	5.635
Z3 (100+1/2WQCV)	5.98		359.6	203.5	73,190		1.680	280,091	6.430
	6.00		359.8	203.7	73,280		1.682	281,556	6.464
	6.50		363.8	207.7	75,550		1.734	318,762	7.318
	7.00		367.8	211.7	77,852		1.787	357,111	8.198
	7.50		371.8	215.7	80,186		1.841	396,619	9.105
	8.00		375.8	219.7	82,551		1.895	437,302	10.039
	8.50		379.8	223.7	84,949		1.950	479,176	11.000
	9.00		383.8	227.7	87,379		2.006	522,257	11.989
	9.50		387.8	231.7	89,841		2.062	566,560	13.006
	10.00		391.8	235.7	92,335		2.120	612,103	14.052
	10.50		395.8	239.7	94,861		2.178	658,900	15.126
	11.00		399.8	243.7	97,418		2.236	706,969	16.230
	11.50		403.8	247.7	100,008		2.296	756,324	17.363
	12.00		407.8	251.7	102,630		2.356	806,982	18.526
	12.50		411.8	255.7	105,284		2.417	858,960	19.719
	13.00		415.8	259.7	107,970		2.479	912,272	20.943
	13.50		419.8	263.7	110,688		2.541	966,935	22.198
	14.00		423.8	267.7	113,437		2.604	1,022,964	23.484
	14.50		427.8	271.7	116,219		2.668	1,080,377	24.802
	15.00		431.8	275.7	119,033		2.733	1,139,189	26.152
	15.50		435.8	279.7	121,879		2.798	1,199,416	27.535
	16.00		439.8	283.7	124,757		2.864	1,261,073	28.950
	16.50		443.8	287.7	127,667		2.931	1,324,178	30.399
	17.00		447.8	291.7	130,608		2.998	1,388,745	31.881
	17.50		451.8	295.7	133,582		3.067	1,454,791	33.397
	18.00		455.8	299.7	136,588		3.136	1,522,333	34.948
	18.50		459.8	303.7	139,626		3.205	1,591,385	36.533
	19.00		463.8	307.7	142,696		3.276	1,661,964	38.153
	19.50		467.8	311.7	145,797		3.347	1,734,086	39.809
	20.00		471.8	315.7	148,931		3.419	1,807,767	41.501
	20.50		475.8	319.7	152,097		3.492	1,883,022	43.228
	21.00		479.8	323.7	155,295		3.565	1,959,869	44.992
	21.50		483.8	327.7	158,525		3.639	2,038,323	46.793
	22.00		487.8	331.7	161,787		3.714	2,118,399	48.632
	22.50		491.8	335.7	165,080		3.790	2,200,115	50.508
	23.00		495.8	339.7	168,406		3.866	2,283,485	52.422
	23.50		499.8	343.7	171,764		3.943	2,368,526	54.374
	24.00		503.8	347.7	175,154		4.021	2,455,254	56.365
	24.50		507.8	351.7	178,576		4.100	2,543,686	58.395
	25.00		511.8	355.7	182,030		4.179	2,633,836	60.465
	25.50		515.8	359.7	185,515		4.259	2,725,721	62.574
	26.00		519.8	363.7	189,033		4.340	2,819,356	64.724

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: **Pine Canyon - Phase 1 Drainage Report**

Basin ID: **Basin I**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	26.11	acres
Watershed Length =	1,081	ft
Watershed Length to Centroid =	500	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	45.50%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.423	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.115	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	1.046	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	1.737	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	2.205	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.69 in.) =	2.353	acre-feet		inches
50-yr Runoff Volume (P1 = 2.26 in.) =	3.571	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	4.394	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	5.582	acre-feet		inches
Approximate 2-yr Detention Volume =	0.873	acre-feet		
Approximate 5-yr Detention Volume =	1.419	acre-feet		
Approximate 10-yr Detention Volume =	1.611	acre-feet		
Approximate 25-yr Detention Volume =	1.563	acre-feet		
Approximate 50-yr Detention Volume =	1.928	acre-feet		
Approximate 100-yr Detention Volume =	2.286	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.423	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.693	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	1.382	acre-feet
Total Detention Basin Volume =	2.497	acre-feet
Initial Surcharge Volume (ISV) =	55	ft^3
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H_{total}) =	6.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.005	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	
Initial Surcharge Area (A_{ISV}) =	167	ft^2
Surcharge Volume Length (L_{ISV}) =	12.9	ft
Surcharge Volume Width (W_{ISV}) =	12.9	ft
Depth of Basin Floor (H_{FLOOR}) =	0.86	ft
Length of Basin Floor (L_{FLOOR}) =	188.4	ft
Width of Basin Floor (W_{FLOOR}) =	98.9	ft
Area of Basin Floor (A_{FLOOR}) =	18,638	ft^2
Volume of Basin Floor (V_{FLOOR}) =	5,897	ft^3
Depth of Main Basin (H_{MAIN}) =	4.31	ft
Length of Main Basin (L_{MAIN}) =	222.9	ft
Width of Main Basin (W_{MAIN}) =	133.4	ft
Area of Main Basin (A_{MAIN}) =	29,733	ft^2
Volume of Main Basin (V_{MAIN}) =	103,312	ft^3
Calculated Total Basin Volume (V_{total}) =	**2.510**	acre-feet

Depth Increment = 0.60 ft

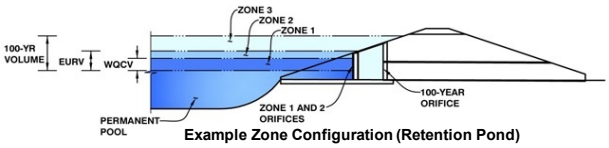
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		12.9	12.9	167		0.004		
ISV	0.33		12.9	12.9	167		0.004	55	0.001
	0.60		12.9	12.9	167		0.004	100	0.002
	1.20		88.4	49.9	4,415		0.101	815	0.019
Floor	1.69		188.4	98.9	18,638		0.428	6,062	0.139
	1.80		189.3	99.8	18,891		0.434	8,127	0.187
Zone 1 (WQCV)	2.33		193.5	104.1	20,135		0.462	18,467	0.424
	2.40		194.1	104.6	20,302		0.466	19,882	0.456
	3.00		198.9	109.4	21,758		0.500	32,498	0.746
	3.60		203.7	114.2	23,261		0.534	46,002	1.056
Zone 2 (EURV)	3.72		204.6	115.2	23,567		0.541	48,811	1.121
	4.20		208.5	119.0	24,810		0.570	60,421	1.387
	4.80		213.3	123.8	26,405		0.606	75,783	1.740
	5.40		218.1	128.6	28,046		0.644	92,116	2.115
Z3 (100+1/2WQCV)	5.98		222.7	133.3	29,676		0.681	108,853	2.499
	6.00		222.9	133.4	29,733		0.683	109,447	2.513
	6.60		227.7	138.2	31,466		0.722	127,805	2.934
	7.20		232.5	143.0	33,245		0.763	147,216	3.380
	7.80		237.3	147.8	35,071		0.805	167,709	3.850
	8.40		242.1	152.6	36,942		0.848	189,310	4.346
	9.00		246.9	157.4	38,860		0.892	212,049	4.868
	9.60		251.7	162.2	40,823		0.937	235,951	5.417
	10.20		256.5	167.0	42,833		0.983	261,046	5.993
	10.80		261.3	171.8	44,889		1.031	287,360	6.597
	11.40		266.1	176.6	46,990		1.079	314,921	7.230
	12.00		270.9	181.4	49,138		1.128	343,758	7.892
	12.60		275.7	186.2	51,332		1.178	373,896	8.583
	13.20		280.5	191.0	53,572		1.230	405,365	9.306
	13.80		285.3	195.8	55,858		1.282	438,192	10.060
	14.40		290.1	200.6	58,191		1.336	472,405	10.845
	15.00		294.9	205.4	60,569		1.390	508,030	11.663
	15.60		299.7	210.2	62,993		1.446	545,097	12.514
	16.20		304.5	215.0	65,464		1.503	583,631	13.398
	16.80		309.3	219.8	67,980		1.561	623,662	14.317
	17.40		314.1	224.6	70,543		1.619	665,217	15.271
	18.00		318.9	229.4	73,151		1.679	708,323	16.261
	18.60		323.7	234.2	75,806		1.740	753,008	17.287
	19.20		328.5	239.0	78,507		1.802	799,300	18.349
	19.80		333.3	243.8	81,254		1.865	847,226	19.450
	20.40		338.1	248.6	84,047		1.929	896,814	20.588
	21.00		342.9	253.4	86,886		1.995	948,091	21.765
	21.60		347.7	258.2	89,771		2.061	1,001,086	22.982
	22.20		352.5	263.0	92,703		2.128	1,055,826	24.238
	22.80		357.3	267.8	95,680		2.197	1,112,338	25.536
	23.40		362.1	272.6	98,703		2.266	1,170,651	26.874
	24.00		366.9	277.4	101,773		2.336	1,230,792	28.255
	24.60		371.7	282.2	104,888		2.408	1,292,787	29.678
	25.20		376.5	287.0	108,050		2.480	1,356,667	31.145
	25.80		381.3	291.8	111,258		2.554	1,422,457	32.655
	26.40		386.1	296.6	114,511		2.629	1,490,185	34.210
	27.00		390.9	301.4	117,811		2.705	1,559,880	35.810
	27.60		395.7	306.2	121,157		2.781	1,631,568	37.456
	28.20		400.5	311.0	124,549		2.859	1,705,277	39.148
	28.80		405.3	315.8	127,987		2.938	1,781,036	40.887
	29.40		410.1	320.6	131,472		3.018	1,858,872	42.674
	30.00		414.9	325.4	135,002		3.099	1,938,811	44.509

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: **Pine Canyon - Phase 1 Drainage Report**

Basin ID: **Basin J**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	44.57	acres
Watershed Length =	1,523	ft
Watershed Length to Centroid =	750	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	66.60%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.967	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	2.873	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	2.576	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	3.873	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	4.717	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.69 in.) =	4.915	acre-feet		inches
50-yr Runoff Volume (P1 = 2.26 in.) =	7.075	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	8.462	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	10.545	acre-feet		inches
Approximate 2-yr Detention Volume =	2.294	acre-feet		
Approximate 5-yr Detention Volume =	3.458	acre-feet		
Approximate 10-yr Detention Volume =	3.937	acre-feet		
Approximate 25-yr Detention Volume =	3.738	acre-feet		
Approximate 50-yr Detention Volume =	4.571	acre-feet		
Approximate 100-yr Detention Volume =	5.110	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.967	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.906	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	2.720	acre-feet
Total Detention Basin Volume =	5.593	acre-feet
Initial Surcharge Volume (ISV) =	126	ft^3
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H_{total}) =	6.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.005	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	
Initial Surcharge Area (A_{ISV}) =	383	ft^2
Surcharge Volume Length (L_{ISV}) =	19.6	ft
Surcharge Volume Width (W_{ISV}) =	19.6	ft
Depth of Basin Floor (H_{FLOOR}) =	1.43	ft
Length of Basin Floor (L_{FLOOR}) =	311.3	ft
Width of Basin Floor (W_{FLOOR}) =	162.6	ft
Area of Basin Floor (A_{FLOOR}) =	50,608	ft^2
Volume of Basin Floor (V_{FLOOR}) =	26,405	ft^3
Depth of Main Basin (H_{MAIN}) =	3.74	ft
Length of Main Basin (L_{MAIN}) =	341.2	ft
Width of Main Basin (W_{MAIN}) =	192.5	ft
Area of Main Basin (A_{MAIN}) =	65,681	ft^2
Volume of Main Basin (V_{MAIN}) =	216,849	ft^3
Calculated Total Basin Volume (V_{total}) =	**5.592**	acre-feet

Depth Increment = 0.50 ft

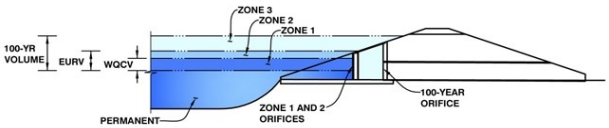
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		19.6	19.6	383		0.009		
ISV	0.33		19.6	19.6	383		0.009	126	0.003
	0.50		19.6	19.6	383		0.009	192	0.004
	1.00		54.3	36.6	1,984		0.046	502	0.012
	1.50		156.3	86.6	13,527		0.311	3,955	0.091
	2.00		258.3	136.6	35,270		0.810	15,730	0.361
Floor	2.26		311.3	162.6	50,608		1.162	26,834	0.616
	2.50		313.2	164.5	51,521		1.183	39,090	0.897
Zone 1 (WQCV)	2.56		313.7	165.0	51,751		1.188	42,188	0.968
	3.00		317.2	168.5	53,448		1.227	65,331	1.500
	3.50		321.2	172.5	55,407		1.272	92,543	2.124
	4.00		325.2	176.5	57,398		1.318	120,743	2.772
Zone 2 (EURV)	4.08		325.9	177.1	57,719		1.325	125,348	2.878
	4.50		329.2	180.5	59,421		1.364	149,946	3.442
	5.00		333.2	184.5	61,475		1.411	180,169	4.136
	5.50		337.2	188.5	63,562		1.459	211,427	4.854
Z3 (100+1/2WQCV)	6.00		341.2	192.5	65,681		1.508	243,736	5.595
	6.50		345.2	196.5	67,832		1.557	277,113	6.362
	7.00		349.2	200.5	70,015		1.607	311,574	7.153
	7.50		353.2	204.5	72,230		1.658	347,133	7.969
	8.00		357.2	208.5	74,476		1.710	383,809	8.811
	8.50		361.2	212.5	76,755		1.762	421,615	9.679
	9.00		365.2	216.5	79,066		1.815	460,569	10.573
	9.50		369.2	220.5	81,409		1.869	500,687	11.494
	10.00		373.2	224.5	83,784		1.923	541,983	12.442
	10.50		377.2	228.5	86,191		1.979	584,476	13.418
	11.00		381.2	232.5	88,629		2.035	628,179	14.421
	11.50		385.2	236.5	91,100		2.091	673,110	15.452
	12.00		389.2	240.5	93,603		2.149	719,285	16.513
	12.50		393.2	244.5	96,138		2.207	766,719	17.601
	13.00		397.2	248.5	98,705		2.266	815,428	18.720
	13.50		401.2	252.5	101,303		2.326	865,429	19.868
	14.00		405.2	256.5	103,934		2.386	916,737	21.045
	14.50		409.2	260.5	106,597		2.447	969,368	22.254
	15.00		413.2	264.5	109,292		2.509	1,023,339	23.493
	15.50		417.2	268.5	112,019		2.572	1,078,666	24.763
	16.00		421.2	272.5	114,778		2.635	1,135,363	26.064
	16.50		425.2	276.5	117,568		2.699	1,193,448	27.398
	17.00		429.2	280.5	120,391		2.764	1,252,937	28.763
	17.50		433.2	284.5	123,246		2.829	1,313,845	30.162
	18.00		437.2	288.5	126,133		2.896	1,376,188	31.593
	18.50		441.2	292.5	129,052		2.963	1,439,983	33.057
	19.00		445.2	296.5	132,003		3.030	1,505,245	34.556
	19.50		449.2	300.5	134,985		3.099	1,571,991	36.088
	20.00		453.2	304.5	138,000		3.168	1,640,236	37.655
	20.50		457.2	308.5	141,047		3.238	1,709,997	39.256
	21.00		461.2	312.5	144,126		3.309	1,781,288	40.893
	21.50		465.2	316.5	147,237		3.380	1,854,128	42.565
	22.00		469.2	320.5	150,379		3.452	1,928,530	44.273
	22.50		473.2	324.5	153,554		3.525	2,004,513	46.017
	23.00		477.2	328.5	156,761		3.599	2,082,090	47.798
	23.50		481.2	332.5	160,000		3.673	2,161,279	49.616
	24.00		485.2	336.5	163,271		3.748	2,242,095	51.471
	24.50		489.2	340.5	166,574		3.824	2,324,555	53.364
	25.00		493.2	344.5	169,908		3.901	2,408,674	55.296
	25.50		497.2	348.5	173,275		3.978	2,494,469	57.265
	26.00		501.2	352.5	176,674		4.056	2,581,955	59.274
	26.50		505.2	356.5	180,105		4.135	2,671,148	61.321

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: **Pine Canyon - Phase 1 Drainage Report**

Basin ID: **Basin K**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	25.30	acres
Watershed Length =	1,100	ft
Watershed Length to Centroid =	550	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	43.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.396	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.017	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	0.961	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	1.622	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	2.073	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.69 in.) =	2.220	acre-feet		inches
50-yr Runoff Volume (P1 = 2.26 in.) =	3.398	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	4.198	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	5.348	acre-feet		inches
Approximate 2-yr Detention Volume =	0.793	acre-feet		
Approximate 5-yr Detention Volume =	1.305	acre-feet		
Approximate 10-yr Detention Volume =	1.484	acre-feet		
Approximate 25-yr Detention Volume =	1.445	acre-feet		
Approximate 50-yr Detention Volume =	1.785	acre-feet		
Approximate 100-yr Detention Volume =	2.134	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.396	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.621	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	1.315	acre-feet
Total Detention Basin Volume =	2.331	acre-feet
Initial Surcharge Volume (ISV) =	52	ft^3
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H_{total}) =	6.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.005	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	
Initial Surcharge Area (A_{ISV}) =	157	ft^2
Surcharge Volume Length (L_{ISV}) =	12.5	ft
Surcharge Volume Width (W_{ISV}) =	12.5	ft
Depth of Basin Floor (H_{FLOOR}) =	0.82	ft
Length of Basin Floor (L_{FLOOR}) =	179.8	ft
Width of Basin Floor (W_{FLOOR}) =	94.5	ft
Area of Basin Floor (A_{FLOOR}) =	16,994	ft^2
Volume of Basin Floor (V_{FLOOR}) =	5,134	ft^3
Depth of Main Basin (H_{MAIN}) =	4.35	ft
Length of Main Basin (L_{MAIN}) =	214.6	ft
Width of Main Basin (W_{MAIN}) =	129.3	ft
Area of Main Basin (A_{MAIN}) =	27,752	ft^2
Volume of Main Basin (V_{MAIN}) =	96,372	ft^3
Calculated Total Basin Volume (V_{total}) =	**2.333**	acre-feet

Depth Increment = 0.50 ft

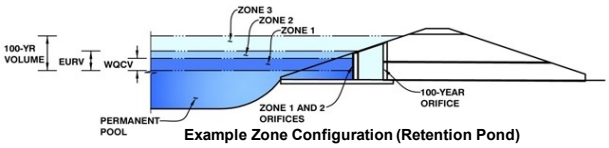
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		12.5	12.5	157		0.004		
ISV	0.33		12.5	12.5	157		0.004	52	0.001
	0.50		12.5	12.5	157		0.004	78	0.002
	1.00		47.2	29.5	1,393		0.032	245	0.006
	1.50		149.2	79.5	11,864		0.272	3,134	0.072
Floor	1.65		179.8	94.5	16,994		0.390	5,287	0.121
	2.00		182.6	97.3	17,770		0.408	11,371	0.261
Zone 1 (WQCV)	2.33		185.2	100.0	18,516		0.425	17,358	0.398
	2.50		186.6	101.3	18,906		0.434	20,539	0.472
	3.00		190.6	105.3	20,074		0.461	30,282	0.695
	3.50		194.6	109.3	21,273		0.488	40,618	0.932
Zone 2 (EURV)	3.68		196.0	110.8	21,713		0.498	44,486	1.021
	4.00		198.6	113.3	22,505		0.517	51,561	1.184
	4.50		202.6	117.3	23,769		0.546	63,128	1.449
	5.00		206.6	121.3	25,064		0.575	75,335	1.729
	5.50		210.6	125.3	26,392		0.606	88,198	2.025
Z3 (100+1/2WQCV)	6.00		214.6	129.3	27,752		0.637	101,732	2.335
	6.50		218.6	133.3	29,143		0.669	115,955	2.662
	7.00		222.6	137.3	30,567		0.702	130,881	3.005
	7.50		226.6	141.3	32,023		0.735	146,527	3.364
	8.00		230.6	145.3	33,510		0.769	162,909	3.740
	8.50		234.6	149.3	35,030		0.804	180,043	4.133
	9.00		238.6	153.3	36,582		0.840	197,945	4.544
	9.50		242.6	157.3	38,165		0.876	216,630	4.973
	10.00		246.6	161.3	39,781		0.913	236,116	5.420
	10.50		250.6	165.3	41,429		0.951	256,417	5.887
	11.00		254.6	169.3	43,108		0.990	277,550	6.372
	11.50		258.6	173.3	44,820		1.029	299,531	6.876
	12.00		262.6	177.3	46,564		1.069	322,375	7.401
	12.50		266.6	181.3	48,340		1.110	346,100	7.945
	13.00		270.6	185.3	50,147		1.151	370,720	8.511
	13.50		274.6	189.3	51,987		1.193	396,252	9.097
	14.00		278.6	193.3	53,859		1.236	422,712	9.704
	14.50		282.6	197.3	55,762		1.280	450,116	10.333
	15.00		286.6	201.3	57,698		1.325	478,480	10.984
	15.50		290.6	205.3	59,666		1.370	507,819	11.658
	16.00		294.6	209.3	61,665		1.416	538,151	12.354
	16.50		298.6	213.3	63,697		1.462	569,490	13.074
	17.00		302.6	217.3	65,761		1.510	601,853	13.817
	17.50		306.6	221.3	67,856		1.558	635,256	14.583
	18.00		310.6	225.3	69,984		1.607	669,714	15.375
	18.50		314.6	229.3	72,144		1.656	705,245	16.190
	19.00		318.6	233.3	74,335		1.707	741,863	17.031
	19.50		322.6	237.3	76,559		1.758	779,586	17.897
	20.00		326.6	241.3	78,815		1.809	818,428	18.789
	20.50		330.6	245.3	81,102		1.862	858,405	19.706
	21.00		334.6	249.3	83,422		1.915	899,535	20.650
	21.50		338.6	253.3	85,774		1.969	941,833	21.622
	22.00		342.6	257.3	88,157		2.024	985,314	22.620
	22.50		346.6	261.3	90,573		2.079	1,029,995	23.645
	23.00		350.6	265.3	93,021		2.135	1,075,892	24.699
	23.50		354.6	269.3	95,500		2.192	1,123,021	25.781
	24.00		358.6	273.3	98,012		2.250	1,171,398	26.892
	24.50		362.6	277.3	100,556		2.308	1,221,039	28.031
	25.00		366.6	281.3	103,131		2.368	1,271,959	29.200
	25.50		370.6	285.3	105,739		2.427	1,324,175	30.399
	26.00		374.6	289.3	108,379		2.488	1,377,703	31.628
	26.50		378.6	293.3	111,050		2.549	1,432,559	32.887

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: **Pine Canyon - Phase 1 Drainage Report**

Basin ID: **Basin L**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**		**Note: L / W Ratio < 1**
Watershed Area =	28.76	acres	**L / W Ratio = 0.34**
Watershed Length =	650	ft	
Watershed Length to Centroid =	300	ft	
Watershed Slope =	0.050	ft/ft	
Watershed Imperviousness =	54.40%	percent	
Percentage Hydrologic Soil Group A =	0.0%	percent	
Percentage Hydrologic Soil Group B =	0.0%	percent	
Percentage Hydrologic Soil Groups C/D =	100.0%	percent	
Target WQCV Drain Time =	40.0	hours	
Location for 1-hr Rainfall Depths =	User Input		

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.524	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.490	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	1.226	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	1.934	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	2.405	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.69 in.) =	2.538	acre-feet		inches
50-yr Runoff Volume (P1 = 2.26 in.) =	3.754	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	4.558	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	5.737	acre-feet		inches
Approximate 2-yr Detention Volume =	1.177	acre-feet		
Approximate 5-yr Detention Volume =	1.845	acre-feet		
Approximate 10-yr Detention Volume =	2.093	acre-feet		
Approximate 25-yr Detention Volume =	2.007	acre-feet		
Approximate 50-yr Detention Volume =	2.467	acre-feet		
Approximate 100-yr Detention Volume =	2.846	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.524	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.966	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	1.618	acre-feet
Total Detention Basin Volume =	3.108	acre-feet
Initial Surcharge Volume (ISV) =	68	ft^3
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H_{total}) =	6.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.005	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	

Initial Surcharge Area (A_{ISV}) =	208	ft^2
Surcharge Volume Length (L_{ISV}) =	14.4	ft
Surcharge Volume Width (W_{ISV}) =	14.4	ft
Depth of Basin Floor (H_{FLOOR}) =	0.99	ft
Length of Basin Floor (L_{FLOOR}) =	216.4	ft
Width of Basin Floor (W_{FLOOR}) =	113.4	ft
Area of Basin Floor (A_{FLOOR}) =	24,537	ft^2
Volume of Basin Floor (V_{FLOOR}) =	8,910	ft^3
Depth of Main Basin (H_{MAIN}) =	4.18	ft
Length of Main Basin (L_{MAIN}) =	249.8	ft
Width of Main Basin (W_{MAIN}) =	146.8	ft
Area of Main Basin (A_{MAIN}) =	36,683	ft^2
Volume of Main Basin (V_{MAIN}) =	127,102	ft^3
Calculated Total Basin Volume (V_{total}) =	**3.126**	acre-feet

Depth Increment = 0.50 ft

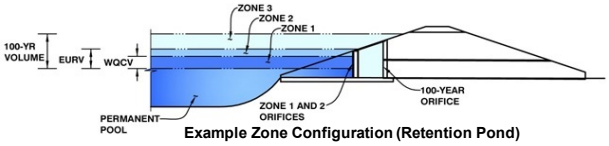
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		14.4	14.4	208		0.005		
ISV	0.33		14.4	14.4	208		0.005	68	0.002
	0.50		14.4	14.4	208		0.005	104	0.002
	1.00		49.1	31.4	1,542		0.035	304	0.007
	1.50		151.1	81.4	12,299		0.282	3,339	0.077
Floor	1.82		216.4	113.4	24,537		0.563	9,122	0.209
	2.00		217.8	114.8	25,014		0.574	13,581	0.312
Zone 1 (WQCV)	2.37		220.8	117.8	26,007		0.597	23,020	0.528
	2.50		221.8	118.8	26,361		0.605	26,424	0.607
	3.00		225.8	122.8	27,739		0.637	39,947	0.917
	3.50		229.8	126.8	29,150		0.669	54,168	1.244
Zone 2 (EURV)	3.87		232.8	129.8	30,214		0.694	65,150	1.496
	4.00		233.8	130.8	30,592		0.702	69,102	1.586
	4.50		237.8	134.8	32,067		0.736	84,766	1.946
	5.00		241.8	138.8	33,574		0.771	101,175	2.323
	5.50		245.8	142.8	35,112		0.806	118,345	2.717
Z3 (100+1/2WQCV)	5.98		249.6	146.7	36,619		0.841	135,559	3.112
	6.00		249.8	146.8	36,683		0.842	136,292	3.129
	6.50		253.8	150.8	38,285		0.879	155,033	3.559
	7.00		257.8	154.8	39,920		0.916	174,583	4.008
	7.50		261.8	158.8	41,587		0.955	194,959	4.476
	8.00		265.8	162.8	43,285		0.994	216,175	4.963
	8.50		269.8	166.8	45,016		1.033	238,249	5.469
	9.00		273.8	170.8	46,778		1.074	261,197	5.996
	9.50		277.8	174.8	48,573		1.115	285,033	6.543
	10.00		281.8	178.8	50,400		1.157	309,775	7.111
	10.50		285.8	182.8	52,258		1.200	335,438	7.701
	11.00		289.8	186.8	54,149		1.243	362,039	8.311
	11.50		293.8	190.8	56,072		1.287	389,592	8.944
	12.00		297.8	194.8	58,026		1.332	418,115	9.599
	12.50		301.8	198.8	60,013		1.378	447,624	10.276
	13.00		305.8	202.8	62,031		1.424	478,134	10.976
	13.50		309.8	206.8	64,082		1.471	509,661	11.700
	14.00		313.8	210.8	66,165		1.519	542,221	12.448
	14.50		317.8	214.8	68,279		1.567	575,830	13.219
	15.00		321.8	218.8	70,426		1.617	610,505	14.015
	15.50		325.8	222.8	72,604		1.667	646,261	14.836
	16.00		329.8	226.8	74,815		1.718	683,115	15.682
	16.50		333.8	230.8	77,058		1.769	721,082	16.554
	17.00		337.8	234.8	79,332		1.821	760,178	17.451
	17.50		341.8	238.8	81,639		1.874	800,419	18.375
	18.00		345.8	242.8	83,977		1.928	841,822	19.326
	18.50		349.8	246.8	86,348		1.982	884,402	20.303
	19.00		353.8	250.8	88,751		2.037	928,175	21.308
	19.50		357.8	254.8	91,185		2.093	973,158	22.341
	20.00		361.8	258.8	93,652		2.150	1,019,366	23.401
	20.50		365.8	262.8	96,150		2.207	1,066,815	24.491
	21.00		369.8	266.8	98,681		2.265	1,115,522	25.609
	21.50		373.8	270.8	101,244		2.324	1,165,501	26.756
	22.00		377.8	274.8	103,838		2.384	1,216,771	27.933
	22.50		381.8	278.8	106,465		2.444	1,269,345	29.140
	23.00		385.8	282.8	109,123		2.505	1,323,241	30.377
	23.50		389.8	286.8	111,814		2.567	1,378,474	31.645
	24.00		393.8	290.8	114,537		2.629	1,435,060	32.944
	24.50		397.8	294.8	117,291		2.693	1,493,016	34.275
	25.00		401.8	298.8	120,078		2.757	1,552,357	35.637
	25.50		405.8	302.8	122,896		2.821	1,613,099	37.032
	26.00		409.8	306.8	125,747		2.887	1,675,259	38.459

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: **Pine Canyon - Phase 1 Drainage Report**

Basin ID: **Basin M**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	34.31	acres
Watershed Length =	1,800	ft
Watershed Length to Centroid =	900	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	50.30%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.592	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.633	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	1.554	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	2.508	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	3.148	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.69 in.) =	3.338	acre-feet		inches
50-yr Runoff Volume (P1 = 2.26 in.) =	4.997	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	6.104	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	7.716	acre-feet		inches
Approximate 2-yr Detention Volume =	1.285	acre-feet		
Approximate 5-yr Detention Volume =	2.046	acre-feet		
Approximate 10-yr Detention Volume =	2.321	acre-feet		
Approximate 25-yr Detention Volume =	2.236	acre-feet		
Approximate 50-yr Detention Volume =	2.753	acre-feet		
Approximate 100-yr Detention Volume =	3.215	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.592	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.041	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	1.878	acre-feet
Total Detention Basin Volume =	3.511	acre-feet
Initial Surcharge Volume (ISV) =	77	ft^3
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H_{total}) =	6.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.005	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	
Initial Surcharge Area (A_{ISV}) =	234	ft^2
Surcharge Volume Length (L_{ISV}) =	15.3	ft
Surcharge Volume Width (W_{ISV}) =	15.3	ft
Depth of Basin Floor (H_{FLOOR}) =	1.07	ft
Length of Basin Floor (L_{FLOOR}) =	233.6	ft
Width of Basin Floor (W_{FLOOR}) =	122.3	ft
Area of Basin Floor (A_{FLOOR}) =	28,571	ft^2
Volume of Basin Floor (V_{FLOOR}) =	11,197	ft^3
Depth of Main Basin (H_{MAIN}) =	4.10	ft
Length of Main Basin (L_{MAIN}) =	266.4	ft
Width of Main Basin (W_{MAIN}) =	155.1	ft
Area of Main Basin (A_{MAIN}) =	41,320	ft^2
Volume of Main Basin (V_{MAIN}) =	142,476	ft^3
Calculated Total Basin Volume (V_{total}) =	**3.532**	acre-feet

Depth Increment = 0.50 ft

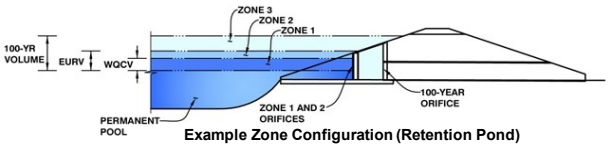
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		15.3	15.3	234		0.005		
ISV	0.33		15.3	15.3	234		0.005	77	0.002
	0.50		15.3	15.3	234		0.005	117	0.003
	1.00		50.0	32.3	1,615		0.037	335	0.008
	1.50		152.0	82.3	12,511		0.287	3,442	0.079
Floor	1.90		233.6	122.3	28,571		0.656	11,440	0.263
	2.00		234.4	123.1	28,856		0.662	14,312	0.329
Zone 1 (WQCV)	2.40		237.6	126.3	30,011		0.689	26,084	0.599
	2.50		238.4	127.1	30,302		0.696	29,100	0.668
	3.00		242.4	131.1	31,780		0.730	44,619	1.024
	3.50		246.4	135.1	33,290		0.764	60,886	1.398
Zone 2 (EURV)	3.81		248.9	137.6	34,243		0.786	71,353	1.638
	4.00		250.4	139.1	34,832		0.800	77,915	1.789
	4.50		254.4	143.1	36,406		0.836	95,724	2.198
	5.00		258.4	147.1	38,012		0.873	114,327	2.625
	5.50		262.4	151.1	39,650		0.910	133,741	3.070
Z3 (100+1/2WQCV)	5.98		266.2	155.0	41,253		0.947	153,157	3.516
	6.00		266.4	155.1	41,320		0.949	153,983	3.535
	6.50		270.4	159.1	43,023		0.988	175,067	4.019
	7.00		274.4	163.1	44,757		1.027	197,011	4.523
	7.50		278.4	167.1	46,523		1.068	219,829	5.047
	8.00		282.4	171.1	48,321		1.109	243,539	5.591
	8.50		286.4	175.1	50,151		1.151	268,155	6.156
	9.00		290.4	179.1	52,013		1.194	293,694	6.742
	9.50		294.4	183.1	53,907		1.238	320,173	7.350
	10.00		298.4	187.1	55,833		1.282	347,606	7.980
	10.50		302.4	191.1	57,791		1.327	376,011	8.632
	11.00		306.4	195.1	59,781		1.372	405,402	9.307
	11.50		310.4	199.1	61,803		1.419	435,797	10.005
	12.00		314.4	203.1	63,857		1.466	467,210	10.726
	12.50		318.4	207.1	65,943		1.514	499,659	11.471
	13.00		322.4	211.1	68,061		1.562	533,158	12.240
	13.50		326.4	215.1	70,211		1.612	567,725	13.033
	14.00		330.4	219.1	72,393		1.662	603,374	13.852
	14.50		334.4	223.1	74,607		1.713	640,123	14.695
	15.00		338.4	227.1	76,853		1.764	677,986	15.564
	15.50		342.4	231.1	79,131		1.817	716,981	16.460
	16.00		346.4	235.1	81,441		1.870	757,122	17.381
	16.50		350.4	239.1	83,783		1.923	798,427	18.329
	17.00		354.4	243.1	86,157		1.978	840,911	19.305
	17.50		358.4	247.1	88,563		2.033	884,589	20.307
	18.00		362.4	251.1	91,001		2.089	929,479	21.338
	18.50		366.4	255.1	93,471		2.146	975,595	22.397
	19.00		370.4	259.1	95,973		2.203	1,022,955	23.484
	19.50		374.4	263.1	98,507		2.261	1,071,574	24.600
	20.00		378.4	267.1	101,073		2.320	1,121,467	25.745
	20.50		382.4	271.1	103,671		2.380	1,172,652	26.920
	21.00		386.4	275.1	106,301		2.440	1,225,143	28.125
	21.50		390.4	279.1	108,963		2.501	1,278,958	29.361
	22.00		394.4	283.1	111,657		2.563	1,334,112	30.627
	22.50		398.4	287.1	114,383		2.626	1,390,620	31.924
	23.00		402.4	291.1	117,141		2.689	1,448,500	33.253
	23.50		406.4	295.1	119,931		2.753	1,507,767	34.614
	24.00		410.4	299.1	122,753		2.818	1,568,436	36.006
	24.50		414.4	303.1	125,607		2.884	1,630,525	37.432
	25.00		418.4	307.1	128,493		2.950	1,694,049	38.890
	25.50		422.4	311.1	131,411		3.017	1,759,023	40.382
	26.00		426.4	315.1	134,361		3.085	1,825,465	41.907

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: **Pine Canyon - Phase 1 Drainage Report**

Basin ID: **Basin O**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	43.86	acres
Watershed Length =	1,800	ft
Watershed Length to Centroid =	900	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	55.40%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.810	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	2.318	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	2.146	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	3.375	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	4.192	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.69 in.) =	4.419	acre-feet		inches
50-yr Runoff Volume (P1 = 2.26 in.) =	6.528	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	7.919	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	9.965	acre-feet		inches
Approximate 2-yr Detention Volume =	1.832	acre-feet		
Approximate 5-yr Detention Volume =	2.862	acre-feet		
Approximate 10-yr Detention Volume =	3.247	acre-feet		
Approximate 25-yr Detention Volume =	3.111	acre-feet		
Approximate 50-yr Detention Volume =	3.822	acre-feet		
Approximate 100-yr Detention Volume =	4.397	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.810	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.508	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	2.484	acre-feet
Total Detention Basin Volume =	4.802	acre-feet
Initial Surcharge Volume (ISV) =	106	ft^3
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H_{total}) =	6.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.005	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	
Initial Surcharge Area (A_{ISV}) =	321	ft^2
Surcharge Volume Length (L_{ISV}) =	17.9	ft
Surcharge Volume Width (W_{ISV}) =	17.9	ft
Depth of Basin Floor (H_{FLOOR}) =	1.30	ft
Length of Basin Floor (L_{FLOOR}) =	283.1	ft
Width of Basin Floor (W_{FLOOR}) =	147.9	ft
Area of Basin Floor (A_{FLOOR}) =	41,875	ft^2
Volume of Basin Floor (V_{FLOOR}) =	19,873	ft^3
Depth of Main Basin (H_{MAIN}) =	3.87	ft
Length of Main Basin (L_{MAIN}) =	314.1	ft
Width of Main Basin (W_{MAIN}) =	178.9	ft
Area of Main Basin (A_{MAIN}) =	56,178	ft^2
Volume of Main Basin (V_{MAIN}) =	189,055	ft^3
Calculated Total Basin Volume (V_{total}) =	**4.802**	acre-feet

Depth Increment = 0.50 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		17.9	17.9	321		0.007		
ISV	0.33		17.9	17.9	321		0.007	106	0.002
	0.50		17.9	17.9	321		0.007	160	0.004
	1.00		52.6	34.9	1,836		0.042	433	0.010
	1.50		154.6	84.9	13,126		0.301	3,748	0.086
	2.00		256.6	134.9	34,617		0.795	15,259	0.350
Floor	2.13		283.1	147.9	41,875		0.961	20,224	0.464
Zone 1 (WQCV)	2.49		286.0	150.8	43,124		0.990	35,523	0.815
	2.50		286.1	150.9	43,159		0.991	35,954	0.825
	3.00		290.1	154.9	44,923		1.031	57,974	1.331
	3.50		294.1	158.9	46,719		1.073	80,883	1.857
Zone 2 (EURV)	3.93		297.5	162.3	48,289		1.109	101,309	2.326
	4.00		298.1	162.9	48,547		1.114	104,698	2.404
	4.50		302.1	166.9	50,406		1.157	129,435	2.971
	5.00		306.1	170.9	52,298		1.201	155,110	3.561
	5.50		310.1	174.9	54,222		1.245	181,738	4.172
Z3 (100+1/2WQCV)	6.00		314.1	178.9	56,178		1.290	209,337	4.806
	6.50		318.1	182.9	58,165		1.335	237,921	5.462
	7.00		322.1	186.9	60,185		1.382	267,508	6.141
	7.50		326.1	190.9	62,237		1.429	298,112	6.844
	8.00		330.1	194.9	64,321		1.477	329,750	7.570
	8.50		334.1	198.9	66,436		1.525	362,438	8.320
	9.00		338.1	202.9	68,584		1.574	396,192	9.095
	9.50		342.1	206.9	70,764		1.625	431,027	9.895
	10.00		346.1	210.9	72,976		1.675	466,961	10.720
	10.50		350.1	214.9	75,220		1.727	504,008	11.570
	11.00		354.1	218.9	77,495		1.779	542,186	12.447
	11.50		358.1	222.9	79,803		1.832	581,509	13.350
	12.00		362.1	226.9	82,143		1.886	621,994	14.279
	12.50		366.1	230.9	84,515		1.940	663,657	15.235
	13.00		370.1	234.9	86,918		1.995	706,514	16.219
	13.50		374.1	238.9	89,354		2.051	750,581	17.231
	14.00		378.1	242.9	91,822		2.108	795,873	18.271
	14.50		382.1	246.9	94,322		2.165	842,408	19.339
	15.00		386.1	250.9	96,853		2.223	890,200	20.436
	15.50		390.1	254.9	99,417		2.282	939,267	21.563
	16.00		394.1	258.9	102,013		2.342	989,623	22.719
	16.50		398.1	262.9	104,641		2.402	1,041,285	23.905
	17.00		402.1	266.9	107,300		2.463	1,094,269	25.121
	17.50		406.1	270.9	109,992		2.525	1,148,591	26.368
	18.00		410.1	274.9	112,716		2.588	1,204,266	27.646
	18.50		414.1	278.9	115,472		2.651	1,261,312	28.956
	19.00		418.1	282.9	118,259		2.715	1,319,743	30.297
	19.50		422.1	286.9	121,079		2.780	1,379,577	31.671
	20.00		426.1	290.9	123,931		2.845	1,440,828	33.077
	20.50		430.1	294.9	126,815		2.911	1,503,513	34.516
	21.00		434.1	298.9	129,730		2.978	1,567,648	35.988
	21.50		438.1	302.9	132,678		3.046	1,633,249	37.494
	22.00		442.1	306.9	135,658		3.114	1,700,331	39.034
	22.50		446.1	310.9	138,670		3.183	1,768,912	40.609
	23.00		450.1	314.9	141,714		3.253	1,839,006	42.218
	23.50		454.1	318.9	144,789		3.324	1,910,631	43.862
	24.00		458.1	322.9	147,897		3.395	1,983,801	45.542
	24.50		462.1	326.9	151,037		3.467	2,058,533	47.257
	25.00		466.1	330.9	154,209		3.540	2,134,843	49.009
	25.50		470.1	334.9	157,412		3.614	2,212,747	50.798
	26.00		474.1	338.9	160,648		3.688	2,292,261	52.623
	26.50		478.1	342.9	163,916		3.763	2,373,400	54.486

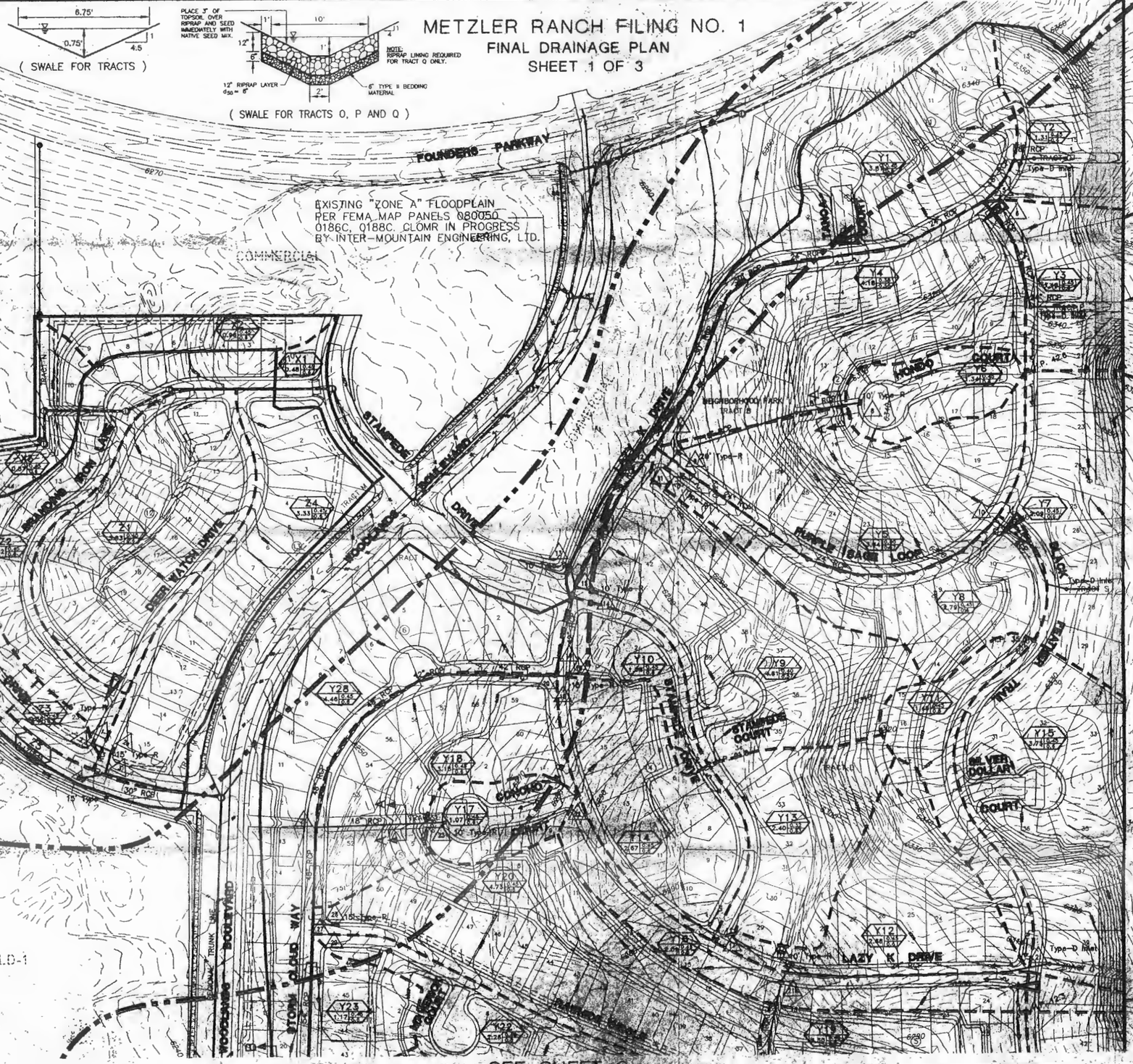
Pine Canyon - Phase 1

POND SUMMARY TABLE							
BASIN	DESIGN POINT	AREA (AC)	IMPERVIOUS (%)	WQCV (AC-FT)	EURV (AC-FT)	100YR + 1/2 WQCV VOL (AC-FT)	100YR EMERGENCY OVERFLOW (CFS)
A	A	15.77	10.0%	-	-	-	-
B	B	16.99	10.0%	-	-	-	-
C	C	18.10	77.7%	0.477	1.558	2.701	70.8
D	D	51.63	72.3%	1.233	4.110	7.244	212.0
E	E	25.27	70.3%	0.582	1.779	3.352	101.8
F	F	38.19	42.9%	0.599	1.538	3.518	118.0
G	G	101.79	44.1%	1.617	4.363	9.627	312.9
H	H	67.28	45.4%	1.095	2.877	6.430	207.3
I	I	26.11	45.5%	0.423	1.115	2.499	95.3
J	J	44.57	66.6%	0.968	2.878	5.595	187.4
K	K	25.30	43.0%	0.396	1.017	2.335	86.7
L	L	28.76	54.4%	0.528	1.496	3.112	136.6
M	M	34.31	50.3%	0.592	1.633	3.516	110.3
N	N	18.78	22.4%	-	-	-	-
O	O	43.86	55.4%	0.815	2.326	4.806	155.9

APPENDIX D

REFERENCE EXCERPTS

METZLER RANCH FILING NO. 1
FINAL DRAINAGE PLAN
SHEET 1 OF 3



(SWALE FOR TRACTS)

(SWALE FOR TRACTS O, P AND Q)

NOTE: RIPRAP LINING REQUIRED FOR TRACT Q ONLY.

SECTION A–A

GROSS BENCHMARK:
PER THE 3" BRASS CAP 0.337 MILES NORTH OF CASTLE ROCK TRAIN STATION, 6' WEST OF WEST RAIL SET AT TOP WEST END OF NORTH ABUTMENT OF BRIDGE 51-30.
ELEV = 8249.80 DATUM USC+GS

PROJECT BENCHMARK:
SET #5 REBAR 6' EAST OF WEST R.O.W. FENCE OF FOUNDERS PARKWAY; APPROXIMATELY 600' WEST OF THE INTERSECTION OF FOUNDERS PARKWAY AND CROWFOOT VALLEY RD.
ELEV=8278.90 PROJECT DATUM (RMC FB. 375028)
ELEV=8271.37 USC+GS
(PROJECT DATUM BASED ON PREVIOUS CONSTRUCTION WORK IN THE AREA)

POINT OF BEGINNING

SHADED AREA REPRESENTS PRESERVATION EASEMENT AREA.

LEGEND
- BASIN I.D.
- 5 YEAR "C" VALUE
- 100 YEAR "C" VALUE
- AREA IN ACRES
- DESIGN POINT
- PROPOSED CROSS-PAN
- FLOW ARROW
- MAJOR BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- OFFSITE BASIN BOUNDARY
- PROPOSED STORM SEWER
- EXISTING 100 YR FLOODPLAIN

SCALE: 1" = 100'

PREPARED UNDER THE DIRECT SUPERVISION OF: LEONARD R. WILSON

LEONARD R. WILSON, P.E. #18810 — DATE 6-16-98

TOWN OF CASTLE ROCK APPROVALS

THESE PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM THE APPROVAL DATE OF THE PUBLIC WORKS DEPARTMENT.

RECOMMENDED APPROVAL:

ENGINEERING DIVISION

DATE

APPROVED BY:

PUBLIC WORKS DIRECTOR

DATE

TOWN OF CASTLE ROCK
METZLER RANCH
FINAL DRAINAGE PLAN

DATE: JUNE '97
DESIGNED BY: MG
DRAWN BY: MLB
CHECKED BY: MG

JOB NO. 2748.012.00

SHEET 1 OF 3

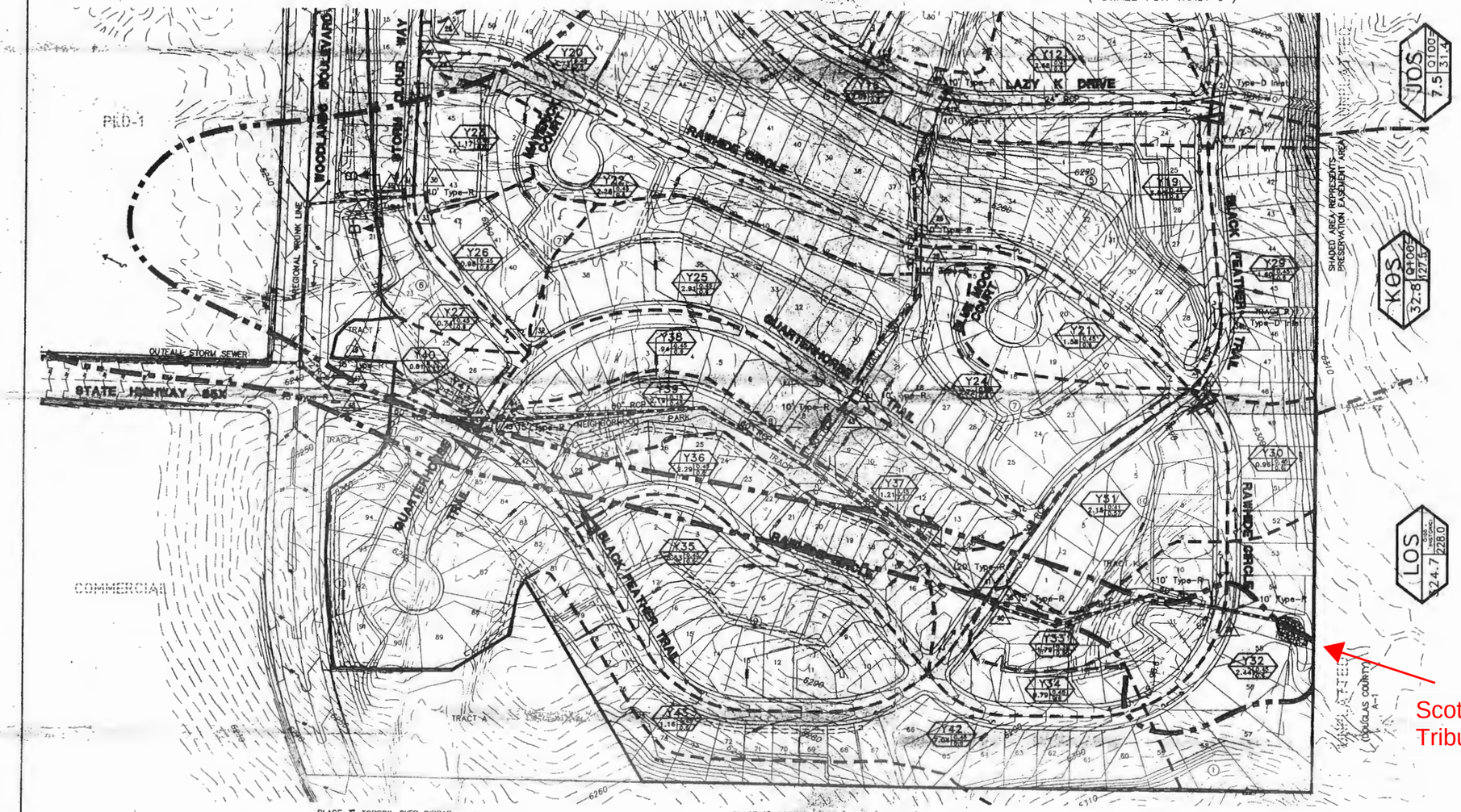
RMC
ROCKY MOUNTAIN CONSULTANTS, INC.
CIVIL AND ENVIRONMENTAL ENGINEERING • PLANNING
8301 E. Prentice Ave. Suite 101
Englewood, CO 80111
(303) 741-6000
FAX (303) 741-6106

NO.	REVISIONS	DATE	BY
1	REV PER TOWN COMMENTS	8/30/97	MG
2	PER TOWN COMMENTS	9/15/97	MG
3	REVISED	10/20/97	DM
4	REVISED	10/21/97	DM
5	REVISED	12/19/97	DM
6	REVISED	2/6/98	DM

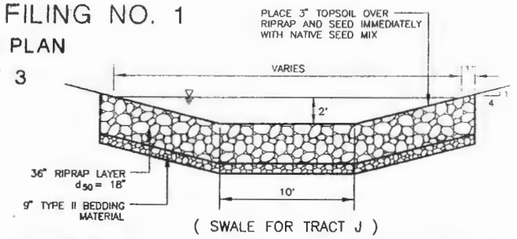
REF. 6

METZLER RANCH FILING NO. 1
FINAL DRAINAGE PLAN
SHEET 2 OF 3

SEE SHEET 1

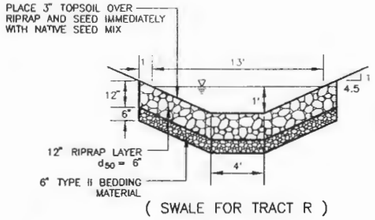


PLACE 3" TOPSOIL OVER RIPRAP AND SEED IMMEDIATELY WITH NATIVE SEED MIX



(SWALE FOR TRACT J)

PLACE 3" TOPSOIL OVER RIPRAP AND SEED IMMEDIATELY WITH NATIVE SEED MIX



(SWALE FOR TRACT R)

LEGEND

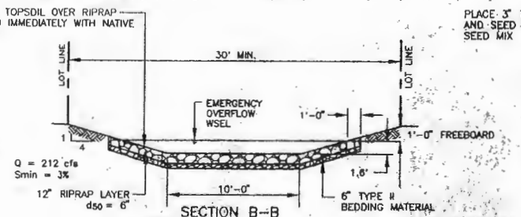
- A01 — BASIN I.D. (0.00 | 0.00 | 0.00 — 5 YEAR "C" VALUE / 100 YEAR "C" VALUE / AREA IN ACRES)
- 00 — DESIGN POINT
- PROPOSED CROSS-PAN
- FLOW ARROW
- MAJOR BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- OFFSITE BASIN BOUNDARY
- PROPOSED STORM SEWER
- EXISTING 100 YR FLOODPLAIN

100 50 0 100 200
SCALE: 1" = 100'

ORIGIN BENCHMARK:
USE THE 3" BRASS CAP Q337 1.3 MILES NORTH OF CASTLE ROCK TRAIN STATION, 8' WEST OF WEST RAIL SET AT TOP WEST END OF NORTH ABUTTMENT OF BRIDGE #31.20.
ELEV.=6141.90 DATUM USC+GS

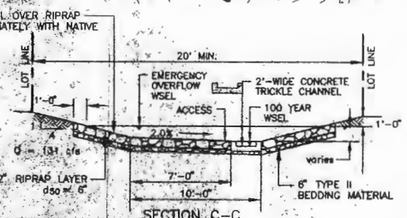
PROJECT BENCHMARK:
SET 3/8 REBAR, 6" EMB. OF WEST R.O.W. FENCE OF FOUNDERS PARKWAY; APPROXIMATELY 800' WEST OF THE INTERSECTION OF FOUNDERS PARKWAY AND CROWFOOT VALLEY RD.
ELEV.=6270.80 PROJECT DATUM (RMC FB. 375028)
ELEV.=6271.37 USC+GS
(PROJECT DATUM BASED ON PREVIOUS CONSTRUCTION WORK IN THE AREA)

PLACE 3" TOPSOIL OVER RIPRAP AND SEED IMMEDIATELY WITH NATIVE SEED MIX



SECTION B-B
EMERGENCY OVERFLOW CHANNEL

PLACE 3" TOPSOIL OVER RIPRAP AND SEED IMMEDIATELY WITH NATIVE SEED MIX



SECTION C-C
EMERGENCY OVERFLOW CHANNEL

TOWN OF CASTLE ROCK APPROVALS
THESE PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM THE , APPROVAL DATE OF THE PUBLIC WORKS DEPARTMENT.

RECOMMENDED APPROVAL:

ENGINEERING DIVISION _____ DATE _____

APPROVED BY:

PUBLIC WORKS DIRECTOR _____ DATE _____

PREPARED UNDER THE DIRECT SUPERVISION OF LEONARD R. WILSON

LEONARD R. WILSON, P.E. #18810 — DATE 6-16-98

REVISIONS

NO	DATE	BY
1	4/30/97	MG
2	5/15/97	MG
3	8/26/97	DM
4	12/19/97	DM
5	1/7/98	DM
6	2/4/98	DM

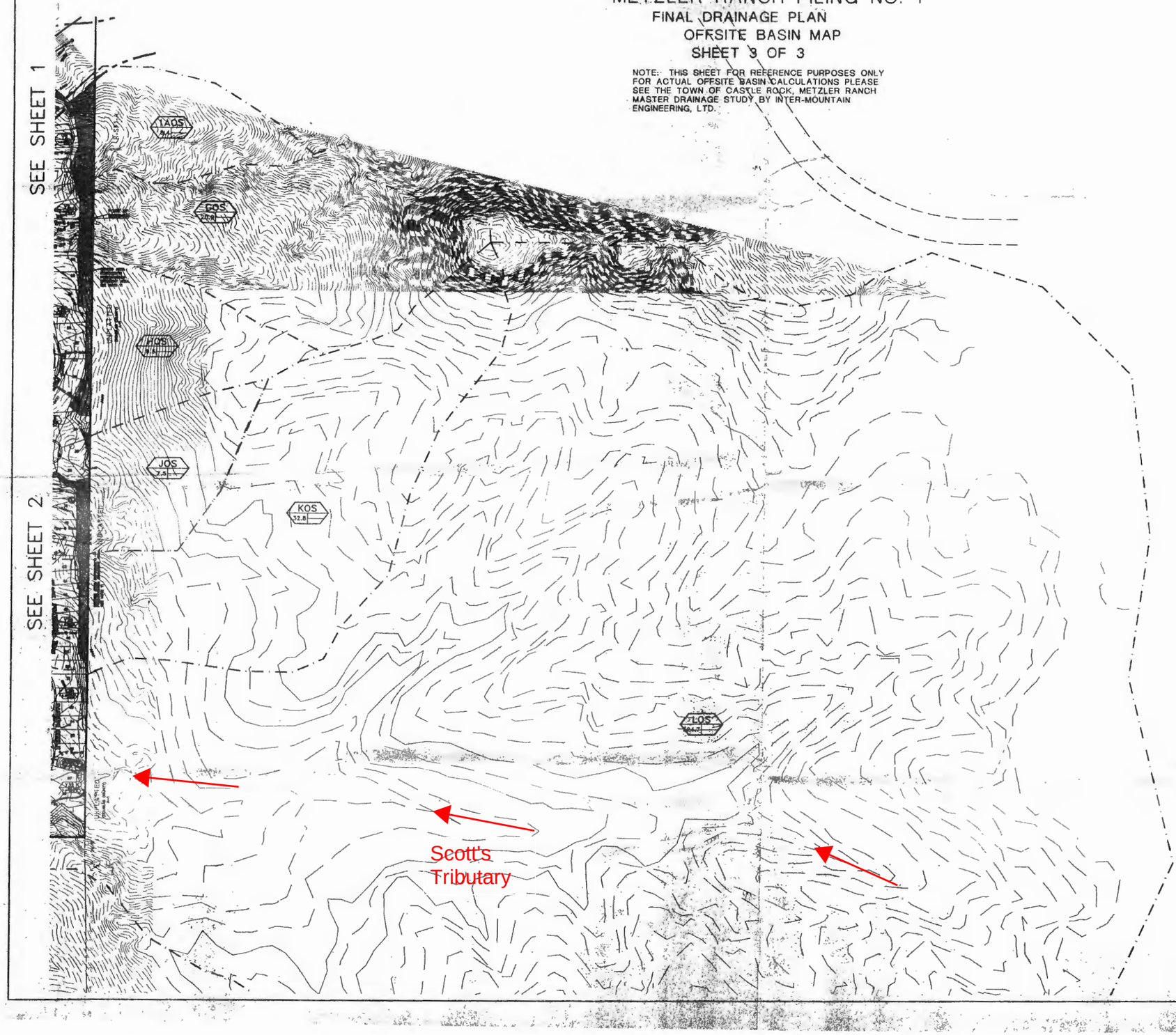
RMC
ROCKY MOUNTAIN CONSULTANTS, INC.
CIVIL AND ENVIRONMENTAL ENGINEERING • PLANNING
8301 E. Prentice Ave. Suite 100
Englewood, CO 80111
(303) 741-6000
FAX (303) 741-6106

TOWN OF CASTLE ROCK
METZLER RANCH
FINAL DRAINAGE PLAN

DATE: JUNE '97
DESIGNED BY: MG
DRAWN BY: NLD
CHECKED BY: MG
JOB NO. 2748.012.00
SHEET 2 OF 3

METZLER RANCH FILING NO. 1
FINAL DRAINAGE PLAN
OFFSITE BASIN MAP
SHEET 3 OF 3

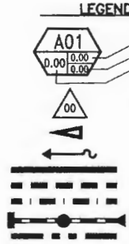
NOTE: THIS SHEET FOR REFERENCE PURPOSES ONLY FOR ACTUAL OFFSITE BASIN CALCULATIONS PLEASE SEE THE TOWN OF CASTLE ROCK, METZLER RANCH MASTER DRAINAGE STUDY BY INTER-MOUNTAIN ENGINEERING, LTD.



ORIGIN BENCHMARK:
USE THE 3" BRASS CAP, 0.33' 1.3 MILES NORTH OF CASTLE ROCK TRAIN STATION, 6' WEST OF WEST RAIL SET AT TOP WEST END OF NORTH ABUTTMENT OF BRIDGE #31.20.
ELEV.=6149.90 DATUM USC+GS

PROJECT BENCHMARK:
SET #5 REBAR 6' EAST OF WEST R.O.W. FENCE OF FOUNDERS PARKWAY; APPROXIMATELY 800' WEST OF THE INTERSECTION OF FOUNDERS PARKWAY AND CROWFOOT VALLEY RD.
ELEV.=8270.80 PROJECT DATUM (RMC FB. 375028)
ELEV.=8271.37 USC+GS
(PROJECT DATUM BASED ON PREVIOUS CONSTRUCTION WORK IN THE AREA)

LEGEND



BASIN I.D.
5 YEAR "C" VALUE
100 YEAR "C" VALUE
AREA IN ACRES
DESIGN POINT
PROPOSED CROSS-PAN
FLOW ARROW
MAJOR BASIN BOUNDARY
SUB-BASIN BOUNDARY
OFFSITE BASIN BOUNDARY
PROPOSED STORM SEWER
EXISTING 100 YR FLOODPLAIN

200 100 0 200 400
SCALE: 1" = 200'

PREPARED UNDER THE DIRECT SUPERVISION OF LEONARD R. WILSON
LEONARD R. WILSON, P.E. #18810 — 18810 — 6-16-97 DATE

TOWN OF CASTLE ROCK APPROVALS
THESE PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM THE APPROVAL DATE OF THE PUBLIC WORKS DEPARTMENT.
RECOMMENDED APPROVAL:
ENGINEERING DIVISION
DATE
APPROVED BY:
PUBLIC WORKS DIRECTOR
DATE

RMC
ROCKY MOUNTAIN CONSULTANTS, INC.
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Englewood, CO 80111
(303) 741-6000
FAX (303) 741-6106

REVISIONS			
NO		DATE	BY
1	REV PER TOWN COMMENTS	4/30/97	MG
2	REVISED	6/19/97	MG

TOWN OF CASTLE ROCK – METZLER RANCH
FINAL DRAINAGE PLAN
OFFSITE BASIN MAP

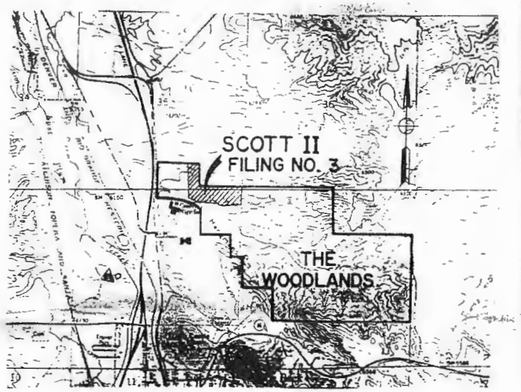
DATE: JUNE '97
DESIGNED BY: MG
DRAWN BY: NLD
CHECKED BY: MG
JOB NO. 2748.012.00
SHEET 3 OF 3

C:\PROJECTS\2748.012\MTZOSDN Mon Dec 22 07:57:23 1997 HUNTER

SCOTT II FILING NO. 3
FINAL DRAINAGE PLAN

DETENTION/SEDIMENTATION POND	
DETENTION VOLUME	0.9 ACRE FEET
SEDIMENTATION VOLUME	0.3 ACRE FEET
100 YEAR W.S.	6205.5 FEET

SCALE: 1"=100'



VICINITY MAP

DOUGLAS CO.

Site

Site

7 OUTFALL

4 INLET NO. 4 L = 15'

6 INLET NO. 5 L = 15'

8 OFFSITE FLOWS

03 3.0

04 2.0

3A INLET NO. 3 L=5'

02 2.0

01 290

9 OFFSITE FLOWS (SEE REF 4) Q_{100} = 43 cfs, Q_2 = 4 cfs, Q_5 = 9 cfs

INLET NO. 4 TYPE 13 (6 RATE)

18" RCP STUB

INLET NO. 1 L=10'

INLET NO. 2 L=10'

TOWN OF CASTLE ROCK BOUNDARY

TRACT "C"

HIGH SCHOOL RD. HWG. ROW

LOT 1 (MULTI-FAMILY)

M1 11.0

B7 1.2

B6 4.4

B5 1.2

B3 1.2

B2 0.8

B1 1.3

B4 2.3

A1 1.6

A2 2.1

PHASE III

PHASE II

RIPRAP OUTFALL FOR PHASE II

SCOTT ROAD

HANGMANS GULCH

CHASE SECTION

SCOTT II FILING No. 2

NATURAL CHANNEL

INLETS L=5'

TRIBUTARY A

STILLEWAY BASIN

PROPOSED 30' EASEMENT

SCOTT II FILING No. 1

WOODLANDS BLVD.

8 SEE REF 4 OFFSITE FLOWS Q_{100} = 203 cfs

FLOODPLAIN LIMITS NOT RECOGNIZED BY FEMA ESTABLISHED BY NOLTE ENG. BASED UPON CONSTRUCTION OF SCOTT BLVD.

DOUGLAS COUNTY SCHOOL DISTRICT RE-1

DOUGLAS CO. SCHOOL DISTRICT

LEGEND:

- BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- SUB-BASIN DESIGNATION / AREA IN ACRES
- DESIGN POINT - ON SITE
- DESIGN POINT - MASTER DRAINAGE PLAN (HISTORIC / DEVELOPED CONDITIONS)
- STORM SEWER w/ INLET
- ESTIMATED LIMITS OF HISTORIC BOUNDARY
- CROSS-PAN
- RIPRAP PROTECTION
- LIMITS OF EXISTING 100 YEAR FLOODPLAIN

DISCHARGE SUMMARY

Design Point	Contributing Basin	Total Area (acres)	Q2 (cfs)	Q100 (this project) (cfs)	Q100* (developed offsite) (cfs)
1	A1	1.6	2.7	8.4	8.4
2	A1, A2	3.7	6.2	19.5	19.5
CUHP	01	29	3.0	48	29* (controlled release)
3	B1, 01	30.3	3.5	33.1	36.4*
3A	B1, B2, 01, 02	33.1	7.5	37.2	—
4	B1, B2, B3, B7 01, 02, 04	37.5	10.3	44.3	84.3*
5	B4	2.3	3.7	12.1	12.1
6	B5, B6	5.8	11.1	44.5	35.8
7	Offsite, B	45.4	22.6	64.2	87.2*

*Note: Developed offsite flows will be controlled at property line. Acceptable release rate (per Douglas County Criteria) equals 3 cfs/1 acre.

PREPARED UNDER THE SUPERVISION OF LEONARD WILSON, P.E.

ALL WORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE TOWN OF CASTLE ROCK STANDARD SPECIFICATIONS

APPROVED FOR ONE YEAR FROM THIS DATE
RECOMMENDED FOR APPROVAL:

ENGINEERING DEPT. — DATE 5-24-94

PUBLIC WORKS DIRECTOR — DATE 6/6/94

RMC
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CIVIL AND ENVIRONMENTAL ENGINEERING • PLANNING
8301 E. Prentice Ave.
Suite 101
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(303) 741-6000
FAX (303) 741-6106

NO.	DESCRIPTION	DATE	BY
1	REV. SYM. SHT. & CHANGES	5/25/94	LW

DATE:
DESIGNED BY:
DRAWN BY:
CHECKED BY:

JOB NO. 2195.014.00

SHEET 1 OF 1

SCOTT II FILING NO.3
FINAL DRAINAGE PLAN

CASTLE TERRACE

SHEET 2 OF 2

FINAL DRAINAGE PLAN

Site



RMC
6301 E. Prentice Ave
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Englewood, CO 80111
(303) 741-8000
FAX (303) 741-8106

ROCKY MOUNTAIN CONSULTANTS, INC.
CIVIL AND ENVIRONMENTAL ENGINEERING • PLANNING

REVISIONS			
NO.		DATE	BY
1	REVISE	9/10/96	VS

CASTLE TERRACE
FINAL DRAINAGE PLAN

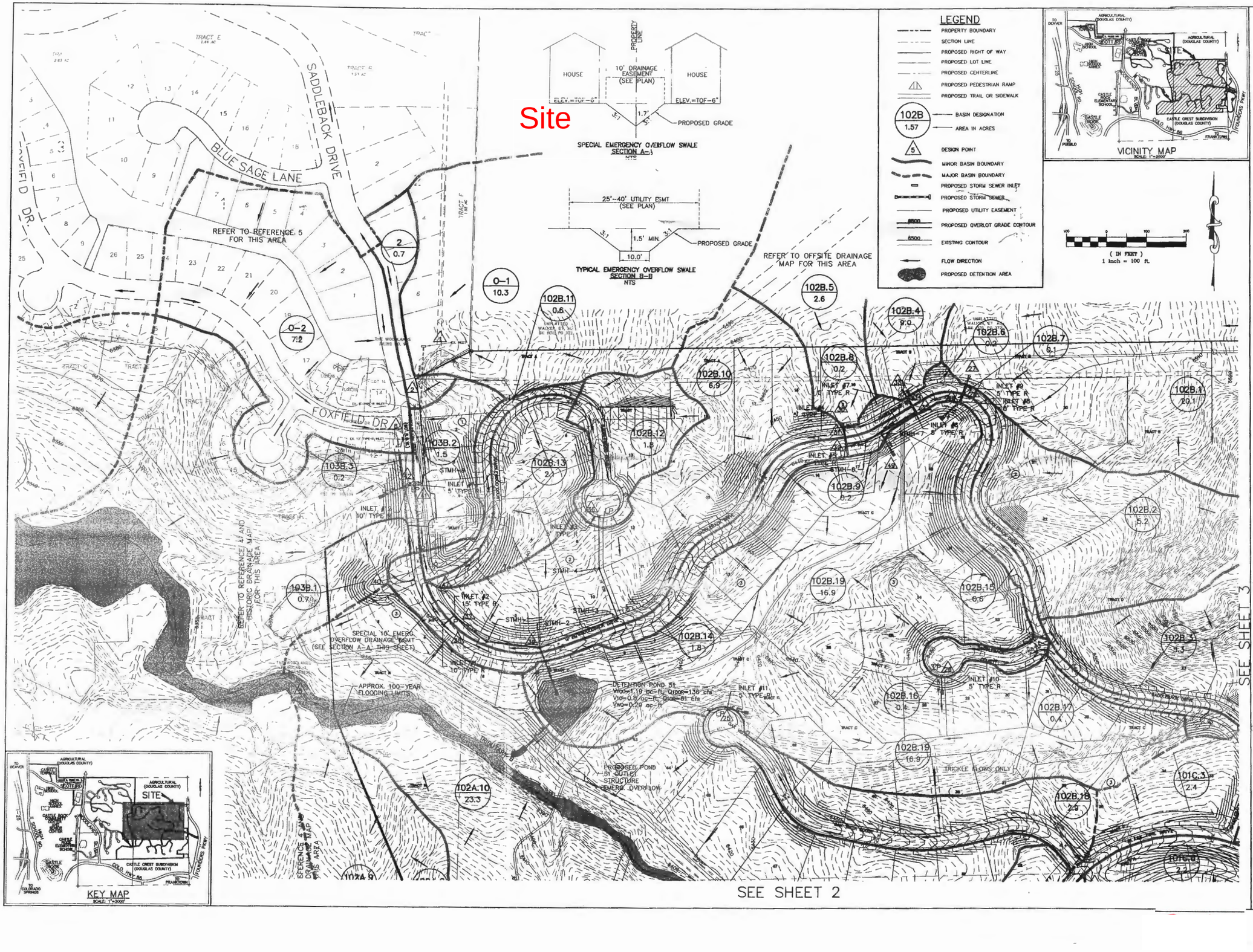
DATE: APRIL 1995
DESIGNED BY: VS
DRAWN BY: JVH
CHECKED BY: LJW

JOB NO.
2600.002.00

SHEET
2 OF 2

CURRENT DRAWING: CTR2002FN.DWG

THE WOODLANDS
FILING NO. 10
PHASE III DRAINAGE MAP



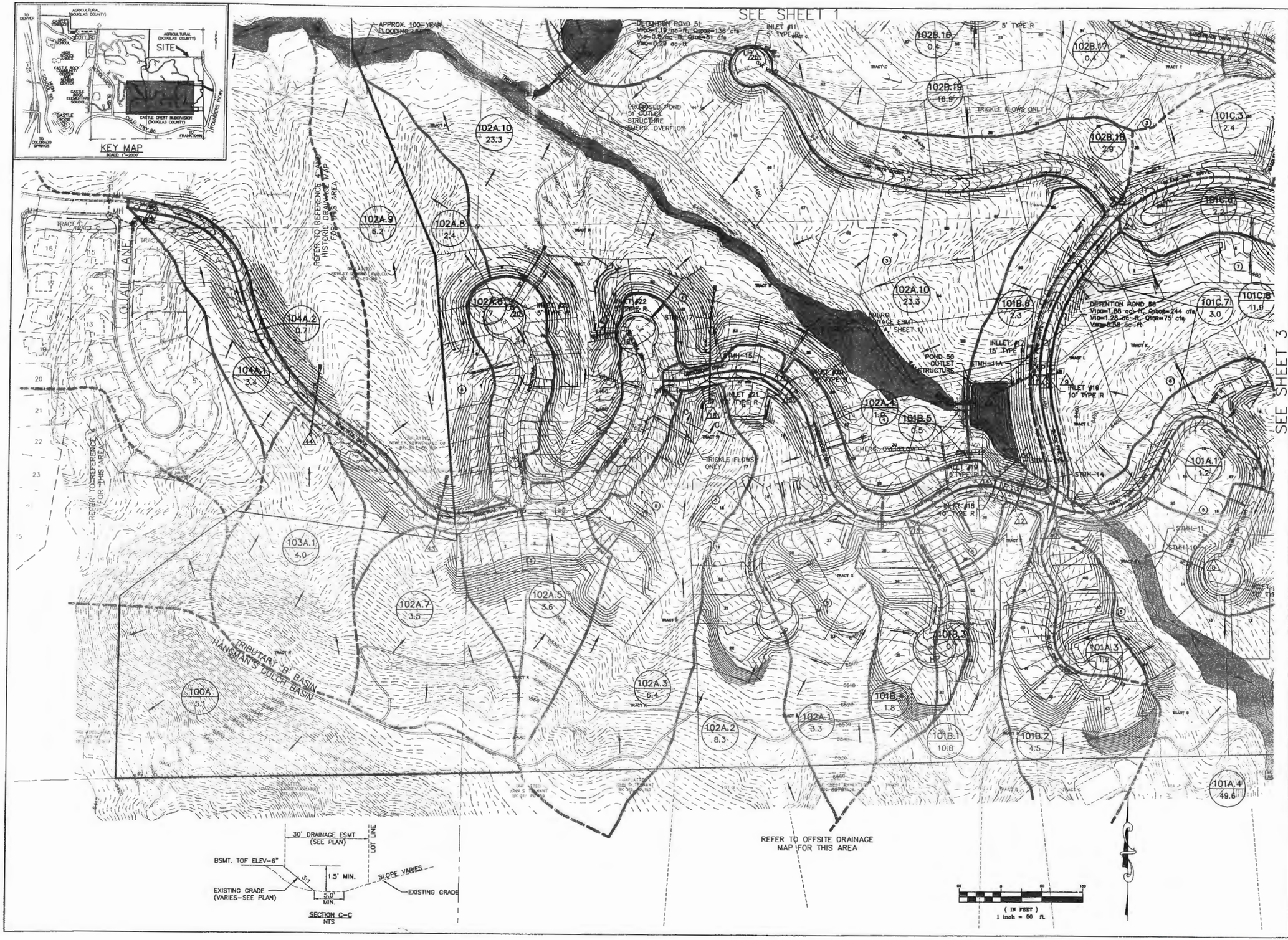
NO.	REVISION	DATE	BY

DEVELOPER

TERRABROOK WOODLANDS, L.L.C.
WESTERRA MGMT., AUTH. REP.
304 INVERNESS WAY SOUTH
SUITE 165
ENGLEWOOD, COLORADO 80112
303-706-7867
303-649-1665 fax
CONTACT: BRUCE O'DONNELL

PEAK CIVIL CONSULTANTS
CIVIL ENGINEERING & LAND DEVELOPMENT SERVICES
2525 16TH STREET, SUITE 210
DENVER, COLORADO 80211
(720) 855-3859 (720) 855-3860 fax
(mail: peakcivil@worldnet.att.net

DATE: 8/07/00
JOB NO: 99.08
DRAWN BY: BK
APPROVED:
CADD FILE: 99.08\PH3DRN-1



NO.	REVISION	DATE	BY

THE WOODLANDS FILING NO. 10

PHASE III DRAINAGE MAP

DEVELOPER

TERRABROOK WOODLANDS, L.L.C.
WESTERRA MGMT., AUTH. REP.
304 INVERNESS WAY SOUTH
SUITE 165
ENGLEWOOD, COLORADO 80112
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2525 16TH STREET, SUITE 210
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(720) 855-3659 (720) 855-3660 fax
Email: peakcivil@worldnet.att.net

DATE: 8/07/99
JOB NO: 99.08
DRAWN BY: BK
APPROVED:
CADD FILE: 99.08\PH3DRN-2

SEE SHEET 2

SEE SHEET 1

101A.1 1.2

101A.2 5.6

101A.3 49.6

101C.7 3.0

101C.8 11.9

101C.5 1.5

101C.4 3.6

101C.3 2.4

101C.2 4.8

101C.1 3.7

102B.2 5.2

102B.1 20.1

102B.3 5.4

102B.4 5.3

HANGMAN'S GULCH BASIN (TRIB 'B')

McMURDO GULCH BASIN

51MH-9

51MH-11

10" TYPE R

REFER TO OFFSITE DRAINAGE MAP FOR THIS AREA

FUTURE DETENTION POND 1 (REF. 4 – BY OTHERS)

EXIST. CULVERT

CONCEPTUAL LAYOUT OF FUTURE FILING (BY OTHERS)

FOUNDERS PARKWAY

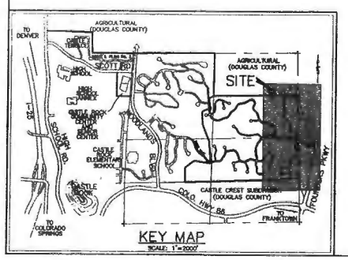
FUTURE DETENTION POND 2 (REF. 4 – BY OTHERS)

EXIST. CULVERT

CONCEPTUAL LAYOUT OF FUTURE FILING (BY OTHERS)

50 0 50 100

(IN FEET)
1 inch = 50 ft.



KEY MAP
SCALE: 1"=2000'

THE WOODLANDS
FILING NO. 10
PHASE III DRAINAGE MAP

NO.	REVISION	DATE	BY

DEVELOPER

TERRABROOK WOODLANDS, L.L.C.
WESTERRA MGMT., AUTH. REP.
304 INVERNESS WAY SOUTH
SUITE 165
ENGLEWOOD, COLORADO 80112
303-706-7867
303-649-1665 fax
CONTACT: BRUCE O'DONNELL

PEAK CIVIL CONSULTANTS
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Email: peakciv@worldnet.att.net

DATE: 8/07/99
JOB NO: 99.08
DRAWN BY: BK
APPROVED:
CADD FILE: 99.08\PH3DRN-1

THE WOODLANDS FILING NO. 10
HISTORIC DRAINAGE PLAN

Site

REFER TO OFFSITE DRAINAGE MAP FOR THIS AREA

APPROX. LIMITS OF PONDING
PROPOSED DETENTION POND 52
V_{100}=14.1 ac-ft, Q_{100}=575 cfs
V_{25}=7.1 ac-ft, Q_{25}=150 cfs
V_{10}=2.7 ac-ft

APPROX. HISTORIC 100-YEAR FLOODING LIMITS

PROPOSED OUTLET STRUCTURE (SEE DRAINAGE REPORT FOR DETAILS)

EXIST. 8'x6' RCB (TO HANGMAN GULCH)

104B 30.0

103B 35.2

102B 71.0

104A 24.3

103A 20.8

101C 31.2

100A 5.1

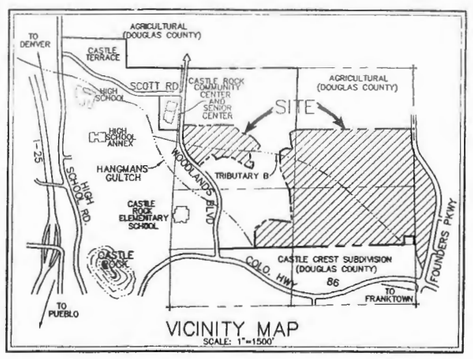
102A 66.8

101B 23.5

101A 58.5

CANYON OAKS DR.
SADDLEBACK DRIVE
FOXFIELD DR.
BLUE SAGE LANE
WOODLANDS BLVD.
RAMBLEWOOD DRIVE
BRIDGE TRAIL DR.
WILDWOOD LANE
OLAF LANE
WHITETAIL DRIVE
PINYON DRIVE
SCOTT CANYON LN.
FOX CANYON LN.
RIDGE ROAD
CASTLE OAKS DRIVE
HANGMANS GULCH BASIN
TRIBUTARY B BASIN
HANGMANS GULCH BASIN
CASTLE CREST AMENDED
CASTLE OAKS SUBDIVISION
MULLER BLVD. FILING NO. 1
THE WOODLANDS FILING NO. 8
THE WOODLANDS FILING NO. 9
THE WOODLANDS FILING NO. 4
UNPLATTED
PART OF OUTLOT 'A'
LOT 2, BLK 2
LOT 1, BLK 2

VICINITY MAP
SCALE: 1"=1500'



LEGEND

- 102B / 1.57 — BASIN DESIGNATION / AREA IN ACRES
- 5 — DESIGN POINT
- HISTORIC BASIN BOUNDARY
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- FLOW DIRECTION
- PROPOSED RIGHT-OF-WAY

REFER TO OFFSITE DRAINAGE MAP FOR THIS AREA

200 0 200 400
(IN FEET)
1 inch = 200 ft

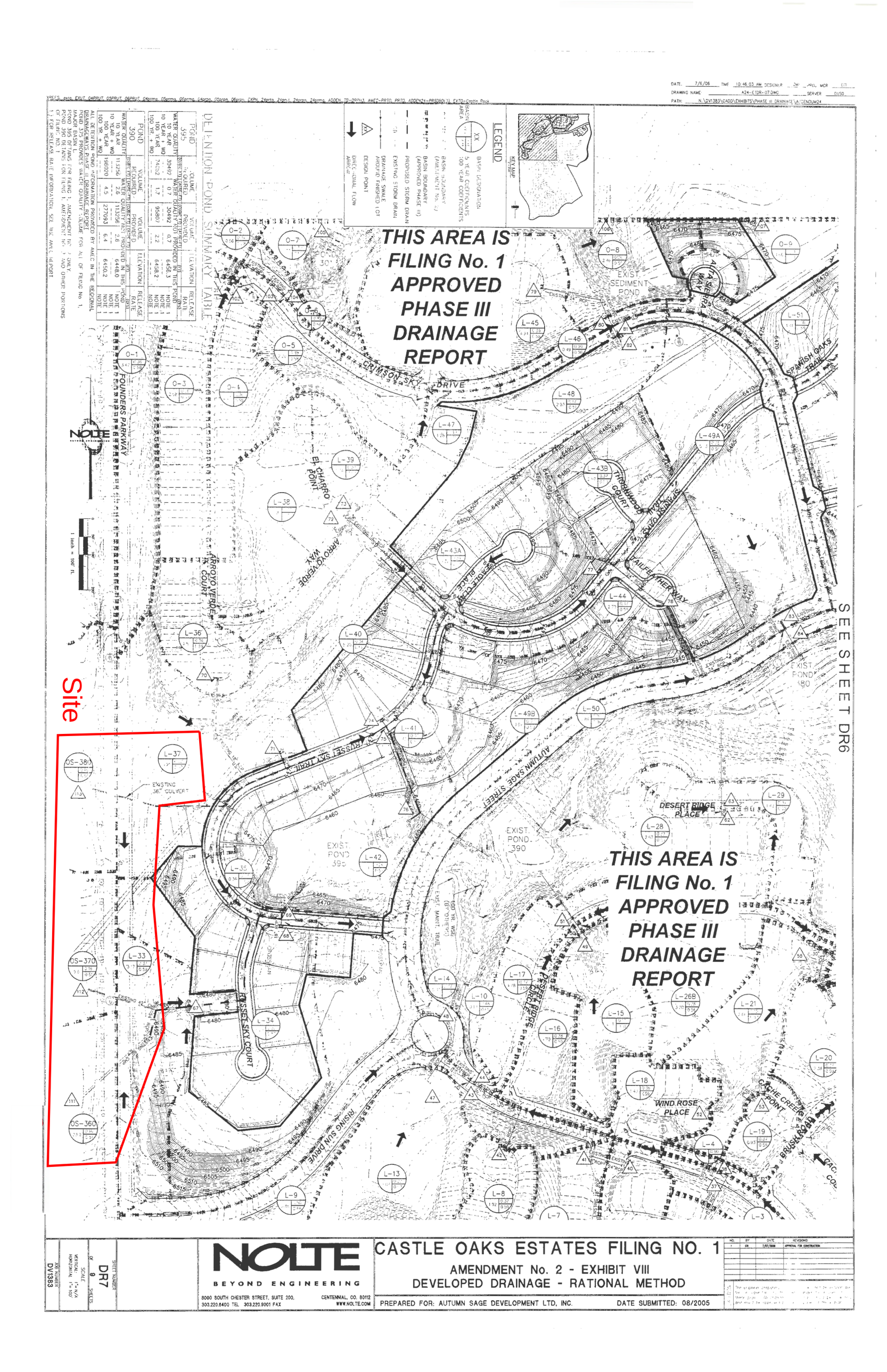
NO.	REVISION	DATE	BY

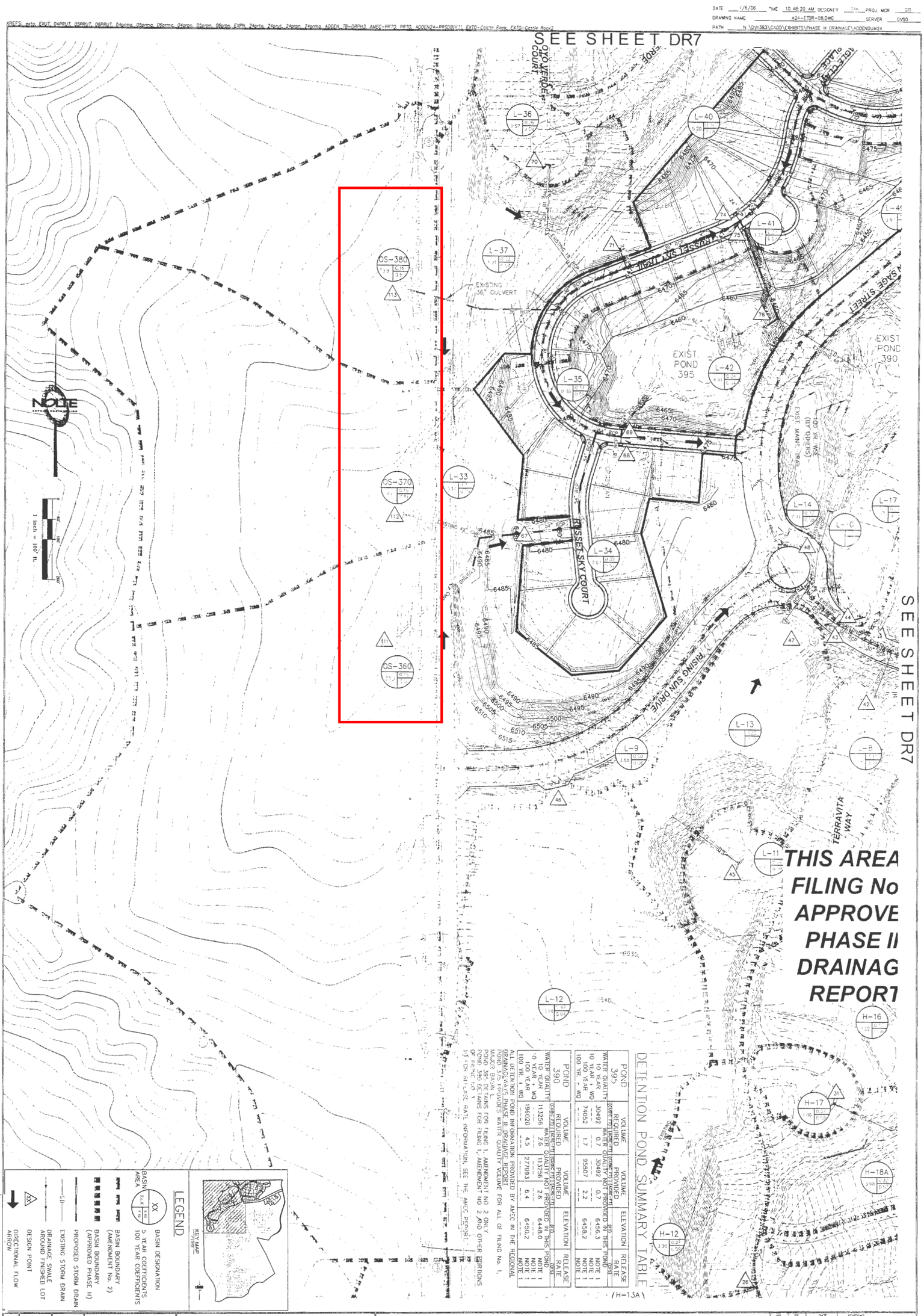
DEVELOPER

TERRABROOK WOODLANDS, LLC
304 INVERNESS WAY SOUTH
SUITE 165
ENGLEWOOD, COLORADO 80112
303-706-7867
303-649-1665 fax
CONTACT: BRUCE O'DONNELL

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2525 16TH STREET, SUITE 210
DENVER, COLORADO 80211
(720) 855-3859 (720) 855-3860 fax
Email: peakcivil@worldnet.att.net

DATE: 8/07/00
JOB NO: 99.08
DRAWN BY: BK
APPROVED:
CADD FILE: 99.08\PH3-F10HIST


THIS AREA IS FILING No. 1 APPROVED PHASE III DRAINAGE REPORT
THIS AREA IS FILING No. 1 APPROVED PHASE III DRAINAGE REPORT
Site
SEE SHEET DR6
DETENTION POND SUMMARY TABLE
LEGEND
KEY MAP
EXIST SEDIMENT POND
EXIST POND 390
EXIST POND 395
EXISTING 36" CULVERT
CRIMSON SKY DRIVE
FOUNDERS PARKWAY
EL CHARRO POINT
ARROYO VERDE WAY
ARROYO VERDE COURT
SPANISH OAKS TRAIL
TAILFEATHER WAY
TROUBADOUR COURT
SAGEBRUSH PLACE
AUTUMN SAGE STREET
DESERT RIDGE PLACE
DESERT RIDGE POINT
WIND ROSE PLACE
CACHE CREEK POINT
BRUSHLAND TRAIL
RISING SUN DRIVE
ASSET SKY COURT
EXIST MANITOU TRAIL (BY OTHERS)
NOLTE
BEYOND ENGINEERING
8000 SOUTH CHESTER STREET, SUITE 200, CENTENNIAL, CO. 80112
303.220.6400 TEL 303.220.9001 FAX WWW.NOLTE.COM
CASTLE OAKS ESTATES FILING NO. 1
AMENDMENT No. 2 - EXHIBIT VIII
DEVELOPED DRAINAGE - RATIONAL METHOD
PREPARED FOR: AUTUMN SAGE DEVELOPMENT LTD, INC.
DATE SUBMITTED: 08/2005
DR7
8 SHEETS
DV1383



POND 395	VOLUME REQUIRED	VOLUME PROVIDED	ELEVATION	RELEASE RATE
WATER QUALITY (CDPHE FILTER)	30492	30492	6456.3	NOTE 1
10 YEAR + WQ	0.7	0.7		NOTE 1
100 YR + WQ	74052	95987	6458.2	NOTE 1
	1.7	2.2		NOTE 1

POND 390	VOLUME REQUIRED	VOLUME PROVIDED	ELEVATION	RELEASE RATE
WATER QUALITY (CDPHE FILTER)	113256	WATER QUALITY NOT PROVIDED IN THIS POND (SEE NOTE 1)		
10 YEAR + WQ	196020	277093	6448.6	NOTE 1
100 YR + WQ	4.5	6.4	6450.2	NOTE 1
	2.6	2.6		NOTE 1

ALL 100 YR + WQ POND INFORMATION PROVIDED BY AMEC IN THE REGIONAL DRAINAGE/EXISTS PHASE III DRAINAGE REPORT. POND 395 PROVIDES WATER QUALITY VOLUME FOR ALL OF FILING No. 1. POND 395 RETAINS FOR FILING 1 AMENDMENT NO. 2 ONLY. POND 390 RETAINS FOR FILING 1, AMENDMENT NO. 2 AND OTHER PORTIONS OF FILING NO. 1

SEE THE AMEC REPORT FOR RELEASE RATE INFORMATION.

KEY MAP

LEGEND

- BASIN DESIGNATION
- 5 YEAR COEFFICIENTS / 100 YEAR COEFFICIENTS
- BASIN AREA
- BASIN BOUNDARY (AMENDMENT No. 2)
- BASIN BOUNDARY (APPROVED PHASE III)
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN
- DRAINAGE SWALE AROUND FINISHED LOT
- DESIGN POINT
- DIRECTIONAL FLOW ARROW

NOLTE
BEYOND ENGINEERING
8000 SOUTH CHESTER STREET, SUITE 200, CENTENNIAL, CO. 80112
303.220.6400 TEL 303.220.9001 FAX
WWW.NOLTE.COM

CASTLE OAKS ESTATES FILING NO. 1

AMENDMENT No. 2 - EXHIBIT IX
DEVELOPED DRAINAGE - RATIONAL METHOD

PREPARED FOR: AUTUMN SAGE DEVELOPMENT LTD, INC.
DATE SUBMITTED: 08/2005

NO.	BY	DATE	REVISIONS
1	CB	7/07/2006	APPROVAL FOR CONSTRUCTION

The engineer preparing these plans is not responsible for unauthorized modifications to these plans. Any modifications must be approved in writing by the engineer of these plans.

JOB NUMBER DV1383
SHEET NUMBER DR8 OF 9 SHEETS
SCALE VERTICAL 1"= N/A HORIZONTAL 1"= 100'

XREFS: ext1 EXIT_04PRUT_05PRUT_06PRUT_04prms_05prms_06prms_04proo_01proo_06proo EXPN_24pro1a_24pro1_24pro2a_24prms ADDEN_TR-08Rh3_AMEC-PRTO_PRTO_ADDEN24-PRERBY1 EXIT2-Castle Park_EXIT2-Castle Rock2

LEGEND

- BASIN DESIGNATION
- BASIN AREA — 5 YEAR COEFFICIENTS / 100 YEAR COEFFICIENTS
- BASIN BOUNDARY
- DESIGN POINT
- DIRECTIONAL FLOW ARROW
- HP — HIGH POINT
- LP — LOW POINT

NOTE: 100-YR FLOODPLAIN SHOWN IS TAKEN FROM FIRM, TOWN OF CASTLE ROCK, COLORADO, COMMUNITY PANEL NUMBER, 080050 0189 C, SEPTEMBER 30, 1987.

RUNOFF SUMMARY TABLE

DESIGN POINT	TRIBUTARY AREA (ACRES)	5-YR RUNOFF (CFS)	100-YR RUNOFF (CFS)
1	4.6	5.3	9.6
2	0.8	1.0	1.8
3	1.9	2.4	4.3
4	4.4	5.3	9.5
5	1.5	1.8	3.3
6	3.2	5.3	9.6
7	1.5	2.1	3.8
8	0.8	1.0	1.9
9	1.8	2.2	4.0
	56.4	41.0	194.0
	30.5	21.0	97.0
10	37.3	20.0	95.0
11	4.3	5.7	10.3
12	20.0	18.7	33.8
13	12.4	6.5	11.7
14	0.9	4.1	7.5
15	1.0	4.3	7.8
16	2.6	5.1	9.2
17	3.0	6.1	11.1
18	3.1	5.6	10.2
19	20.9	17.5	31.7
20	9.69*	16.0	30.0
21	7.5	8.0	14.6
22	2.3	2.9	5.3
23	1.6	2.1	3.9
24	5.0	3.9	7.1
25	3.1	7.8	14.2
26	3.3	6.9	12.6
27	5.0	6.0	10.9
28	2.9	3.8	6.9
29	3.4	4.5	8.2
30	7.4	5.3	9.7
31	5.5	6.3	11.5
32	3.2	4.2	7.7
33	1.0	1.3	2.5
34	7.4	7.5	13.5
35	3.3	4.2	7.6
36	2.3	5.8	10.6
37	0.9	2.3	4.1
38	1.3	1.8	3.4
39	4.8	5.7	10.3
40	1.0	2.2	4.0
41	1.7	2.6	4.7
42	1.5	5.6	10.3
43	20.0	18.8	34.0
44	5.0	2.8	5.1
45	1.7	2.0	3.5
46	1.8	2.3	4.2
47	1.4	2.1	3.9
48	3.7	4.6	8.4
49	2.2	2.6	4.7
50	2.1	2.6	4.8
51	0.3	1.3	2.4
52	0.9	1.2	2.2
53	2.0	2.5	4.6
54	3.6	4.9	8.9
55	3.9	5.0	9.1
56	1.4	3.0	5.5
57	1.9	4.6	8.4
58	7.8	7.1	12.8
59	1.4	5.7	10.4
60	1.5	4.5	8.3
61	1.4	2.8	5.1
62	0.7	3.0	5.5
63	1.4	3.9	7.0
64	32.5	42.0	81.0
65	9.3	17.0	32.0
66	5.3	5.7	10.4
67	8.2	8.6	15.6
68	0.7	1.6	2.9
69	3.7	3.0	5.5
70	8.9	13.0	25.0
71	1.8	2.3	4.2
72	4.6	4.0	7.3
73	3.3	4.1	7.5
74	4.9	5.1	9.3
75	2.4	3.1	5.6
76	1.0	1.3	2.3
77	7.0	7.8	14.1
78	2.1	2.6	4.8
79	4.3	6.3	11.5
80	5.0	4.3	7.7
81	0.5	2.3	4.3
82	4.3	5.3	9.7
83	4.1	5.3	9.7
84	4.6	4.7	8.7
85	3.8	4.6	8.4
86	1.8	2.3	4.2
87	7.1	7.4	13.4
88	6.1	13.4	24.2
89	2.8	1.6	2.8
90	1.1	1.4	2.6
91	2.2	2.7	4.9
92	1.3	1.7	3.2
93	1.0	1.3	2.4
94	2.2	2.7	4.9
95	4.2	2.9	5.3
96	6.0	7.1	12.9
97	0.2	1.1	2.0
98	2.1	2.0	3.6
99	1.6	2.1	3.8
100	4.5	2.8	5.0
101	3.0	4.2	7.6
102	0.4	1.5	2.7
103	2.7	3.4	6.1
104	1.3	1.7	3.1
105	3.6	6.1	11.1
106	2.5	3.1	5.7
107	4.4	5.0	9.0
108	32.0	17.9	32.5
109	0.6	0.4	0.8
110	4.3	4.7	8.5
111	4.0	4.9	9.0
112	2.3	2.7	4.9
113	1.0	1.3	2.4
114	6.6	3.8	6.9
115	3.1	4.0	7.2
116	6.3	7.3	13.2
117	0.9	4.1	7.5
118	6.9	3.7	6.7
119	17.8	13.7	25.1
120	3.9	4.1	7.5
121	2.8	3.2	5.9
122	1.9	2.3	4.1
123	1.9	2.9	5.3
124	0.4	1.9	3.5
125	2.2	2.1	3.9
126	4.5	7.2	9.5



NO	BY	DATE	REMARKS
1	ALG	09/27/02	1ST TOWN COMMENTS
2	ALG	01/06/03	2ND TOWN COMMENTS DATED 10/31/02

CAUTION

The enclosed preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT VIII

DEVELOPED DRAINAGE - OVERALL RATIONAL METHOD

PREPARED FOR: CASTLE OAKS ESTATES, LLC

DATE SUBMITTED: 04/02

NOLTE
BEYOND ENGINEERING
7000 SOUTH YOSEMITE ST., SUITE 200, ENGLEWOOD, CO. 80112
303.220.1001 TEL. 303.220.9001 FAX. WWW.NOLTE.COM

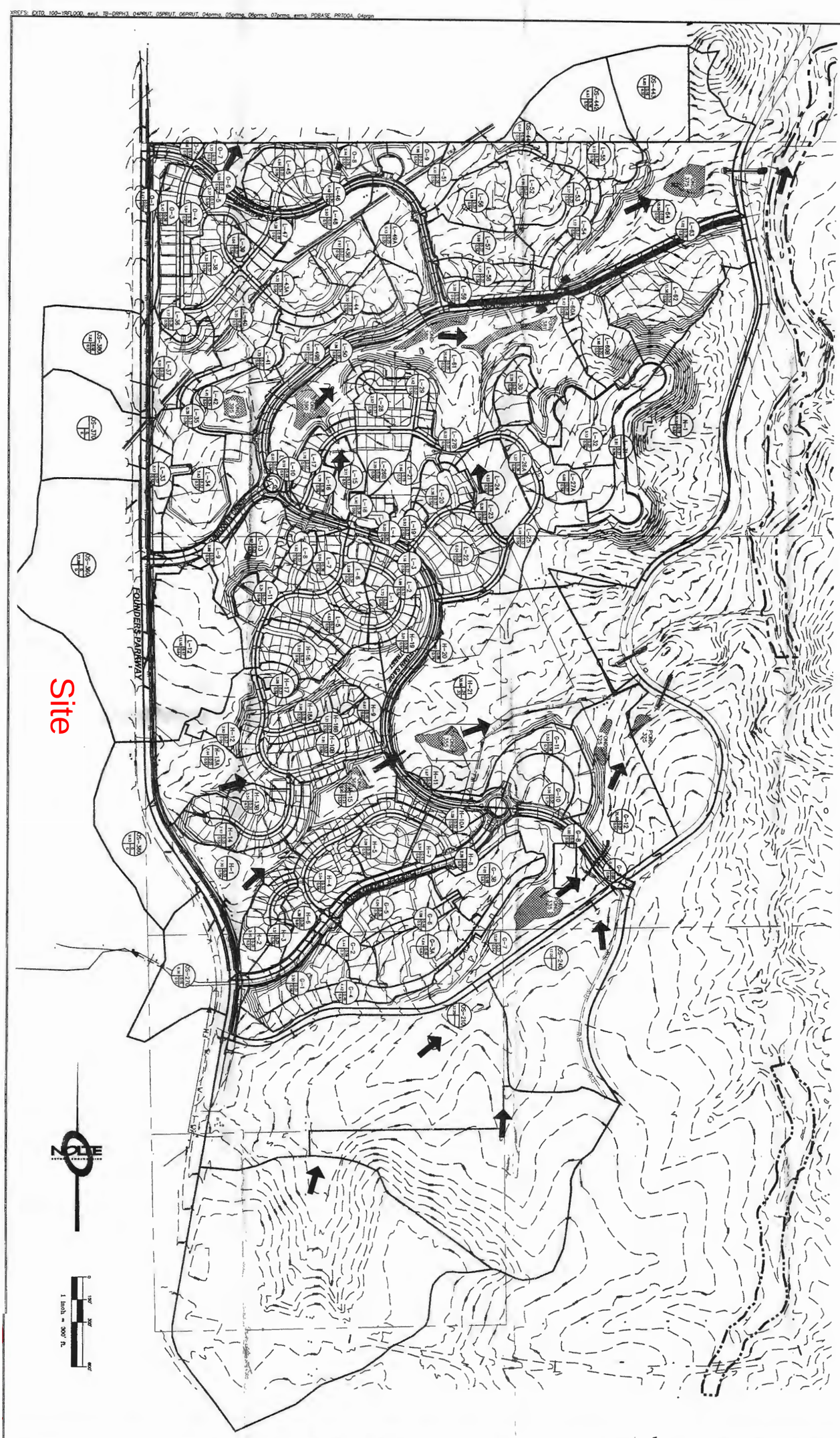
DATE PRINTED
JAN 13 2003
☐ NOLTE & ASSOC.

SHEET NUMBER
VIII
OF 14 SHEETS

SCALE
VERTICAL: 1"= N/A
HORIZONTAL: 1"= 300'

JOB NUMBER
DV1383

DATE: 01/06/03 INC. 11:07 AM DRAWING NAME: ESTATES.DWG
SERVER: DV01 SERVICE: ENGINEERING PLOTTED: 1/13/03 11:07 AM BY: ALG
N:\ADMIN\DV\CADD\Exhibits\Phase II Documents\ESTATES.DWG
XREFS: BASE_EXTD_100-YR0.000_grades-ml_expl_PROT_PROT-DR_pda_grading_TB-DRNG2.dtc-ff



NOLTE
BEYOND ENGINEERING
7000 SOUTH YOSEMITE ST., SUITE 200, ENGLEWOOD, CO. 80112
303.220.1001 TEL 303.220.9001 FAX WWW.NOLTE.COM

CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT V

DEVELOPED DRAINAGE - OVERALL RATIONAL METHOD

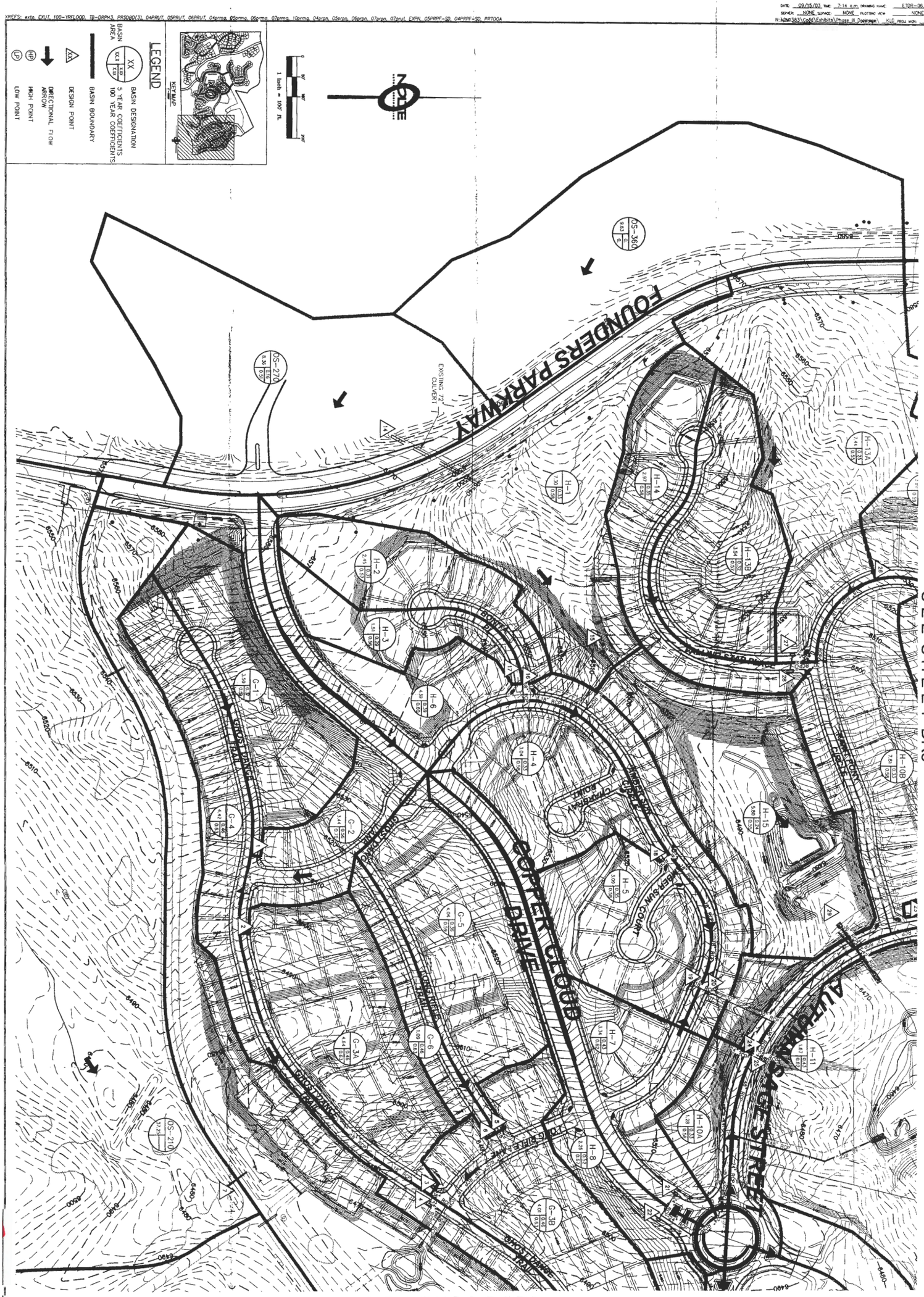
PREPARED FOR: CASTLE OAKS ESTATES, LLC DATE SUBMITTED: JUNE 2003

NO.	BY	DATE	REVISIONS
1	RWS	7/29/03	ENG COMMENTS DATED 7/7/03

The engineer preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

JOB NUMBER DV1883
SHEET NUMBER V
OF 10 SHEETS
SCALE VERTICAL: 1"=N/A HORIZONTAL: 1"=300'

DATE: 09/25/03 TIME: 7:14 a.m. DRAWING NAME: ETDR-06.DWG
SERVER: NONE SUPPORT: NONE PLOTTING VIEW: NONE
N:\DM\3831\Cadd\Exhibits\Phase III Drainage\ XLG MSU MDR RAM
XREFS: exte_EXIT_100-YRFLOOD_TB-DRPH3_PRSRBB01(3)_04PRUT_05PRUT_06PRUT_04prma_05prma_06prma_07prma_10prma_04cpa_05cpa_06cpa_07cpa_07prvt_EXPN_05PRPF-SD_04PRPF-SD_PRTOOA



NOLTE
BEYOND ENGINEERING
7000 SOUTH YOSEMITE ST., SUITE 200, ENGLEWOOD, CO. 80112
303.220.9001 TEL 303.220.9001 FAX WWW.NOLTE.COM

CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT VI-A

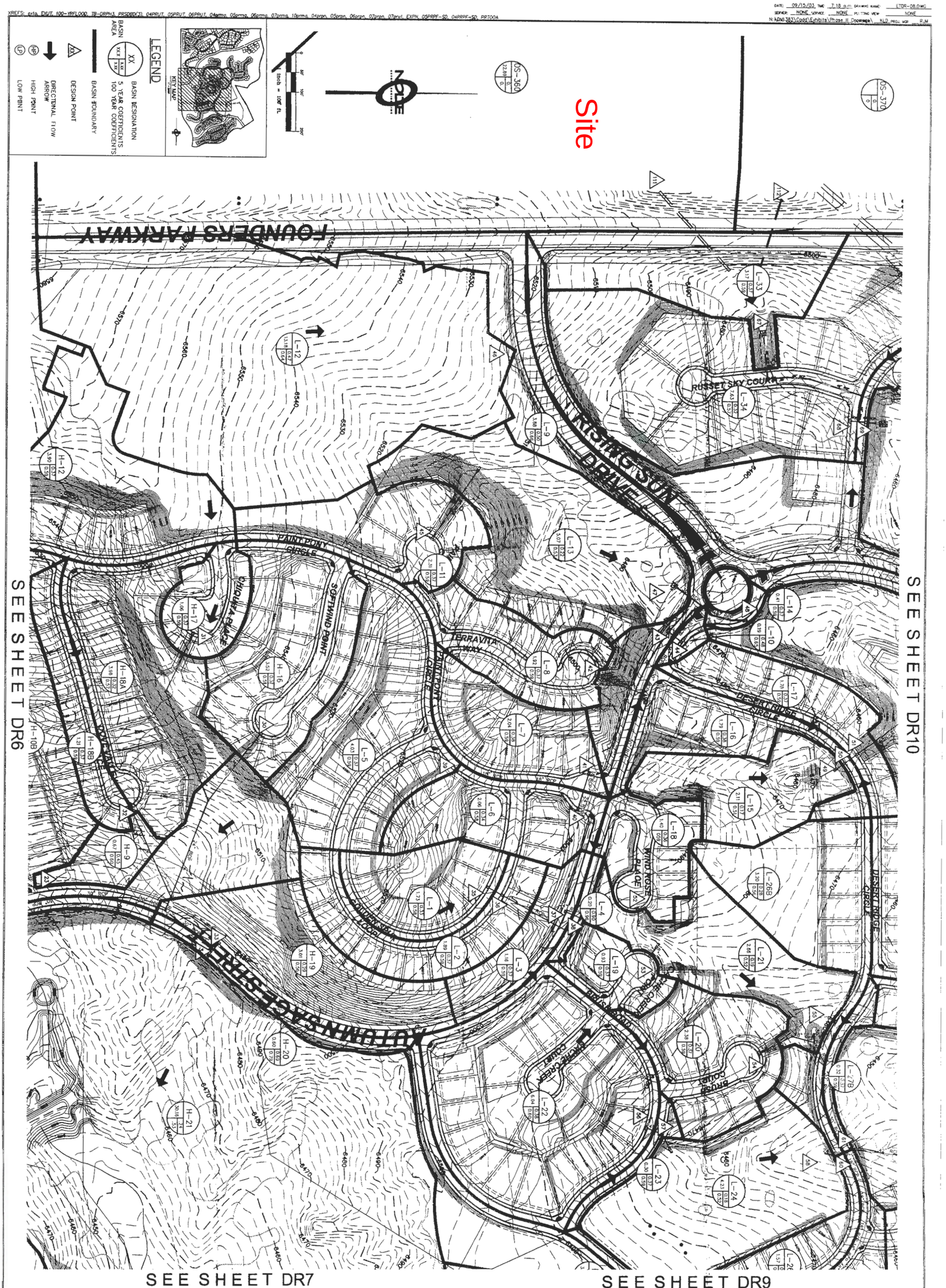
DEVELOPED DRAINAGE - RATIONAL METHOD

PREPARED FOR: CASTLE OAKS ESTATES, LLC DATE SUBMITTED: JUNE 2003

NO.	BY	DATE	REVISIONS
1	RAS	7/24/03	ESM COMMENTS DATED 7/7/03

The engineer preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

SHEET NUMBER DR6 OF 10 SHEETS
SCALE: VERTICAL: 1"= N/A HORIZONTAL: 1"= 100'
JOB NUMBER DV1983



NOLTE
BEYOND ENGINEERING
7000 SOUTH YOSEMITE ST., SUITE 200, ENGLEWOOD, CO. 80112
303.220.1001 TEL 303.220.8001 FAX WWW.NOLTE.COM

CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT IX-A

DEVELOPED DRAINAGE - RATIONAL METHOD

PREPARED FOR: CASTLE OAKS ESTATES, LLC

DATE SUBMITTED: JUNE 2003

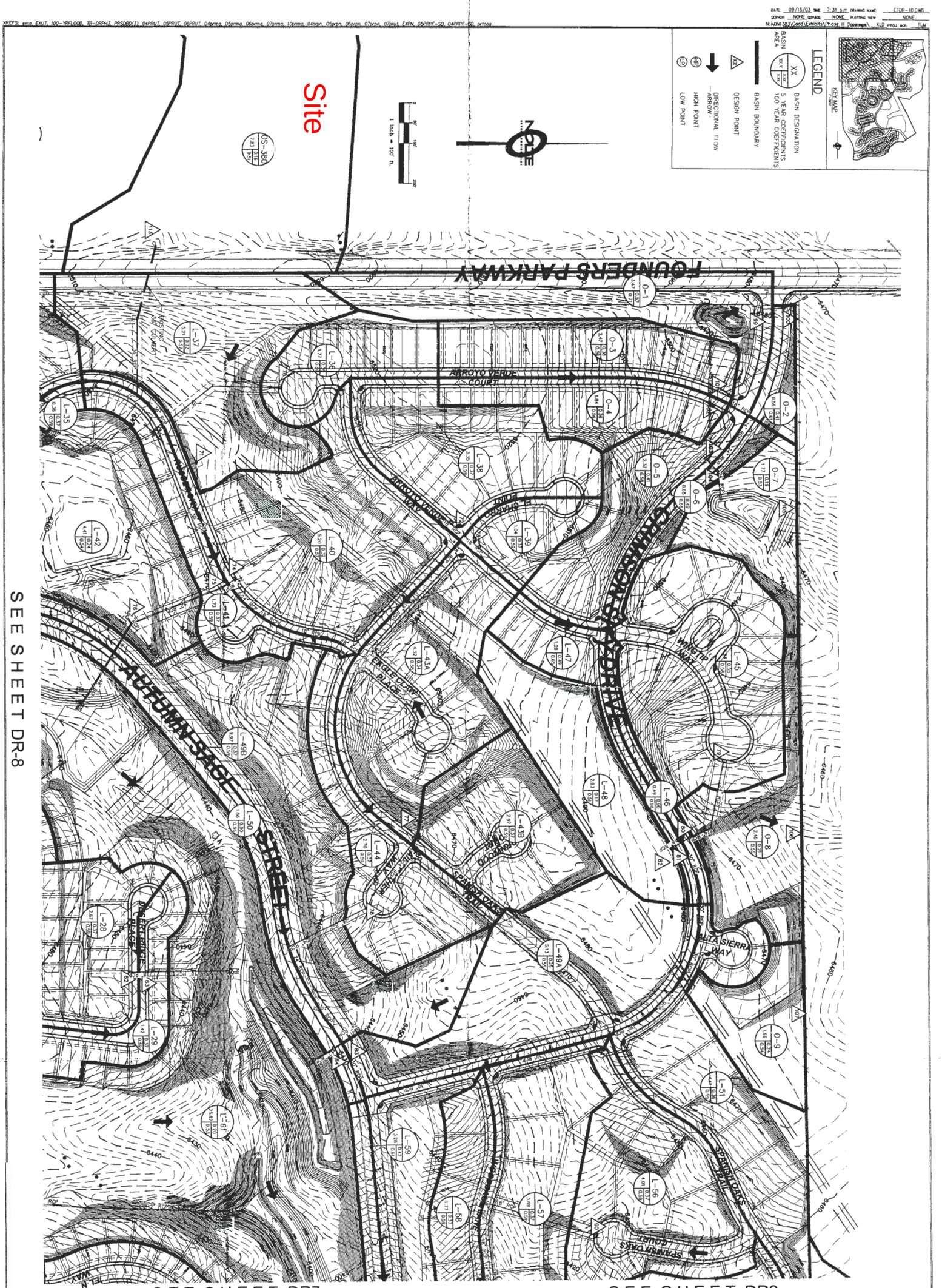
NO.	BY	DATE	REVISIONS
1	KAS	7/24/03	TOW COMMENTS SHEET 7/7/03

The engineer preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans, must be in writing and must be approved by the engineer of these plans.

JOB NUMBER DV1383

SHEET NUMBER DR8 OF 10 SHEETS

SCALE VERTICAL: 1"=N/A HORIZONTAL: 1"= 100'



NOLTE
BEYOND ENGINEERING
7000 SOUTH YOSEMITE ST., SUITE 200, ENGLEWOOD, CO. 80112
303.220.1001 TEL 303.220.9001 FAX WWW.NOLTE.COM

CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT VI-E
DEVELOPED DRAINAGE - RATIONAL METHOD

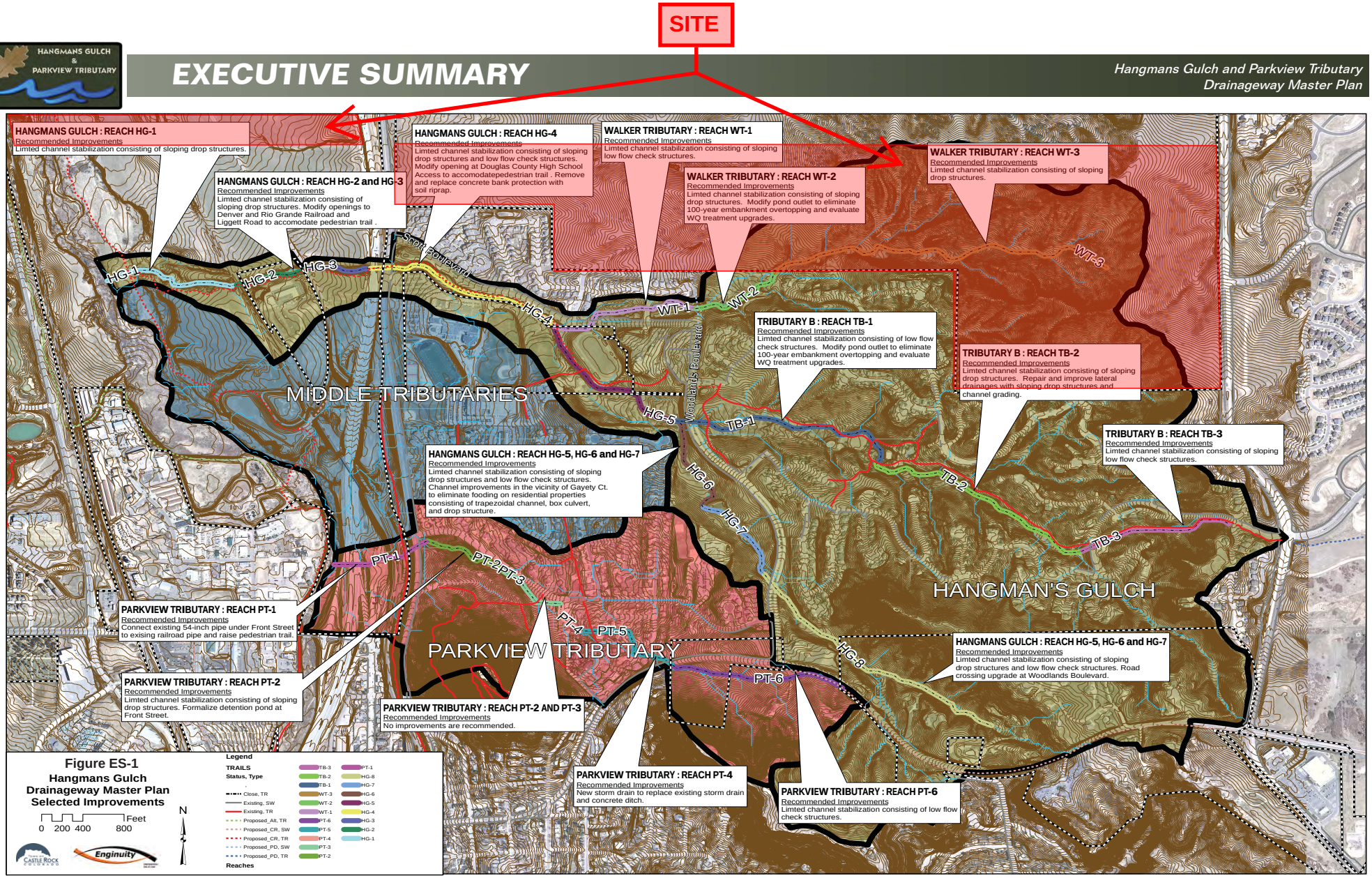
PREPARED FOR: CASTLE OAKS ESTATES, LLC

DATE SUBMITTED: JUNE 2003

NO.	BY	DATE	REVISIONS
1	EKS	7/24/03	TOWN COMMENTS DATED 7/7/03

The engineer preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

SHEET NUMBER DR10 OF 10 SHEETS
SCALE HORIZONTAL 1"= N/A VERTICAL 1"= N/A
JOB NUMBER 20018883


SITE
HANGMANS GULCH : REACH HG-1
Recommended Improvements
Limted channel stabilization consisting of sloping drop structures.
HANGMANS GULCH : REACH HG-2 and HG-3
Recommended Improvements
Limted channel stabilization consisting of sloping drop structures. Modify openings to Denver and Rio Grande Railroad and Liggett Road to accomodate pedestrian trail .
HANGMANS GULCH : REACH HG-4
Recommended Improvements
Limted channel stabilization consisting of sloping drop structures and low flow check structures. Modify opening at Douglas County High School Access to accomodatepedestrian trail . Remove and replace concrete bank protection with soil riprap.
WALKER TRIBUTARY : REACH WT-1
Recommended Improvements
Limted channel stabilization consisting of sloping low flow check structures.
WALKER TRIBUTARY : REACH WT-2
Recommended Improvements
Limted channel stabilization consisting of sloping drop structures. Modify pond outlet to eliminate 100-year embankment overtopping and evaluate WQ treatment upgrades.
WALKER TRIBUTARY : REACH WT-3
Recommended Improvements
Limted channel stabilization consisting of sloping drop structures.
TRIBUTARY B : REACH TB-1
Recommended Improvements
Limted channel stabilization consisting of low flow check structures. Modify pond outlet to eliminate 100-year embankment overtopping and evaluate WQ treatment upgrades.
TRIBUTARY B : REACH TB-2
Recommended Improvements
Limted channel stabilization consisting of sloping drop structures. Repair and improve lateral drainages with sloping drop structures and channel grading.
TRIBUTARY B : REACH TB-3
Recommended Improvements
Limted channel stabilization consisting of sloping low flow check structures.
HANGMANS GULCH : REACH HG-5, HG-6 and HG-7
Recommended Improvements
Limted channel stabilization consisting of sloping drop structures and low flow check structures. Channel improvements in the vicinity of Gayety Ct. to eliminate fooding on residential properties consisting of trapezoidal channel, box culvert, and drop structure.
HANGMANS GULCH : REACH HG-5, HG-6 and HG-7
Recommended Improvements
Limted channel stabilization consisting of sloping drop structures and low flow check structures. Road crossing upgrade at Woodlands Boulevard.
PARKVIEW TRIBUTARY : REACH PT-1
Recommended Improvements
Connect existing 54-inch pipe under Front Street to exising railroad pipe and raise pedestrian trail.
PARKVIEW TRIBUTARY : REACH PT-2
Recommended Improvements
Limted channel stabilization consisting of sloping drop structures. Formalize detention pond at Front Street.
PARKVIEW TRIBUTARY : REACH PT-2 AND PT-3
Recommended Improvements
No improvements are recommended.
PARKVIEW TRIBUTARY : REACH PT-4
Recommended Improvements
New storm drain to replace existing storm drain and concrete ditch.
PARKVIEW TRIBUTARY : REACH PT-6
Recommended Improvements
Limted channel stabilization consisting of low flow check structures.
MIDDLE TRIBUTARIES
HANGMAN'S GULCH
PARKVIEW TRIBUTARY
Scott Boulevard
Woodlands Boulevard
HG-1
HG-2
HG-3
HG-4
HG-5
HG-6
HG-7
HG-8
WT-1
WT-2
WT-3
TB-1
TB-2
TB-3
PT-1
PT-2
PT-3
PT-4
PT-5
PT-6
Figure ES-1
Hangmans Gulch
Drainageway Master Plan
Selected Improvements
0 200 400 800 Feet
N
Legend
TRAILS
Status, Type
Close, TR
Existing, SW
Existing, TR
Proposed_Alt, TR
Proposed_CR, SW
Proposed_CR, TR
Proposed_PD, SW
Proposed_PD, TR
Reaches
TB-3
TB-2
TB-1
WT-3
WT-2
WT-1
PT-6
PT-5
PT-4
PT-3
PT-2
PT-1
HG-8
HG-7
HG-6
HG-5
HG-4
HG-3
HG-2
HG-1
Enginuity

HAZEN/MOORE FILING NO. 2
PHASE III DRAINAGE MAP

HISTORIC CONDITIONS

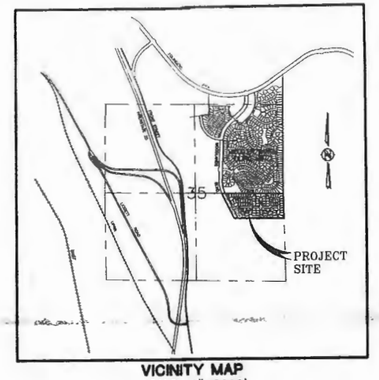
UNCC
CALL BEFORE
YOU DIG
1-800-922-1987
Utility Notification
Center of Colorado
Administrative Office 303-232-1991
12600 W. Colfax Ave., Suite B-310
Lakewood, Co 80215

CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

ROCKY MOUNTAIN CONSULTANTS ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS (HORIZONTAL AND VERTICAL). THE EXISTING UTILITIES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. IT IS, HOWEVER, THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY THE LOCATION OF ALL UTILITIES PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES.

100 50 0 100 200
SCALE: 1" = 100'

DISCHARGE SUMMARY HISTORIC CONDITION			
DESIGN POINT	CONTRIBUTING AREA acres	RUNOFF 5-YEAR PEAK (cfs)	RUNOFF 100-YEAR PEAK (cfs)
H1	50.0	19.5	115.0
H2	2.1	1.5	9.5



VICINITY MAP
SCALE: 1"=2000'



LEGEND

- 04 — BASIN I.D.
- 12.7 — 5 YEAR "C" VALUE
- 1.34 — 100 YEAR "C" VALUE
- 1.50 — AREA IN ACRES
- H1 — DESIGN POINT
- MAJOR BASIN BOUNDARY
- OFFSITE SUB-BASIN BOUNDARY
- 5000 — EXISTING CONTOUR
- EXISTING CULVERT

PROJECT BENCHMARK

DOUGLAS COUNTY CONTROL POINT 2010010. A STANDARD DOUGLAS COUNTY 3 1/4" ALUMINUM CAP ON STEEL ROD SET IN CONCRETE. LOCATED +\- 140' SOUTH OF THE SOUTHEAST CORNER OF SECTION 26, T7S, R67W. ELEVATION = 6365.03' NAVD 88

COLORADO REGISTERED PROFESSIONAL ENGINEER VERA B. STEPANEK 26800

TOWN OF CASTLE ROCK APPROVALS
THESE PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM DATE OF THE PUBLIC WORKS DIRECTOR APPROVAL.

Recommend Approval By:

Engineering Division *Date*

Approved By:

Public Works Department *Date*

RMC
ROCKY MOUNTAIN CONSULTANTS, INC.
CIVIL AND ENVIRONMENTAL ENGINEERING • PLANNING
8391 E. Prentice Ave. Suite 101
Englewood, CO 80111
(303) 741-6000
FAX (303) 741-6106

REVISIONS			
NO.		DATE	BY
1	Added Basin H2	3.21.03	MW

HAZEN/MOORE FILING NO. 2
PHASE III DRAINAGE MAP
HISTORIC CONDITIONS

DATE: March 03
DESIGNED BY: MW
DRAWN BY: TLK
CHECKED BY: VS

JOB NO.
0965.044.01

SHEET
1 OF 3

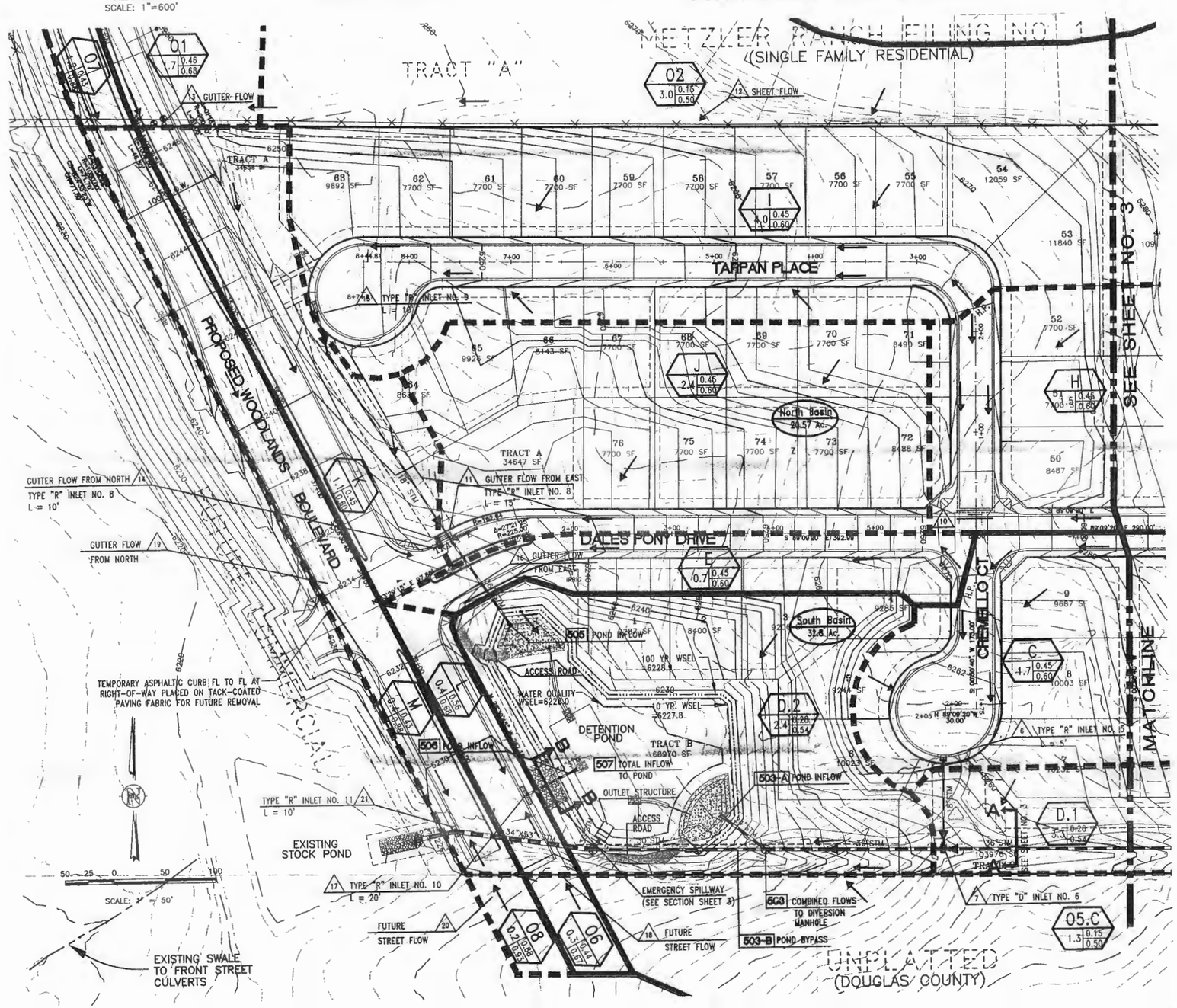
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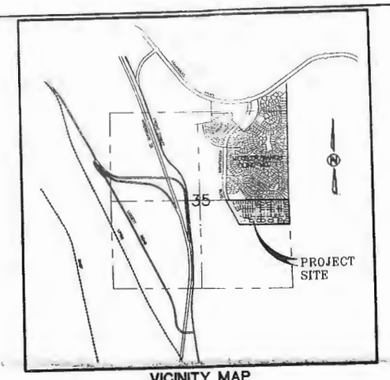
HAZEN/MOORE FILING NO. 2
PHASE III DRAINAGE MAP
PROPOSED CONDITIONS

PROJECT BENCHMARK

DOUGLAS COUNTY CONTROL POINT 2010010. A STANDARD DOUGLAS COUNTY 3 1/4" ALUMINUM CAP ON STEEL ROD SET IN CONCRETE. LOCATED +\- 140' SOUTH OF THE SOUTHEAST CORNER OF SECTION 26, T7S, R67W. ELEVATION = 6365.03' NAVD 88

KEY MAP
SCALE: 1"=600'





VICINITY MAP
SCALE: 1"=2000'

HAZEN/MOORE FILING 2

Discharge Summary Developed Flows

Design Point	BASIN DETAILS: Contributing Basins	Area (acres)	RUNOFF: Initial Storm (cfs)	RUNOFF: Major Storm (cfs)	DESCRIPTION
1	O3	1.40	0.7	3.8	Sheet Flow
2	O3.A	4.10	4.4	11.8	Inlet No.1
3	O4	12.70	5.0	29.2	Inlet No.2
4	O.6A	3.30	1.5	8.9	Inlet No.3
501	O3,O4,O6.A,A	20.10	9.9	47.5	
5	B	1.80	3.0	8.0	Inlet No.4
502	O3,O4,O6.A,O6.B.A	24.10	17.5	62.3	Pipe/Swale
6	C	1.70	2.9	6.4	
7	D.1	3.30	5.6	11.2	
503	O3,O4,O6.A-B, A-D.1, F & G Intercept	29.10	23.3	78.2	Total to Diversion Manhole
503-A	503 Diverted to pond		23.3	38.9	Pond Inflow (A.)
503-B	503 Bypass		0.0	39.3	High-Flow Bypass
	0.5C + D.2	3.70	2.6	7.2	Pond Inflow Direct
8	F	2.30	4.5	11.0	
	G	2.80	4.7	10.6	
9	Intercept bypass		8.5	8.6	Inlet No. 7
9			2.1	12.8	Inlet No. 7
10	H	1.60	2.5	6.9	
11	F-H.J	9.00	8.5	28.6	Inlet No.8 (E. gutter)
12	O2	3.00	1.7	9.6	Sheet Flows
13	O1,O2	4.70	5.5	15.0	
14	O1,O2,K	5.80	6.8	19.3	Inlet No.8 (W. gutter)
15	I	4.00	5.1	19.4	Inlet No.8
505	O2,O1,F-H,I-K	18.80	20.0	62.8	Pond Inflow (N.)
16	E	0.70	1.5	3.6	
17	L	0.40	1.0	1.4	
18	O6	0.30	0.5	2.1	
506	O6,E,L	1.40	2.5	7.2	Pond Inflow (W.)
507	503+D.2+05C+505+506	53.00	42.0	113	Total Pond Inflow
19	O7	1.20	1.8	7.2	
20	O8	0.20	0.9	1.2	
21	O7,O8,M	1.80	3.0	10.0	Inlet No.11
22	N	0.80	1.7	4.2	Flow to Metzler

DETENTION POND SUMMARY

	WATER SURFACE ELEVATION (ft)	TOTAL VOLUME (ac ft) REQUIRED	TOTAL VOLUME (ac ft) PROVIDED	RELEASE RATE (cfs)
WATER QUALITY CAPTURE VOLUME	6226.0	0.48	0.60	40 HR RELEASE
10 YR. STORAGE *	6227.8	1.50	1.65	8.9
100 YR. STORAGE *	6228.9	2.32	2.45	29.3

* = VOL. INCLUDES WATER QUALITY VOL.

LEGEND

- A1 / 0.00 / 0.00 — SUB-BASIN I.D., 5 YEAR "C" VALUE, 100 YEAR "C" VALUE, AREA IN ACRES
- 1 — DESIGN POINT
- PROPOSED SUB-BASIN BOUNDARY
- PROPOSED BASIN (NORTH & SOUTH) BOUNDARY
- 5000 — PROPOSED CONTOUR
- 5000 — EXISTING CONTOUR
- CROSS PAN

TOWN OF CASTLE ROCK APPROVALS
THESE PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM DATE OF THE PUBLIC WORKS DIRECTOR APPROVAL.

Recommend Approval By:

Engineering Division *Date*

Approved By:

Public Works Department *Date*

COLORADO REGISTERED VERA B. STERNER 26800 PROFESSIONAL ENGINEER

RMC
ROCKY MOUNTAIN CONSULTANTS, INC.
CIVIL AND ENVIRONMENTAL ENGINEERING • PLANNING
8301 E. Prentice Ave. Suite 101
Greenwood Village, CO 80111
(303) 741-6000
FAX (303) 741-6105

NO.	REVISIONS	DATE	BY
1	AS PER TOWN OF CASTLE ROCK	1.21.03	MW
2	AS PER TOWN OF CASTLE ROCK	5.28.03	MW

HAZEN/MOORE FILING NO. 2
PHASE III DRAINAGE MAP
PROPOSED CONDITIONS

DATE: MARCH 03
DESIGNED BY: MW
DRAWN BY: TLK
CHECKED BY: VS

JOB NO. 0965.044.02

SHEET 2 OF 3

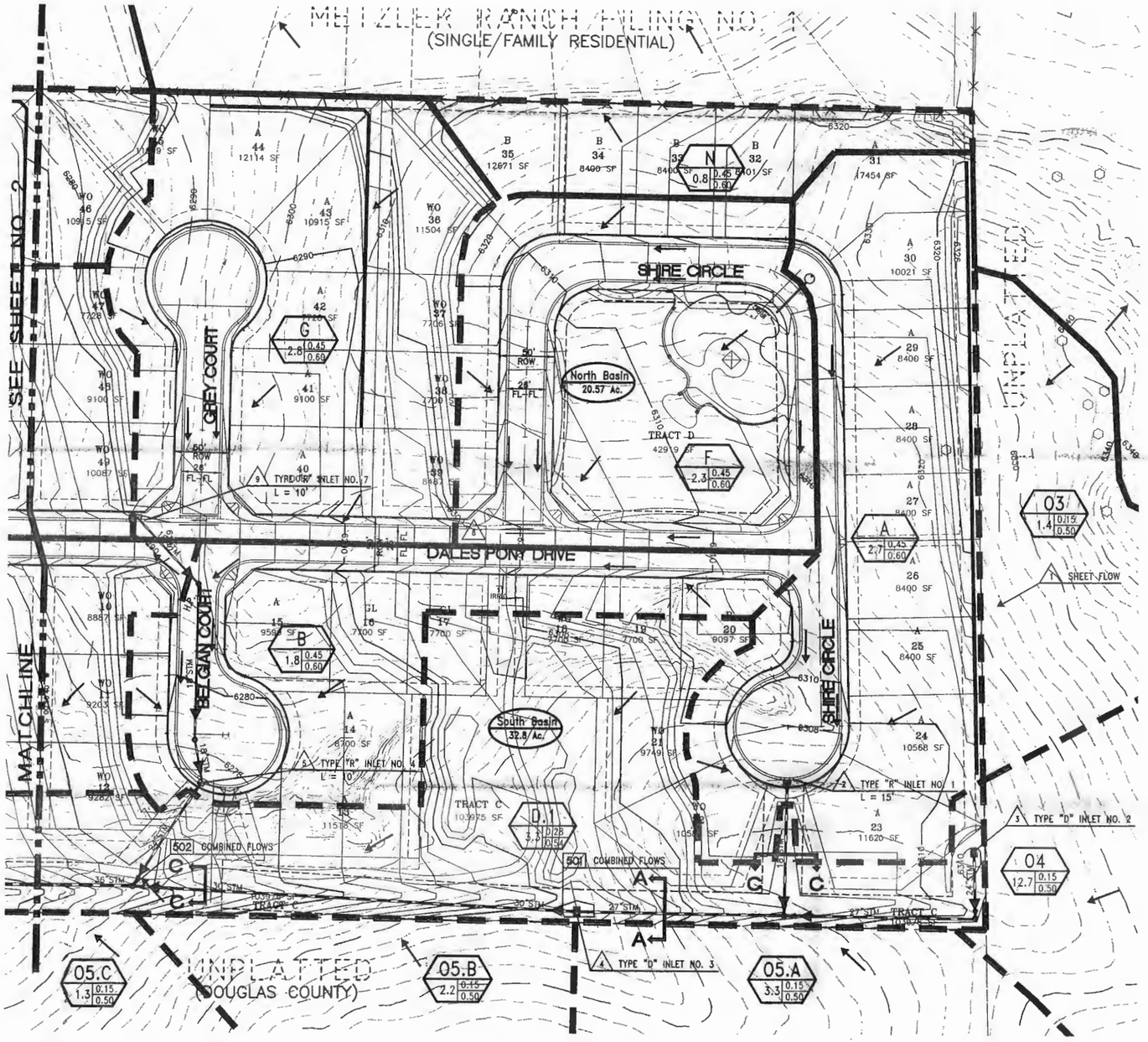
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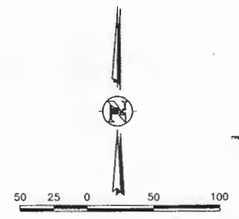
HAZEN/MOORE FILING NO. 2
PHASE III DRAINAGE MAP
PROPOSED CONDITIONS

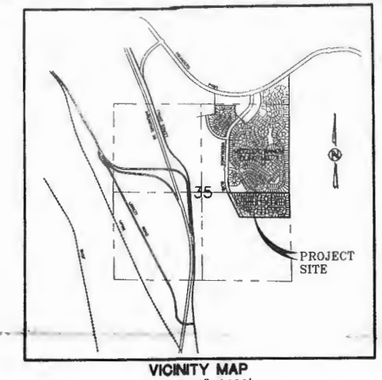
KEY MAP
SCALE: 1"=600'

PROJECT BENCHMARK

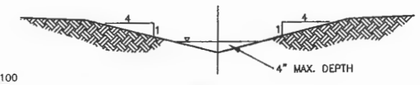
DOUGLAS COUNTY CONTROL POINT 2010010. A STANDARD DOUGLAS COUNTY 3 1/4" ALUMINUM CAP ON STEEL ROD SET IN CONCRETE. LOCATED +\- 140' SOUTH OF THE SOUTHEAST CORNER OF SECTION 26, T7S, R67W. ELEVATION = 6365.03' NAVD 88



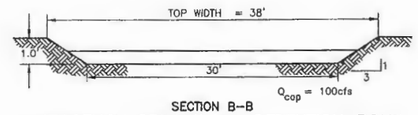




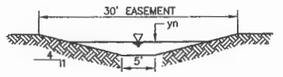
VICINITY MAP
SCALE: 1"=2000'



SECTION A–A
SWALE SECTION
SCALE: 1/2"=1'-0"



SECTION B–B
EMERGENCY SPILLWAY – DETENTION POND
SCALE: 1"=5'



SHIRE CIRCLE
Smin. = 1%
Q_{100} = 11.6cfs
Yn = 2ft (min.)

BELGIAN COURT
Smin. = 1%
Q_{100} = 8.2cfs
Yn = 2ft (min.)

SECTION C–C
EMERGENCY SPILLWAY – FROM CUL–DE–SAC
SCALE: 1"=5'

LEGEND

- A1 / 0.00 / 0.00 / 0.00 — SUB–BASIN I.D., 5 YEAR "C" VALUE, 100 YEAR "C" VALUE, AREA IN ACRES
- 1 — DESIGN POINT
- PROPOSED SUB–BASIN BOUNDARY
- PROPOSED BASIN (NORTH & SOUTH) BOUNDARY
- 5000 — PROPOSED CONTOUR
- 5000 — EXISTING CONTOUR
- CROSS PAN

COLORADO REGISTERED PROFESSIONAL ENGINEER
VERA B. STEPNER
26800

TOWN OF CASTLE ROCK APPROVALS
THESE PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM DATE OF THE PUBLIC WORKS DIRECTOR APPROVAL.

Recommend Approval By:

Engineering Division *Date*

Approved By:

Public Works Department *Date*

RMC
ROCKY MOUNTAIN CONSULTANTS, INC.
CIVIL AND ENVIRONMENTAL ENGINEERING • PLANNING
8301 E. Prentice Ave.
Suite 101
Greenwood Village, CO 80111
(303) 741-6000
FAX (303) 741-6106

NO.	REVISIONS	DATE	BY
1	AS PER TOWN OF CASTLE ROCK	3.31.03	MW

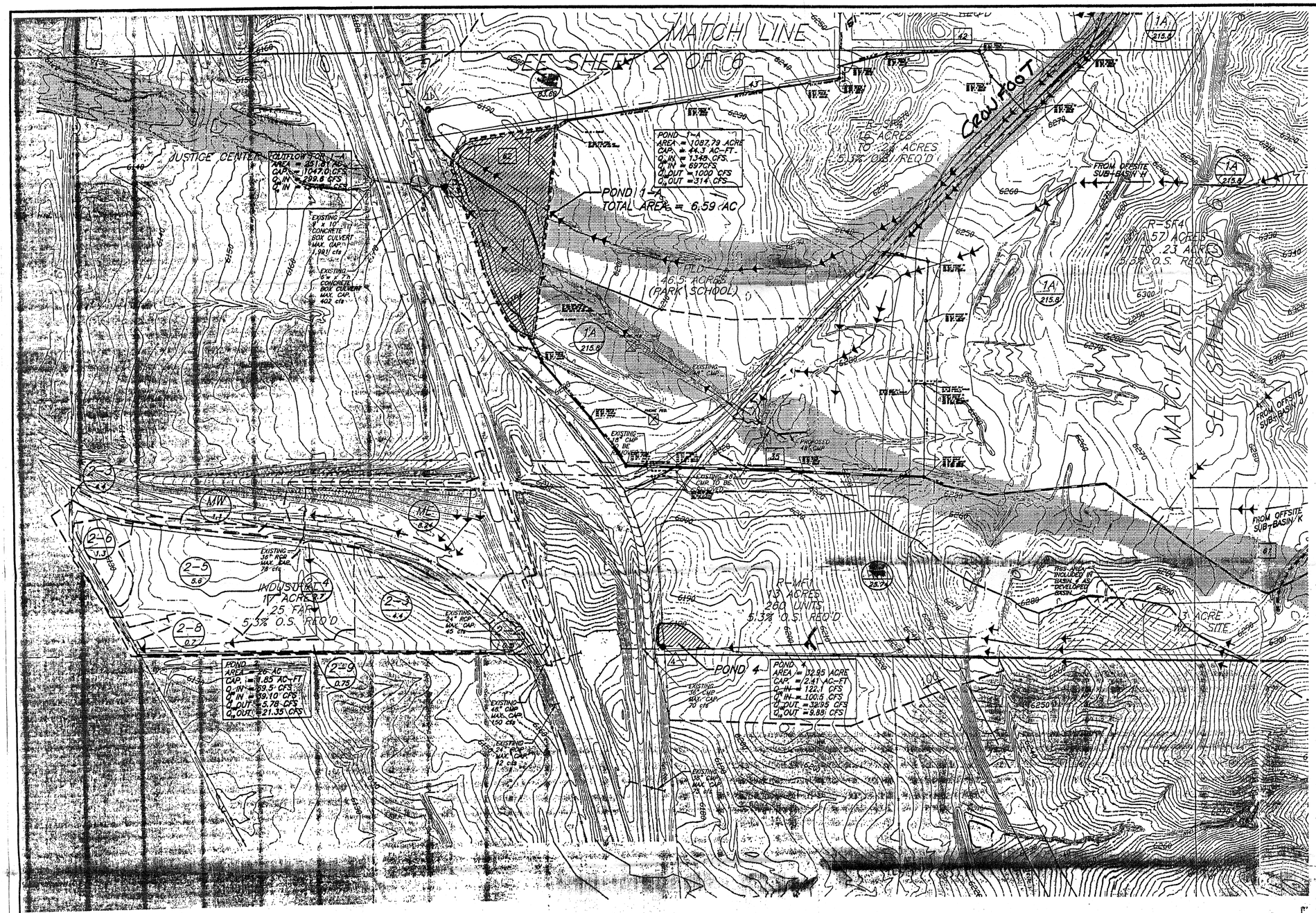
HAZEN/MOORE FILING NO. 2
PHASE III DRAINAGE MAP
PROPOSED CONDITIONS

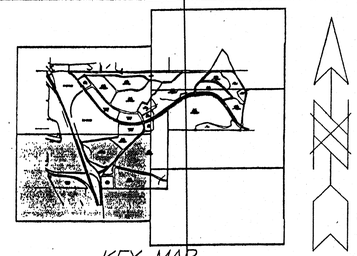
DATE: MARCH 03
DESIGNED BY: MW
DRAWN BY: TLK
CHECKED BY: VS

JOB NO.
0965.044.02

SHEET
3 OF 3

REF. 7





200 0 200 600

Scale 1" = 200 ft

SUMMARY RUNOFF TABLE

DESIGN POINT	CONTRIBUTING AREA (ACRES)	CUMULATIVE AREA (ACRES)	RUNOFF 10(yr) (cfs)	ROUTED 10(yr) (cfs)	PEAK 100(yr) (cfs)	ROUTED 100(yr) (cfs)
1a	215.8	1088	174	350.00	360	831.0
1b	83.69	182.50	173.6	201.0	331.3	372.0
ME	8.8		5.2		12.5	
MW	1.1		1.3		3.3	
2-2	0.5		0.7		1.7	
2-3	4.4		19.3		32.5	
2-4	3.4		16.3		27.8	
2-5	3.7		15.3		26.7	
2-6	2.5		9.4		16.8	
2-7	0.74		1.2		2.4	
2-8	1.7		3.0	39.1	7.1	69.5
2-9	0.74		1.3		2.6	
4	32.95		100.5		122.1	

NOTE: PEAK RUNOFF REFLECTS Q. VALUES THAT HAVE NOT BEEN DETAINED.

LEGEND

- EXISTING BARBED WIRE FENCE
- EXISTING CONCRETE BOX CULVERT
- EXISTING CULVERT
- BASIN BOUNDARY
- PROPERTY LINE
- FLOWLINE FOR FLOW PATH
- SHEET FLOW
- SHALLOW FLOW
- CHANNEL FLOW
- DESIGN POINT
- BASIN DELINEATION NAME
- BASIN AREA
- DETENTION POND
- EXISTING EARTHEN DAM
- PROPOSED EARTHEN DAM
- EXISTING 10' CONTOUR
- EXISTING DRAINAGE MANHOLE
- PROPOSED DRAINAGE MANHOLE
- EXISTING FLOOD PLAIN (ZONE "A") SEPT. 1987
- PROPOSED REGIONAL DRAINAGE CHANNEL
- PROPOSED REGIONAL DRAINAGE CONDUIT
- PROPOSED CONCRETE CONTROL STRUCTURE

POND XX
AREA = XX.XX AC
CAP. = XXX.X AC-FT
Q100 IN = XX.XX CFS
Q10 IN = XX.XX CFS
Q100 OUT = XX.XX CFS
Q10 OUT = XX.XX CFS

POND AND BASIN LOCATION
BASIN AREA CONTRIBUTING
POND CAPACITY (DEVELOPED)
TOTAL INFLOW FOR 100 YEAR STORM (DEVELOPED)
TOTAL INFLOW FOR 10 YEAR STORM (DEVELOPED)
TOTAL ALLOWABLE DISCHARGE FOR 100 YEAR STORM (DEVELOPED ALLOWABLE)
TOTAL ALLOWABLE DISCHARGE FOR 10 YEAR STORM (DEVELOPED ALLOWABLE)

10 TRANSPORT GUTTER NUMBER FOR USE WITH UD-SWMM-PC

COLORADO REGISTERED DAVID W. MATHEWS 31436 PROFESSIONAL ENGINEER 1/29/98

APPROVED FOR ONE YEAR FROM THIS DATE

TOWN ENGINEER DATE

DIRECTOR OF PUBLIC WORKS DATE

DATE	REVISIONS
7/14/97	REVISIONS PER TOWN OF CASTLE ROCK COMMENTS
08/15/97	REVISIONS PER TOWN OF CASTLE ROCK COMMENTS
9/19/97	REVISIONS PER TOWN OF CASTLE ROCK COMMENTS
10/03/97	REVISIONS PER TOWN OF CASTLE ROCK COMMENTS
10/09/97	REVISIONS PER TOWN OF CASTLE ROCK COMMENTS
12/5/97	REVISIONS PER TOWN OF CASTLE ROCK COMMENTS
1/16/98	REVISIONS PER TOWN OF CASTLE ROCK COMMENTS

P. O. BOX 978
0077 METCALF ROAD
AVON, COLO. 81620
(303) 949-5072

Inter-Mountain Engineering ltd.

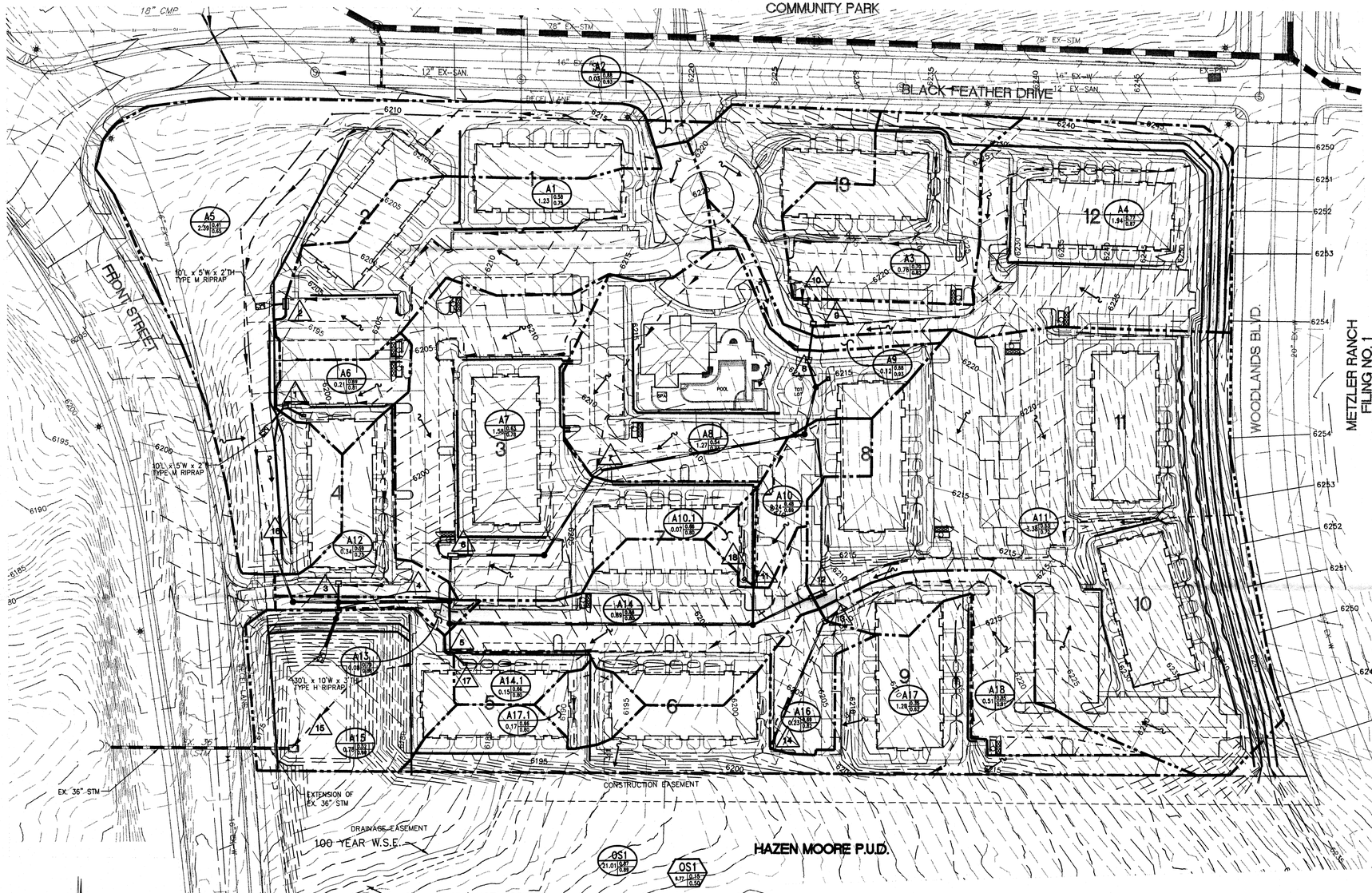
SUITE 101
1420 VANCE STREET
LAKEWOOD, COLO. 80215
(303) 232-0158

DESIGNED BY: DWM
DRAWN BY: DWM
CHECKED BY: DWM
FIELD BOOK PAGE

DRAINAGE BASIN MAP

MASTER DRAINAGE STUDY
METZLER RANCH
TOWN OF CASTLE ROCK
DOUGLAS COUNTY, COLORADO

PROJECT NO. 95059BE
DATE ISSUED: 7-23-96
SCALE: 1" = 200'
SHEET NO. 4 OF 6



ROCKY MOUNTAIN CONSULTANTS, (RMC) BENCHMARK DESCRIPTION

HORIZ. DATUM

GPS OBSERVATIONS NAD 83/92, MOVED TO LOCAL DATUM

ORIGIN BENCHMARK

NGS STATION K 23
ELEVATION 5984.83' (NAVD 88)
A BRASS DISK SET IN A CONCRETE POST 0.4' ABOVE THE GROUND. LOCATED IN THE CENTER OF SECTION 20, T7S, R67W. FROM THE INTERCHANGE OF US HIGHWAY 85 AND AND INTERSTATE 25, GO NORTHWEST ON US HIGHWAY 85 FOR 3.4 MILES TO THE STATION ON THE LEFT.

METZLER RANCH FILING NO. 8/HAZEN-MOORE FILING NO. 1 DETENTION POND SUMMARY TABLE			
EVENT	OUTFLOW (cfs)	STORAGE (Ac-ft.)	MAX W.S.E. (ft.)
WQCV	---	1.4	6178.2
10 YR.	10.1	4.4	6180.6
100 YR.	34.8	6.3	6181.8

TOTAL TRIBUTARY AREA = 37.1 Ac.

I HEREBY AFFIRM THAT THESE FINAL CONSTRUCTION PLANS WERE PREPARED UNDER MY DIRECT SUPERVISION, IN ACCORDANCE WITH ALL APPLICABLE TOWN OF CASTLE ROCK AND STATE OF COLORADO STANDARDS AND STATUTES, RESPECTIVELY; AND THAT I AM FULLY RESPONSIBLE FOR ALL DESIGN AND REVISIONS RELATIVE TO SAID PLANS.

MARK J. LOVATO, P.E. #35184 DATE

UNCC CALL BEFORE YOU DIG

1-800-922-1987
Utility Notification Center of Colorado
Administrative Office 303-232-1991
12600 W. Colfax Ave., Suite B-310
Lakewood, Co 80215

CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

ROCKY MOUNTAIN CONSULTANTS ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS (HORIZONTAL AND VERTICAL). THE EXISTING UTILITIES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. IT IS, HOWEVER, THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY THE LOCATION OF ALL UTILITIES PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES.

DISCHARGE TABLE

DESIGN POINT	CONTRIBUTING BASINS AND DESIGN POINTS	CONTRIBUTING AREA (ACRES)	5-YEAR (CFS)	100-YEAR (CFS)	COMMENTS
1	A6	0.21	0.8	1.6	TYPE R INLET
2	A1	1.23	4.1	9.0	TYPE R INLET
3	A12	0.34	1.0	2.4	TYPE R INLET
4	A13,3,5,6,11,12,16	15.38	29.2	69.7	TYPE R INLET
5	A14,17	1.04	3.4	7.3	TYPE R INLET
6	A7,7	5.67	13.0	31.8	TYPE R INLET
7	A8,8	4.09	8.7	22.3	TYPE R INLET
8	A9,9	2.82	6.9	17.4	TYPE R INLET
9	A4,10	2.70	6.5	16.5	TYPE R INLET
10	A3	0.76	2.3	5.3	TYPE R INLET
11	A10,18	3.45	1.1	2.3	TYPE R INLET
12	A11,13	0.97	11.1	26.0	TYPE R INLET
13	A18,14	0.74	2.8	5.6	TYPE R INLET
14	A16	0.23	0.9	1.8	TYPE R INLET
15	A15,4,OS1,A17,A17.1	38.51	93.2	192.1	DETENTION POND
16	A5,1,2	3.83	5.6	15.6	CULVERT
17	A14.1	0.15	0.5	1.1	DETENTION POND
18	A10.1	0.07	0.2	0.5	CULVERT

LEGEND

- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- SUB-BASIN BOUNDARY
- PROPERTY LINE
- DESIGN POINT
- BASIN DESCRIPTION (DEVELOPED)
- 5 YEAR "C" VALUE
- 100 YEAR "C" VALUE
- AREA IN ACRES
- BASIN DESCRIPTION (HISTORIC)
- 5 YEAR "C" VALUE
- 100 YEAR "C" VALUE
- AREA IN ACRES
- FLOW ARROW
- T_c PATH

TOWN OF CASTLE ROCK APPROVALS
THESE PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM DATE OF THE PUBLIC WORKS DIRECTOR APPROVAL.

RECOMMENDED APPROVAL:

ENGINEERING DIVISION DATE LIFE-SAFETY CHIEF DATE

APPROVED BY:

PUBLIC WORKS DIRECTOR DATE

RMC
ROCKY MOUNTAIN CONSULTANTS, INC.
CIVIL AND ENVIRONMENTAL ENGINEERING • PLANNING
8301 E. Prentice Ave.
Suite 101
Englewood, CO 80111
(303) 741-6000
FAX (303) 741-6106

REVISIONS

NO.	DATE	BY

DELWEST
FINAL DRAINAGE PLAN

DATE: APR '01
DESIGNED BY: JBW
DRAWN BY: JBW
CHECKED BY: MJL

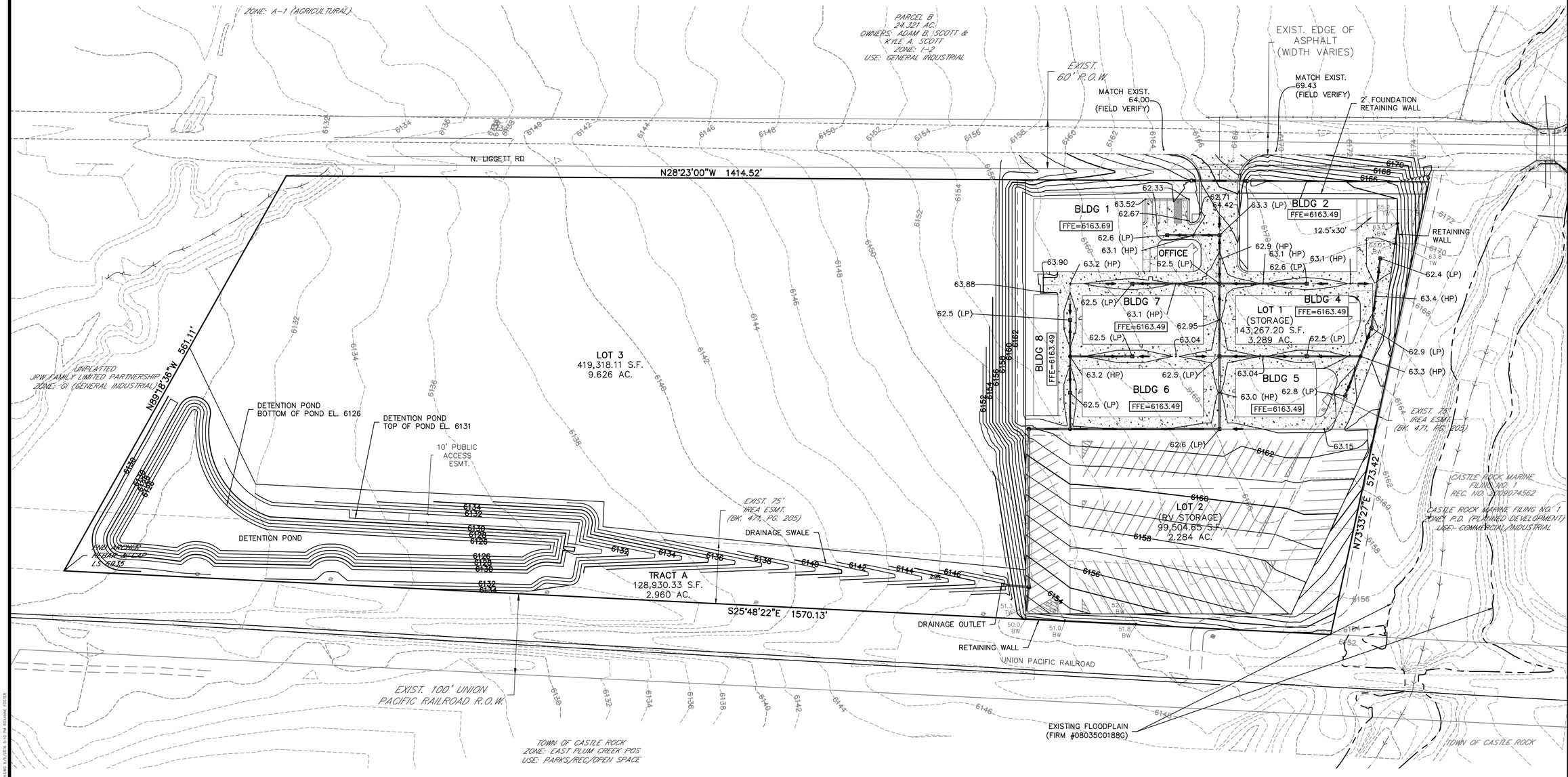
JOB NO. 3891.001.00

SHEET 1 OF 1

CASTLE LOCK II SELF STORAGE

DOUGLAS COUNTY, STATE OF COLORADO

SITE DEVELOPMENT PLAN



EARTHWORK SUMMARY TABLE

	CUT	FILL	FILL +10% SHRINK (CY)	TOTAL	
OVERALL TOTAL	23,898	132	145	23,753	LONG

60 0 60 120

(IN FEET)
1 inch = 60 ft.

CASTLE LOCK II SITE DEVELOPMENT PLAN
PROJECT NO. ---------

BENCHMARK:

NGS BENCH MARK Q 337
3.5" BRASS DISK SET FLUSH IN THE RAIL ROAD BRIDGE ABUTMENT LOCATED IN SEC. 2, T 8 S, R 67 W OF THE 6TH P.M., 1.3 MI (2.09 KM) NORTH OF CASTLE ROCK, ON THE DENVER AND RIO GRANDE TRACKS, 6 FT (1.83 M) WEST OF THE WEST RAIL OF THE MAIN TRACK, TOP WEST END RAIL, NORTH ABUTMENT OF THE BRIDGE WALL, BRIDGE NO. 30.21.

ELEVATION = 6153.20 FEET (NAVD88)

Know what's below. Call before you dig.

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NOTICE:
CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR; NEITHER THE OWNER NOR THE ENGINEER SHALL BE EXPECTED TO ASSUME ANY RESPONSIBILITY FOR SAFETY OF THE WORK, OF PERSONS ENGAGED IN THE WORK, OF ANY NEARBY STRUCTURES, OR OF ANY OTHER PERSONS.

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303.462.1100

ARBROATH, LLC
2034 LIGGETT ROAD
CASTLE ROCK, CO 80109
303.588.6005
KYLE SCOTT

CLIENT

CASTLE LOCK II, LLC

CASTLE LOCK II SELF STORAGE
CASTLE ROCK, COLORADO

GRADING PLAN

DATE 06/03/16

REVISIONS

DR.	JSE
CH.	BG
P.M.	BG
BOOK	--
JOB	15001241
SHEET NO.	C3

CAD FILE: 15001241-GRADING PLAN.DWG

G:\15001241\CAD\SITE\15001241-PRELIMINARY SITE\15001241-GRADING PLAN.DWG 6/3/2016 3:15 PM JEROMIE STOTEN

CASTLE LOCK II SELF STORAGE

DOUGLAS COUNTY, STATE OF COLORADO

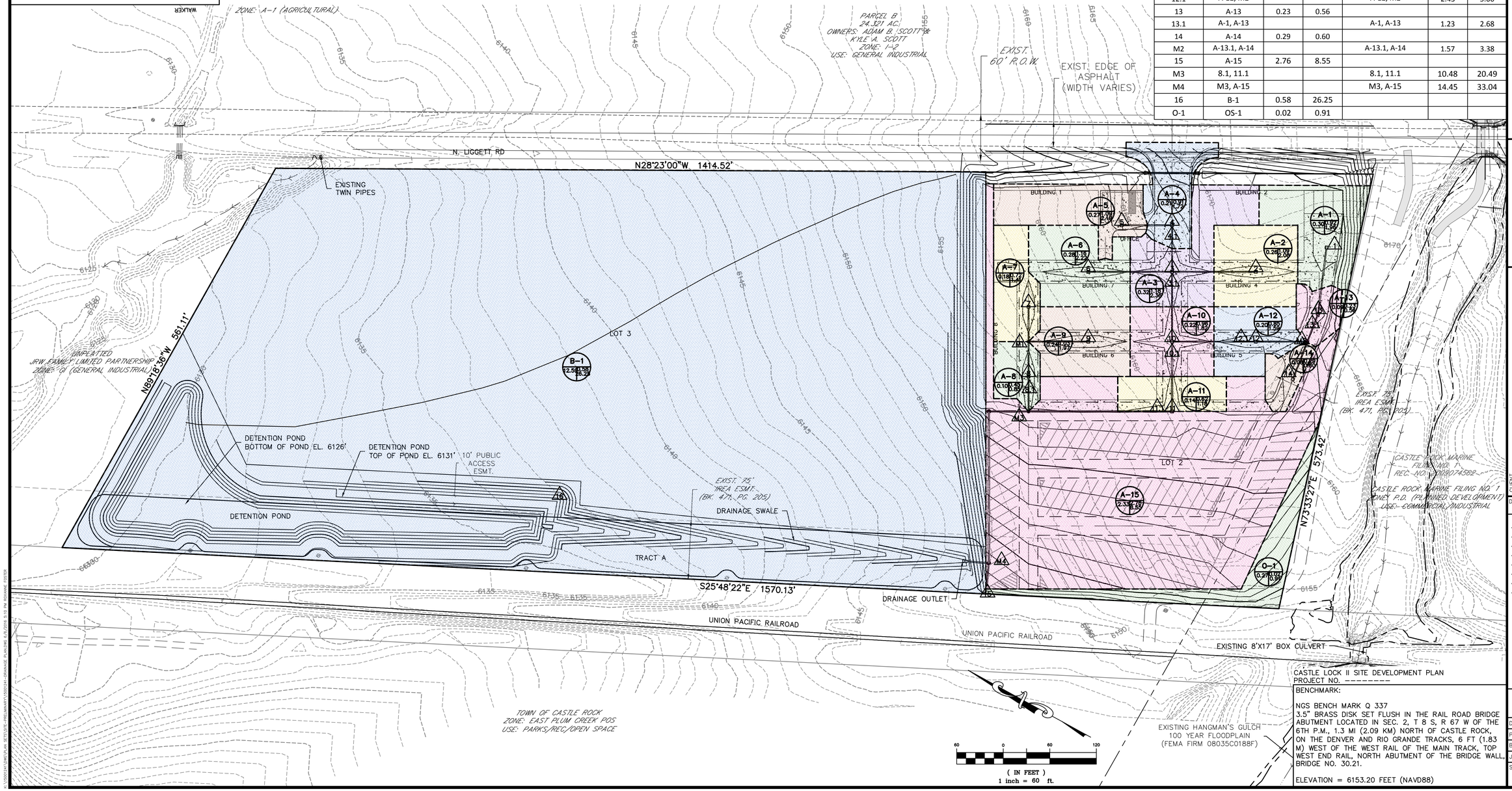
SITE DEVELOPMENT PLAN

LEGEND

- PROPERTY BOUNDARY
- PROPOSED RIGHT-OF-WAY
- EXISTING RIGHT-OF-WAY
- PROPOSED LOT LINE
- EXISTING LOT LINE
- PROPOSED CURB & GUTTER
- EXISTING CURB & GUTTER
- PROPOSED SIDEWALK
- EXISTING SIDEWALK
- EXISTING SECTION LINE
- PROPOSED EASEMENT
- EXISTING EASEMENT
- PROPOSED CONTOURS
- EXISTING CONTOURS
- PROPOSED STORM
- EXISTING STORM
- DRAINAGE BASIN BOUNDARY
- DESIGN POINT
- AREA IN ACRES — A-5 (0.26 / 0.18 / 2.15) — BASIN DESIGNATION, 5-YEAR RUNOFF, 100-YEAR RUNOFF

RUNOFF SUMMARY TABLE

DESIGN POINT	DIRECT RUNOFF BASIN	DIRECT RUNOFF Q5 (CFS)	DIRECT RUNOFF Q100 (CFS)	CUMULATIVE RUNOFF BASIN	CUMULATIVE RUNOFF Q5 (CFS)	CUMULATIVE RUNOFF Q100 (CFS)
1	A-1	0.92	1.96			
2	A-2	1.09	2.08			
3	A-3	1.18	2.36			
3.1	A-3, A-4.1, A-6			A-3, A-4.1, A-6	4.37	8.47
4	A-4	0.91	1.73			
4.1	A-4, A-5			A-4, A-5	2.01	3.85
5	A-5	1.09	2.10			
6	A-6	1.16	2.22			
7	A-7	0.72	1.41			
M1	A-7, A-9			A-7, A-9	1.74	3.35
8	A-8	0.45	0.85			
8.1	M1, A-8			M1, A-8	2.20	4.23
9	A-9	1.03	1.97			
10	A-10	0.96	1.82			
10.1	3.1, 12.1, A-10			3.1, 12.1, A-10	7.81	15.37
11	A-11	0.62	1.18			
11.1	10.1, A-11			10.1, A-11	8.43	16.54
12	A-12	0.85	1.59			
12.1	A-12, M2			A-12, M2	2.43	5.00
13	A-13	0.23	0.56			
13.1	A-1, A-13			A-1, A-13	1.23	2.68
14	A-14	0.29	0.60			
M2	A-13.1, A-14			A-13.1, A-14	1.57	3.38
15	A-15	2.76	8.55			
M3	8.1, 11.1			8.1, 11.1	10.48	20.49
M4	M3, A-15			M3, A-15	14.45	33.04
16	B-1	0.58	26.25			
O-1	OS-1	0.02	0.91			



CASTLE LOCK II SITE DEVELOPMENT PLAN
PROJECT NO. ---------

BENCHMARK:

NGS BENCH MARK Q 337
3.5" BRASS DISK SET FLUSH IN THE RAIL ROAD BRIDGE ABUTMENT LOCATED IN SEC. 2, T 8 S, R 67 W OF THE 6TH P.M., 1.3 MI (2.09 KM) NORTH OF CASTLE ROCK, ON THE DENVER AND RIO GRANDE TRACKS, 6 FT (1.83 M) WEST OF THE WEST RAIL OF THE MAIN TRACK, TOP WEST END RAIL, NORTH ABUTMENT OF THE BRIDGE WALL, BRIDGE NO. 30.21.

ELEVATION = 6153.20 FEET (NAVD88)

811 Know what's below. Call before you dig.

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NOTICE:
CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR; NEITHER THE OWNER NOR THE ENGINEER SHALL BE EXPECTED TO ASSUME ANY RESPONSIBILITY FOR SAFETY OF THE WORK, OF PERSONS ENGAGED IN THE WORK, OF ANY NEARBY STRUCTURES, OR OF ANY OTHER PERSONS.

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ARBROATH, LLC
2034 LIGGETT ROAD
CASTLE ROCK, CO 80109
303.588.6005
KYLE SCOTT

CLIENT
CASTLE LOCK II, LLC
CASTLE LOCK II SELF STORAGE
CASTLE ROCK, COLORADO

DRAINAGE PLAN

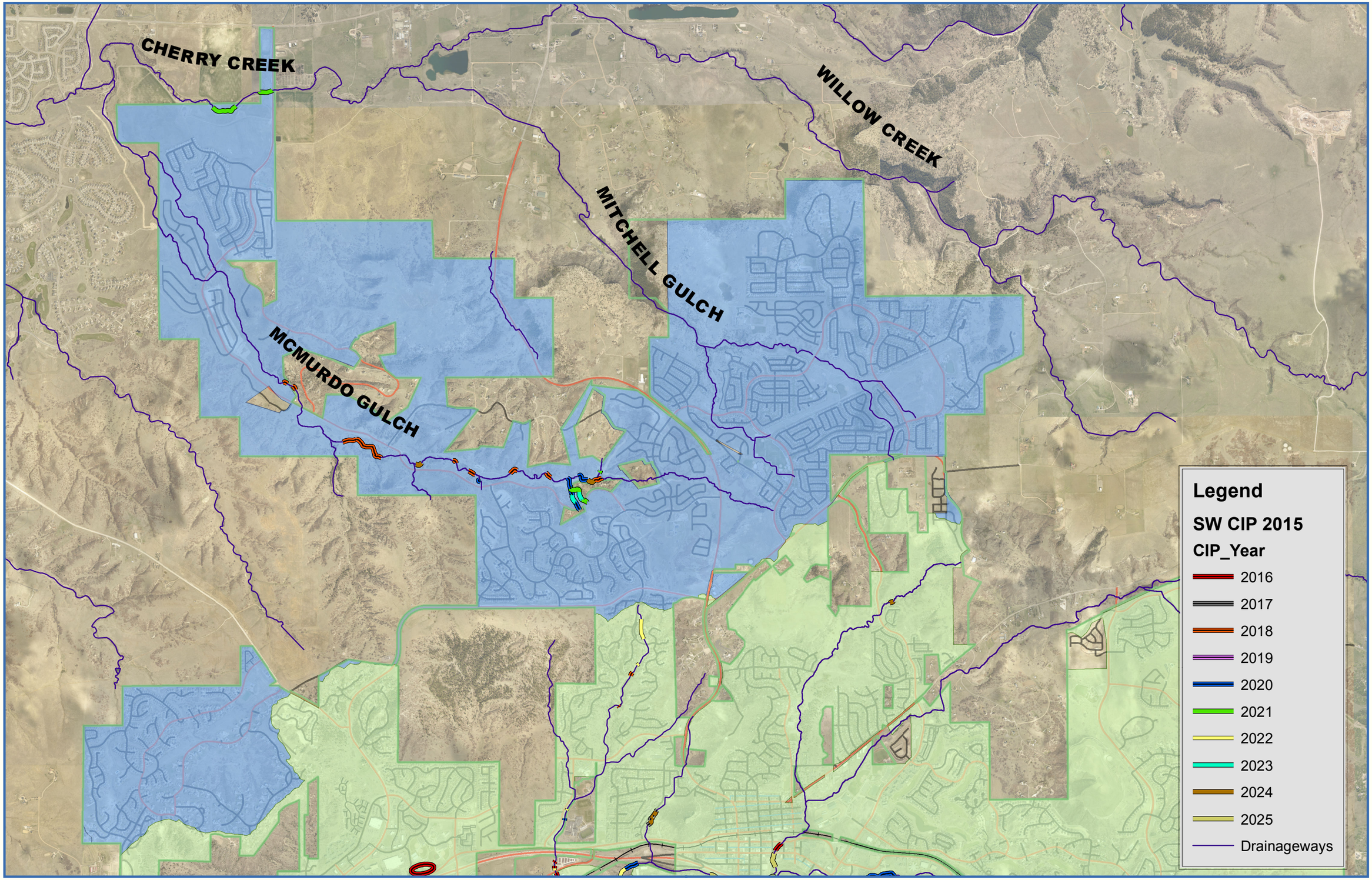
DATE 06/03/16

REVISIONS

DR. JSE | CH. BG
P.M. BG
BOOK --
JOB 15001241
SHEET NO. C4

CAD FILE: 15001241-DRAINAGE PLAN.DWG
I:\15001241\CAD\PLOT\15001241-DRAINAGE PLAN.DWG

Figure 5.11 - Ten-Year CIP Cherry Creek Basin



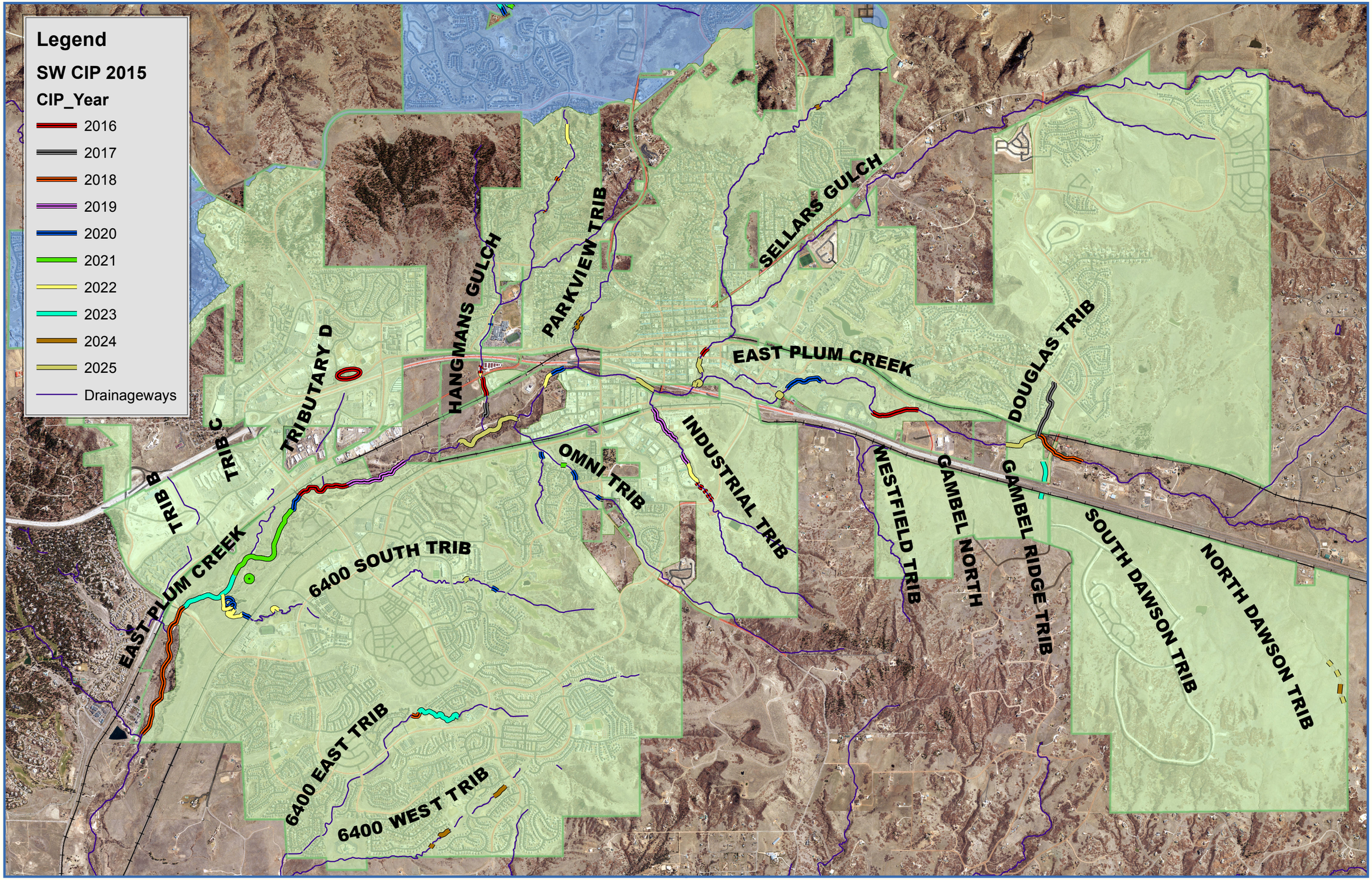
10-YEAR CAPITAL PLAN
CHERRY CREEK BASIN

Disclaimer: The data presented has been compiled from various sources, some of which may not have been verified by the Town of Castle Rock. Such determinations as to accuracy, authority or completeness are those of the user, and no liability for its use or accuracy. Questions or comments regarding the cartographic composition of this map including, but not limited to, typographical errors, omissions, and/or misplacement should be directed to the Utilities Department, Town of Castle Rock, (720) 733-6087. Copyright 2012. Town of Castle Rock Utilities Mapping.

1 inch = 3,000 feet

CASTLE ROCK Water
Securing our future drop by drop

Figure 5.12 - Ten Year CIP Plum Creek Basin

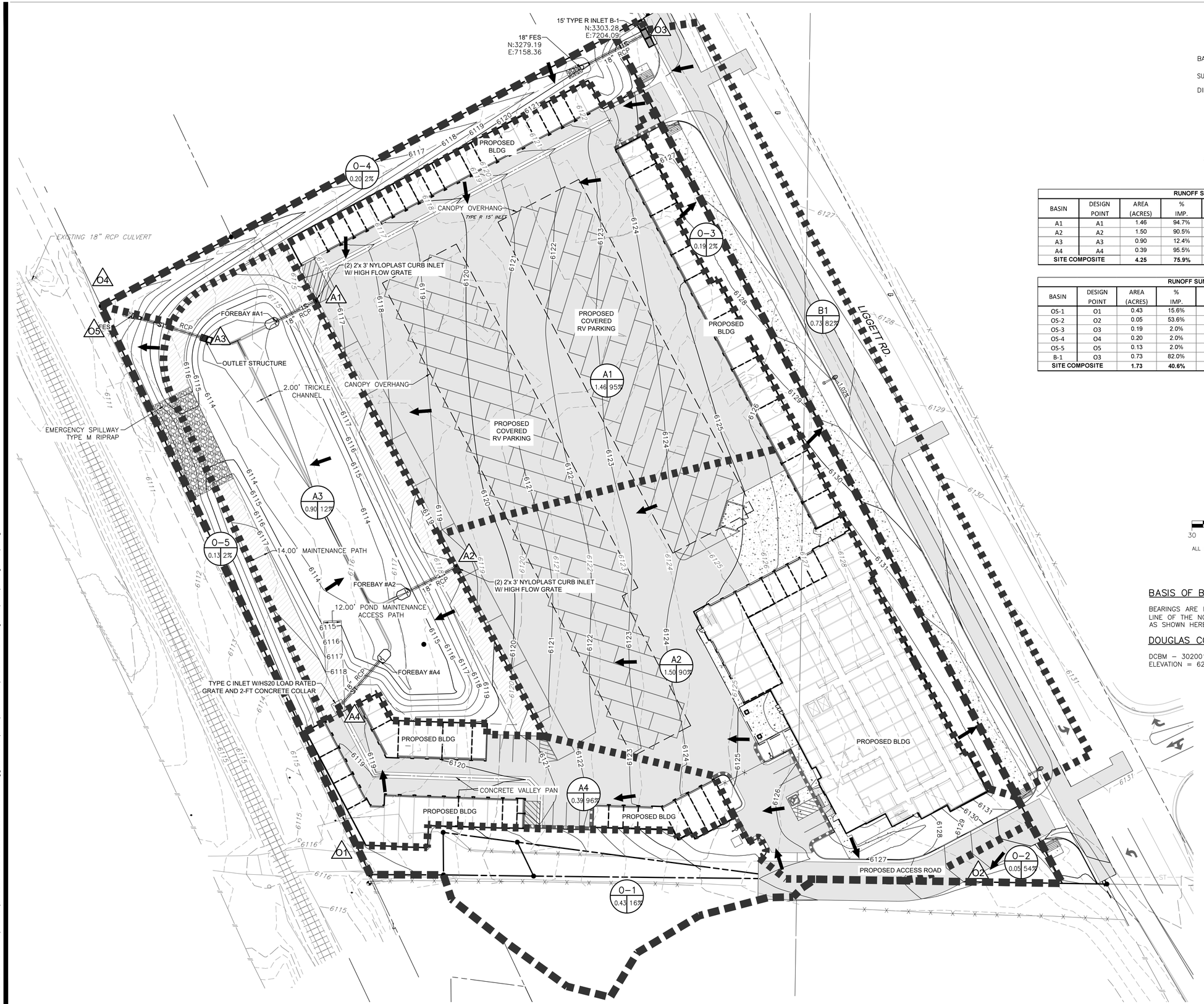


10-YEAR CAPITAL PLAN
PLUM CREEK BASIN

Disclaimer: The data presented has been compiled from various sources, each of varying degrees of accuracy and completeness. The Town of Castle Rock assumes no liability for it's use or accuracy. Questions or comments regarding the cartographic composition of this map including, but not limited to, omissions or inaccuracies should be directed to (720) 733-6087. Utilities Department, Town of Castle Rock. (720) 733-6087. Copyright 2012. Town of Castle Rock Utilities Mapping.

1 inch = 3,000 feet

CASTLE ROCK Water
Securing our future drop by drop



LEGEND

BASIN BOUNDARY

SUB-BASIN BOUNDARY

DIRECTION OF FLOW

BASIN — B — PERCENT IMPERVIOUSNESS

AREA IN ACRES — X.XX | XX%

RUNOFF SUMMARY							
BASIN	DESIGN POINT	AREA (ACRES)	% IMP.	C_5	C_{100}	Q_5 (CFS)	Q_{100} (CFS)
A1	A1	1.46	94.7%	0.81	0.87	5.35	10.43
A2	A2	1.50	90.5%	0.77	0.85	5.59	11.20
A3	A3	0.90	12.4%	0.09	0.48	0.30	3.01
A4	A4	0.39	95.5%	0.82	0.87	1.47	2.84
SITE COMPOSITE		**4.25**	**75.9%**	**0.64**	**0.78**	**12.71**	**27.49**

RUNOFF SUMMARY							
BASIN	DESIGN POINT	AREA (ACRES)	% IMP.	C_5	C_{100}	Q_5 (CFS)	Q_{100} (CFS)
OS-1	O1	0.43	15.6%	0.11	0.50	0.17	1.36
OS-2	O2	0.05	53.6%	0.43	0.68	0.11	0.30
OS-3	O3	0.19	2.0%	0.01	0.44	0.01	0.58
OS-4	O4	0.20	2.0%	0.01	0.44	0.01	0.61
OS-5	O5	0.13	2.0%	0.01	0.44	0.01	0.40
B-1	O3	0.73	82.0%	0.69	0.81	2.08	4.42
SITE COMPOSITE		**1.73**	**40.6%**	**0.34**	**0.61**	**2.38**	**7.67**

N

30 15 0 30 60

SCALE: 1"=30'

ALL LINEAL DIMENSIONS ARE IN U.S. SURVEY FEET

BASIS OF BEARINGS

BEARINGS ARE BASED ON THE CONSIDERATION THAT THE SOUTH LINE OF THE NORTHWEST ¼ OF SECTION 35 BEARS N89°03'33"W AS SHOWN HEREON BETWEEN THE MONUMENTS IDENTIFIED.

DOUGLAS COUNTY BENCHMARK

DCBM – 3020015
ELEVATION = 6255.22 (NAVD88)

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STORQUEST CASTLE ROCK

CONSTRUCTION DOCUMENTS

DRAINAGE MAP

No.	Issue / Revision	Date	Name

Job Number	21.0096
Project Manager	C. CLARK-SUPINSKI
Design By	B. WILLEMS
Drawn By	L. JACKSON
Principal In Charge	S. PALING

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APPENDIX E

DRAINAGE MAPS

EX1 34.55
EX2 18.16
EX3 26.84
EX4 22.70
EX5 17.49
EX6 41.82
EX7 19.90
EX8 38.91
EX9 73.50
EX10 18.57
EX11 36.11
EX12 44.57
EX13 25.28
EX14 19.39
EX15 114.62
EX16 6.22
EX17 25.44
EX18 12.35
EX19 24.71
EX20 8.24
EX21 6.53
EX22 6.73
EX23 35.20
EX24 51.70
EX25 12.06
EX26 12.30
EX27 18.41
EX28 16.73
EX29 24.52

EXISTING CULVERT
EXISTING SWALE
UNION PACIFIC RAILROAD
EXISTING DETENTION POND STORQUEST
EXISTING 18" RCP
N. LUGGETT RD
METZLER RANCH PD FILING NO.2 (GI)
EXISTING DETENTION POND MEZLER RANCH FILING NO. 2
EXISTING 24" RCP
EXISTING SWALE
EXISTING 54" RCP
EXISTING 8'X7' BOX CULVERT
EAST PLUM CREEK
WALKER TRIBUTARY #1
EXISTING 4'X6' BOX CULVERT
MEADOWS FOURTH AMENDMENT PD DENSITY: 1-8 DU/AC (SFD), 8-12 DU/AC (MF)
REGULATORY FLOODPLAIN
PARKS & OPEN SPACE
EXISTING 48" CMP
EXISTING DETENTION POND CASTLE LOCK SELF STORAGE
UNPLATTED SCOTT PARCEL
INTERSTATE 25
FRONT STREET
EXISTING DETENTION POND CASTLE TERRACE SCOTT II, FILING 3
CASTLE TERRACE SCOTT II RESIDENTIAL (MF)
HANGMAN'S GULCH
SCOTT II FILING NO. 3 RESIDENTIAL (SFD)
EXISTING RCP
EXISTING 60" RCP
METZLER RANCH FILING NO. 8
EXISTING DETENTION POND METZLER RANCH FILING NO. 8
METZLER RANCH FILING NO. 1
EXISTING 36" RCP
EXISTING24" RCP
HAZEN MOORE FILING NO. 1
WOODLANDS BLVD
HAZEN MOORE FILING NO. 2
EXISTING DETENTION POND HAZEN MOORE FILING NO. 2
EXISTING 42" STORM
EXISTING 7'X10' BOX CULVERT
EXISTING POND
WALKER TRIBUTARY #1
UNPLATTED SCOTT PARCEL
EXISTING FRONT STREET STORM SEWER SYSEM
PLATEAU NATURAL GAS COMPANY EASEMENT (BK 146, PG 66)
EXISTING 24" RCP
EXISTING 18" RCP
EXISTING DETENTION POND SCOTT II, FILING 3
EXISTING AREA INLET
EXISTING 60" RCP
SCOTT'S TRIBUTARY
EXISTING 30" HDPE
EXISTING 27" HDPE
UNPLATTED SCOTT PARCEL
EXISTING 36" RCP CULVERT
EXISTING STOCK POND
EXISTING 75' PUBLIC SERVICE EASEMENT (BK 121 PG 480)
EXISTING 10' EASEMENT (BK 569 PG 262)
EXISTING 36" CULVERT
FOUNDERS PARKWAY
CASTLE ROCK RIDGELINE (MAJOR BASIN DIVIDE)
WALKER TRIBUTARY #2
EAST PLUM CREEK BASIN
CHERRY CREEK BASIN
EXISTING 42" RCP CULVERT
EXISTING 60" RCP CULVERT
EXISTING 60.0' COLORADO GAS COMPANY EASEMENT (BK 505, PG 256) (BK 653, PG 756)
CASTLE OAKS FILING NO.1 RESIDENTIAL(SFD)
WOODLANDS 9 TRIBUTARY
THE WOODLANDS FILING NO.9 RESIDENTIAL (SFD)
EXISTING 36" RCP
EXISTING 30" RCP
EXISTING 27" RCP
THE WOODLANDS FILING NO. 10 RESIDENTIAL (SFD)
THE WOODLANDS FILING NO. 12 RESIDENTIAL (SFD)

0 400' 800'
1 inch = 400 ft.

LEGEND

XX — BASIN DESIGNATION
XX.XX — BASIN AREA
DIRECTIONAL FLOW AROW
X — DESIGN/COLLECTION POINT
X — PROPOSED POND DESIGNATION (APPROXIMATE LOCATION)
OVERALL PROPERTY BOUNDARY
MAJOR DRAINAGE BASIN BOUNDARY (CASTLE ROCK RIDGELINE)
MINOR DRAINAGE BASIN BOUNDARY
CHANNEL FLOWLINE & FLOW DIRECTION
PLANNING AREA (PA) BOUNDARY

KEY MAP
SCALE: 1" = 2000'

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PHASE I DRAINAGE MAPS
EXISTING DRAINAGE MAP

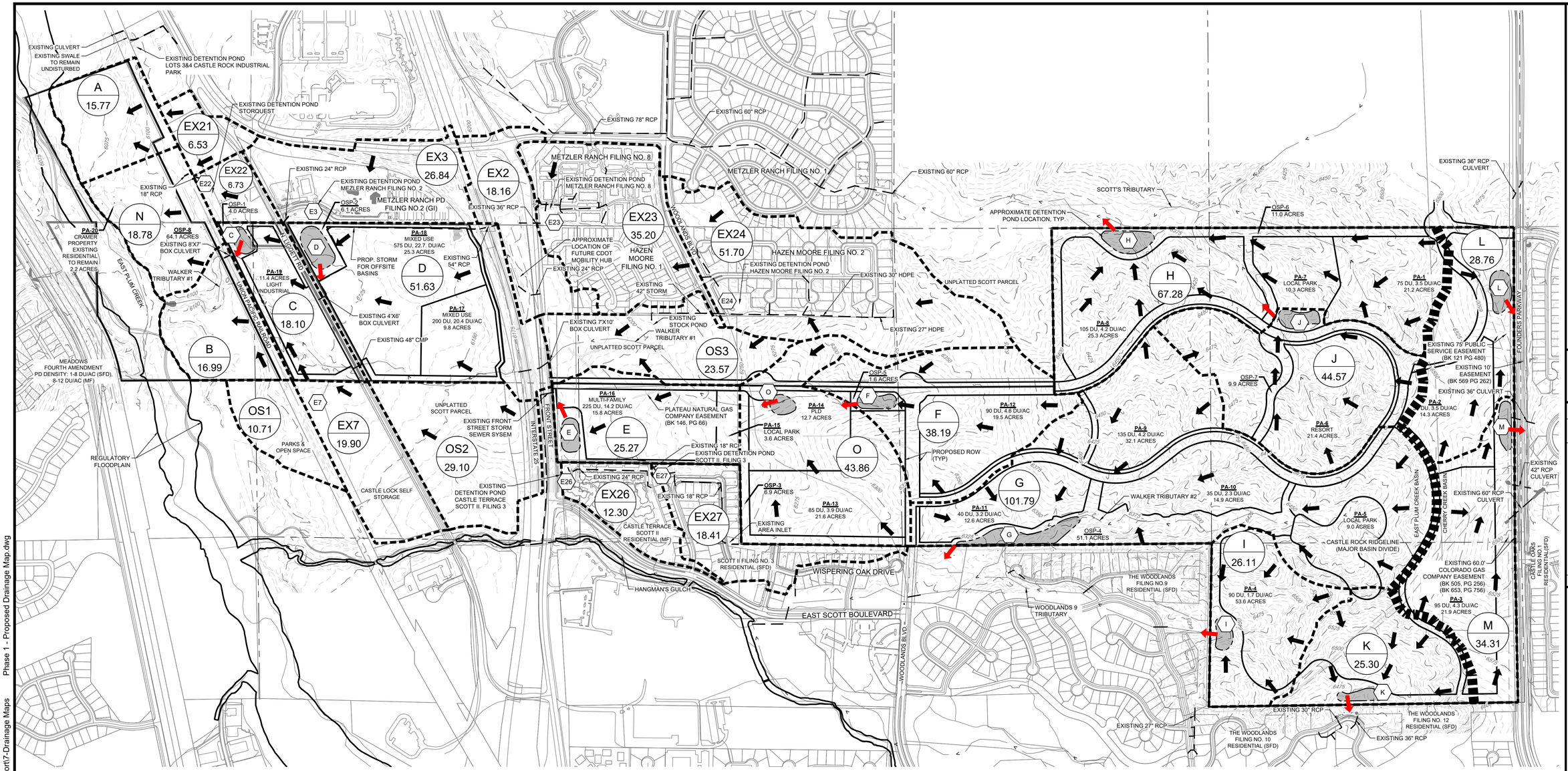
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0 400' 800'

1 inch = 400 ft.

POND SUMMARY TABLE

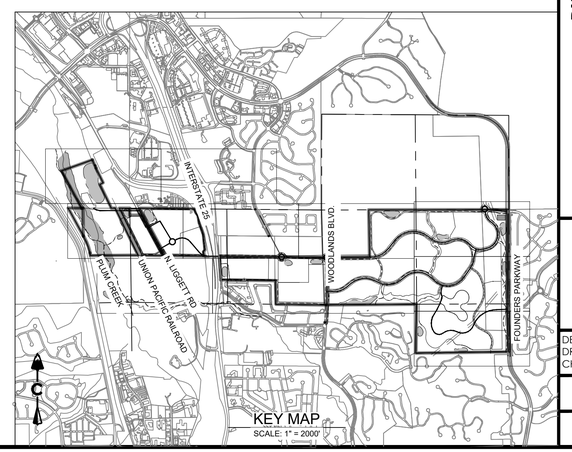
BASIN	DESIGN POINT	AREA (AC)	IMPERVIOUS (%)	WQCV (AC-FT)	EURV (AC-FT)	100YR + 1/2 WQC V VOL (AC-FT)	100YR EMERGENCY OVERFLOW (CFS)
A	A	15.77	10.0%	-	-	-	-
B	B	16.99	10.0%	-	-	-	-
C	C	18.10	77.7%	0.477	1.558	2.701	70.8
D	D	51.63	72.3%	1.233	4.110	7.244	212.0
E	E	25.27	70.3%	0.582	1.779	3.352	101.8
F	F	38.19	42.9%	0.599	1.538	3.518	118.0
G	G	101.79	44.1%	1.617	4.363	9.627	312.9
H	H	67.28	45.4%	1.095	2.877	6.430	207.3
I	I	26.11	45.5%	0.423	1.115	2.499	95.3
J	J	44.57	66.6%	0.968	2.878	5.595	187.4
K	K	25.30	43.0%	0.396	1.017	2.335	86.7
L	L	28.76	54.4%	0.528	1.496	3.112	136.6
M	M	34.31	50.3%	0.592	1.633	3.516	110.3
N	N	18.78	22.4%	-	-	-	-
O	O	43.86	55.4%	0.815	2.326	4.806	155.9

NOTES
1. VALUES IN THIS TABLE ARE ESTIMATES, AND WILL BE EVALUATED FURTHER IN FUTURE PHASES.

NOTES:
1. SLOPE EASEMENTS ARE REQUIRED ANYWHERE LAND IS DISTURBED WITHIN THE TOWN OPEN SPACE. REQUIRED PRIVATE MAINTENANCE WILL INCLUDE EROSION CONTROL AND NATIVE GROUND COVER UPKEEP. THE EXACT LOCATIONS OF THESE EASEMENTS WILL BE ESTABLISHED AFTER PHASE I.
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LEGEND

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- PROPOSED FLOW ARROW (CONTOURS NOT SHOWN, TBD)
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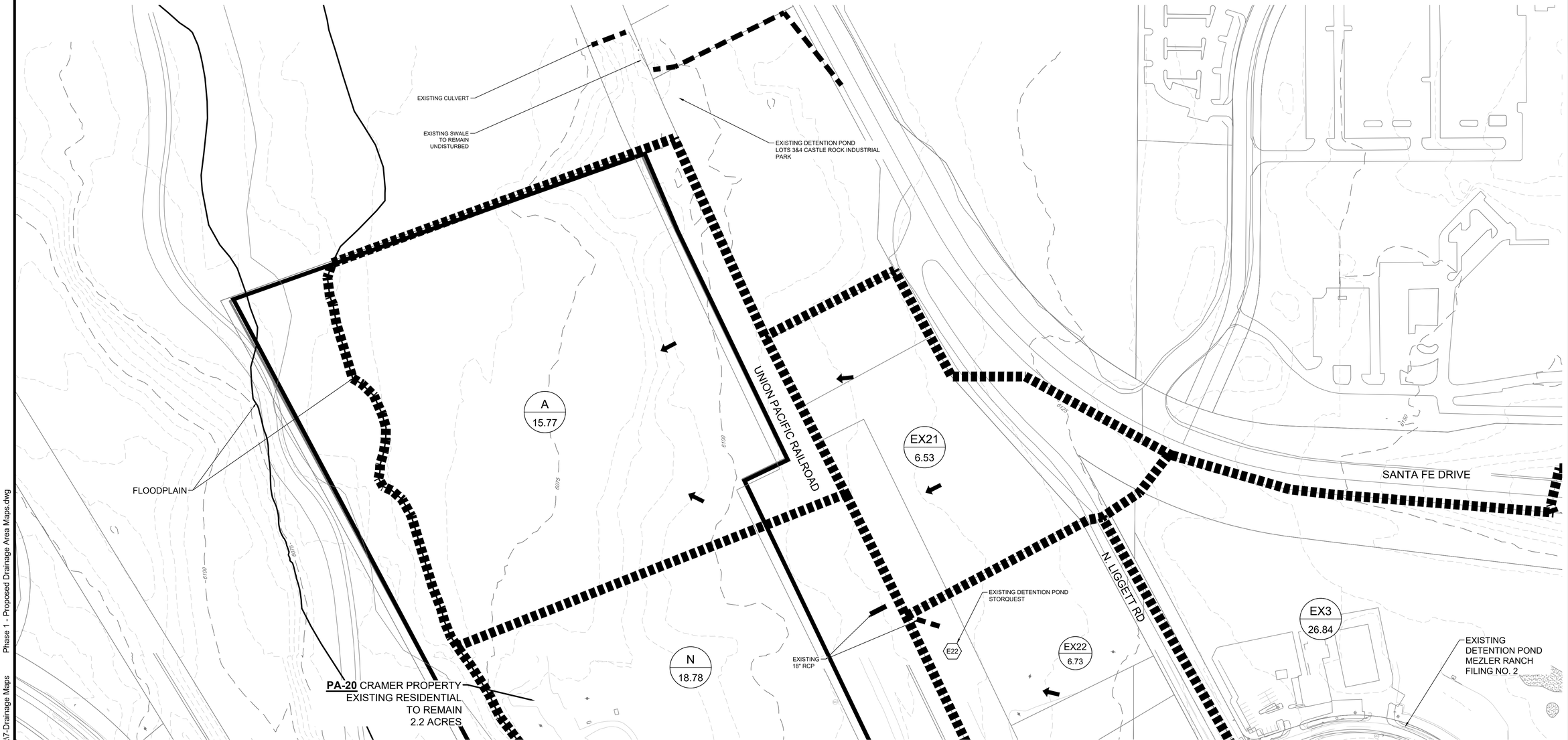
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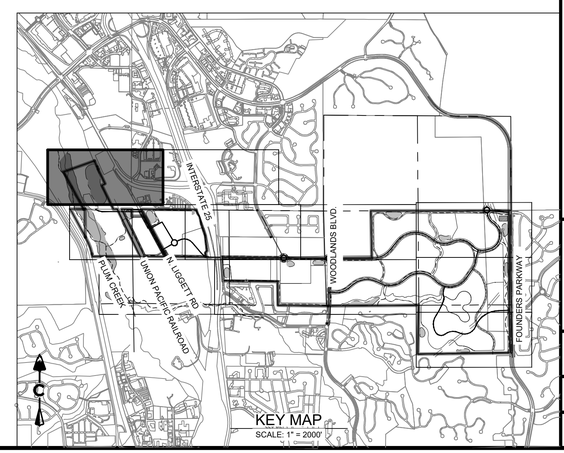
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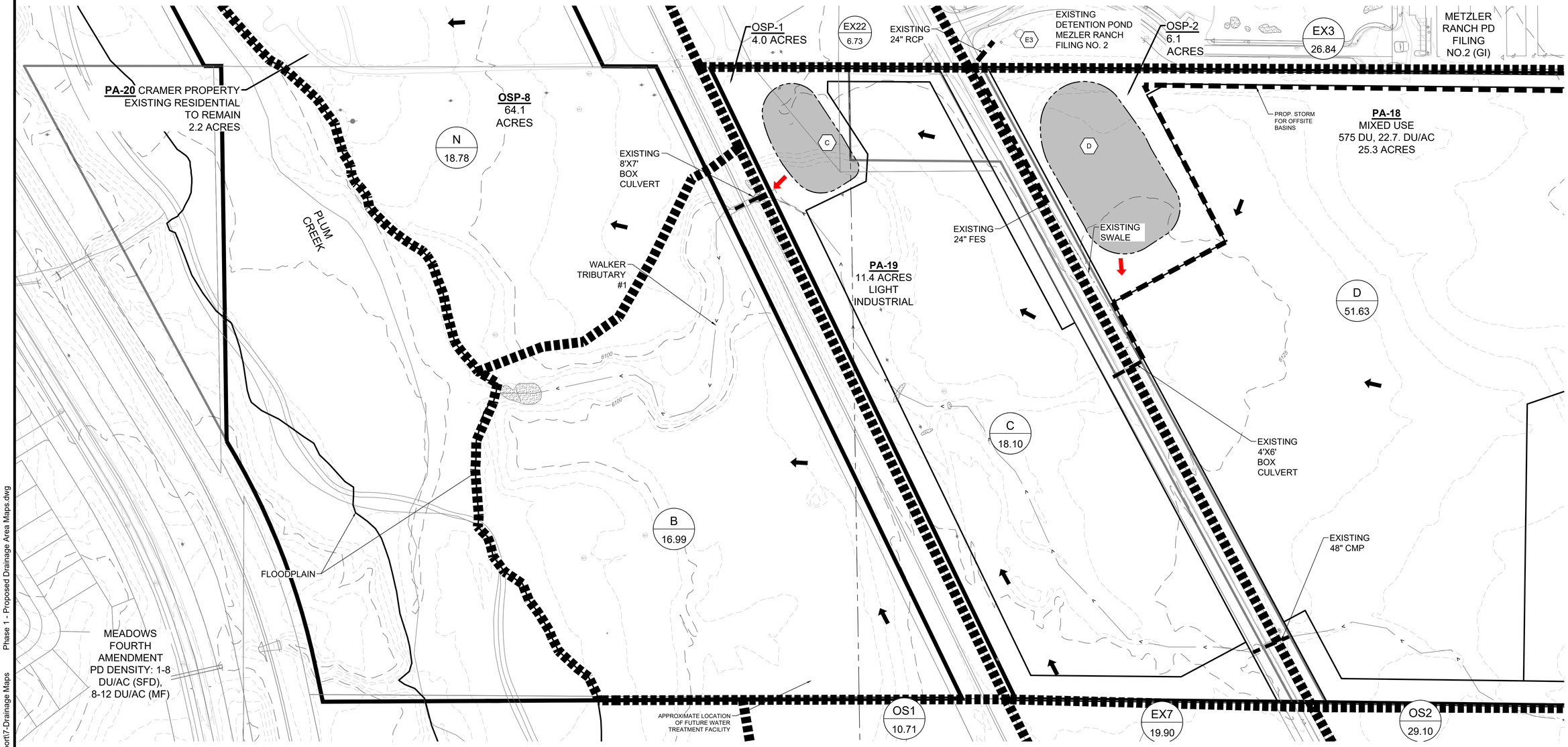
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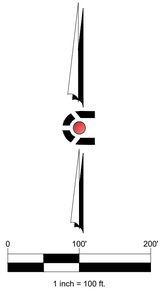
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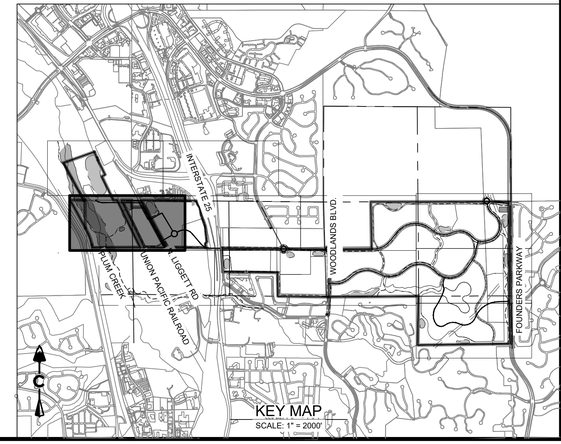


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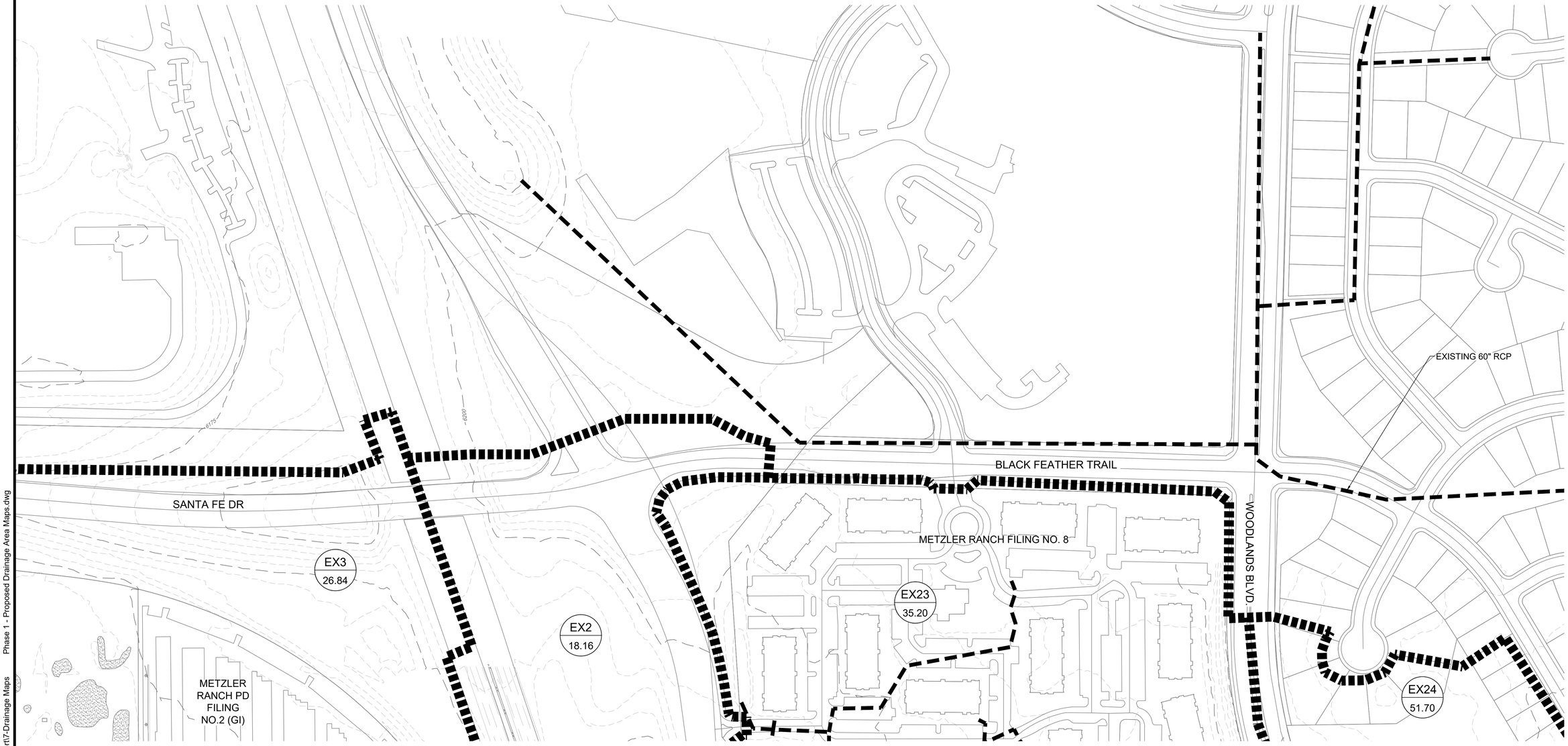
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0 100' 200'

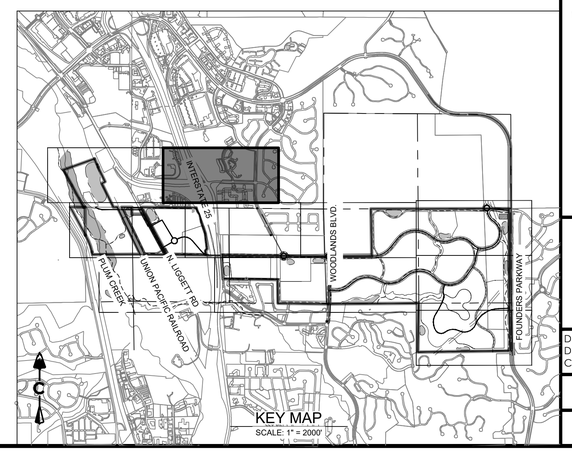
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KEY MAP
SCALE: 1" = 2000'

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METZLER RANCH PD FILING NO.2 (GI)

EX3
26.84

EXISTING 36" RCP

E23

EXISTING DETENTION POND METZLER RANCH FILING NO. 8

EX23
35.20

METZLER RANCH FILING NO.

WOODLANDS BLVD.

EX24
51.70

HAZEN MOORE FILING NO. 2

EXISTING 54" RCP

EX2
18.16

HAZEN MOORE FILING NO. 1

APPROXIMATE LOCATION OF FUTURE CDOT MOBILITY HUB

EXISTING24" RCP

D
51.63

EXISTING 42" STORM

EXISTING DETENTION POND HAZEN MOORE FILING NO. 2

E24

PA-17
MIXED USE
200 DU, 20.4 DU/AC
9.8 ACRES

EXISTING STOCK POND

EXISTING 7'X10' BOX CULVERT

WALKER TRIBUTARY #1

UNPLATTED SCOTT PARCEL

OS3
23.57

O
43.86

E
25.27

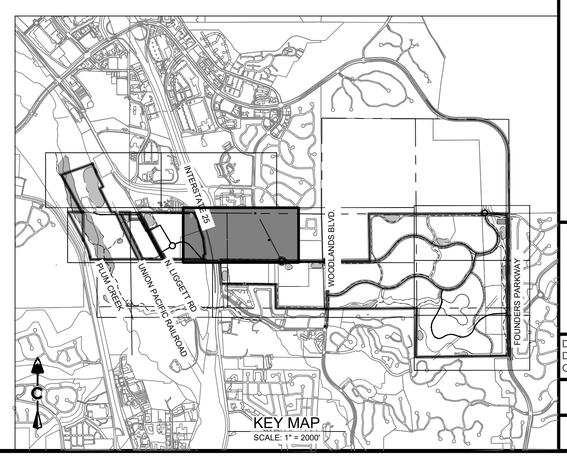
OS2
29.10

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KEY MAP
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PINE CANYON
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PROPOSED AREA DRAINAGE MAPS

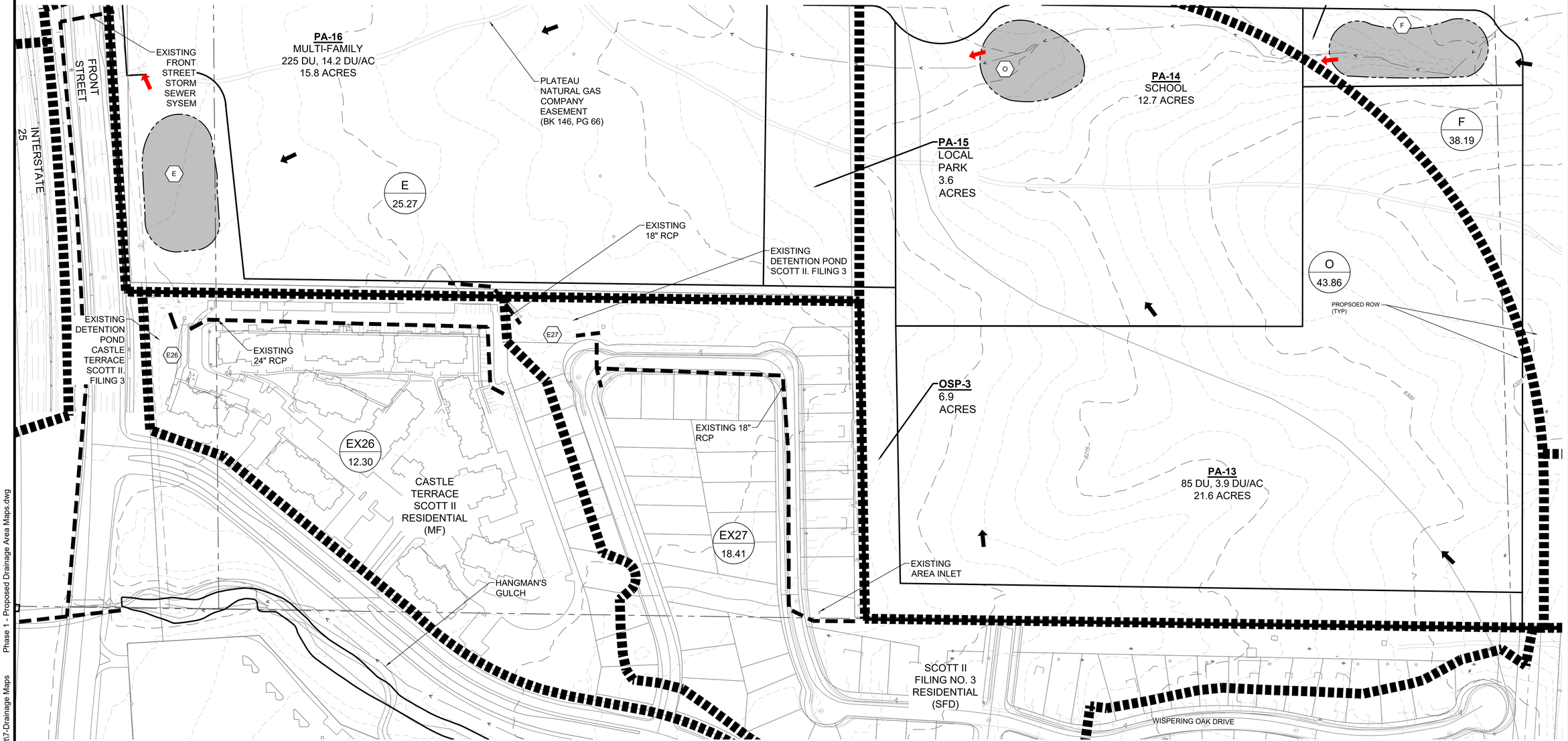
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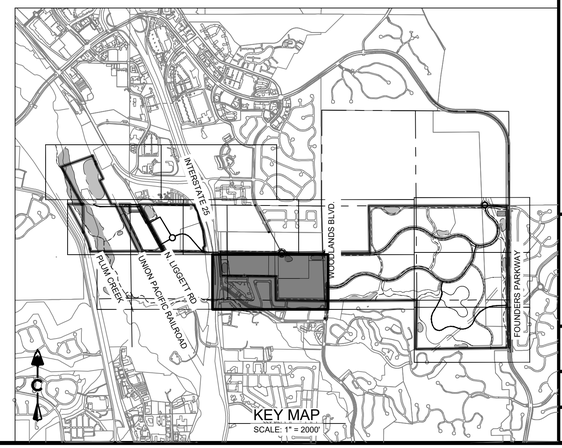
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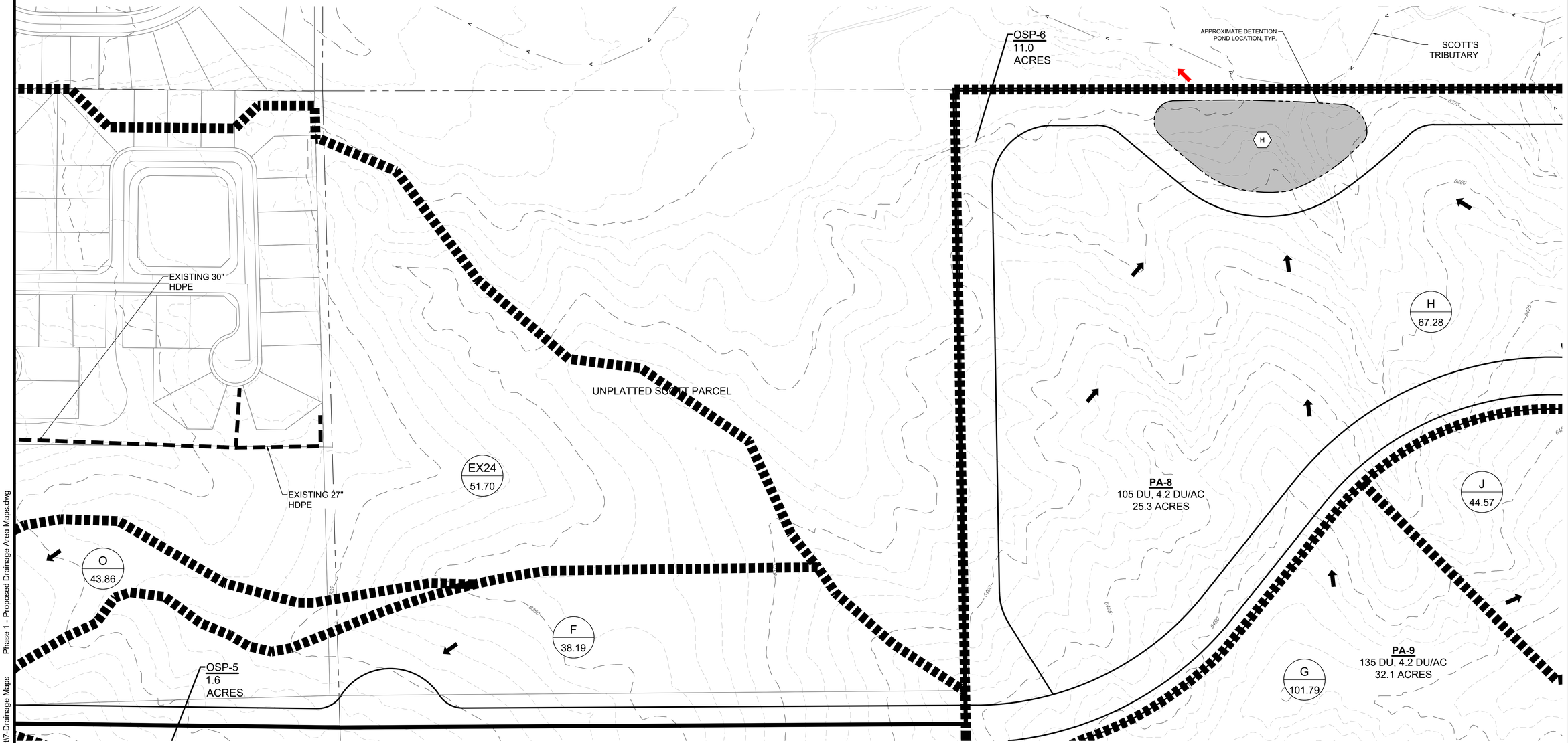
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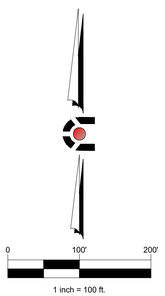
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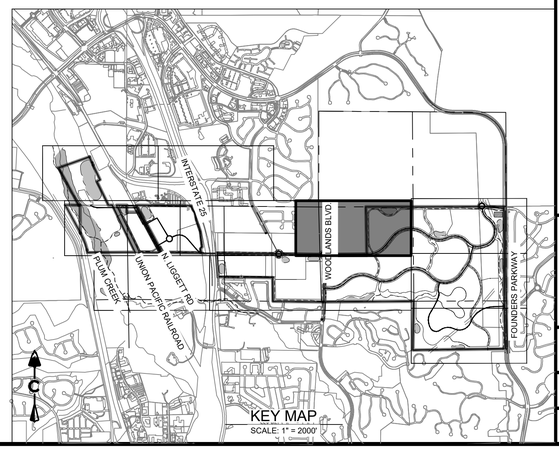


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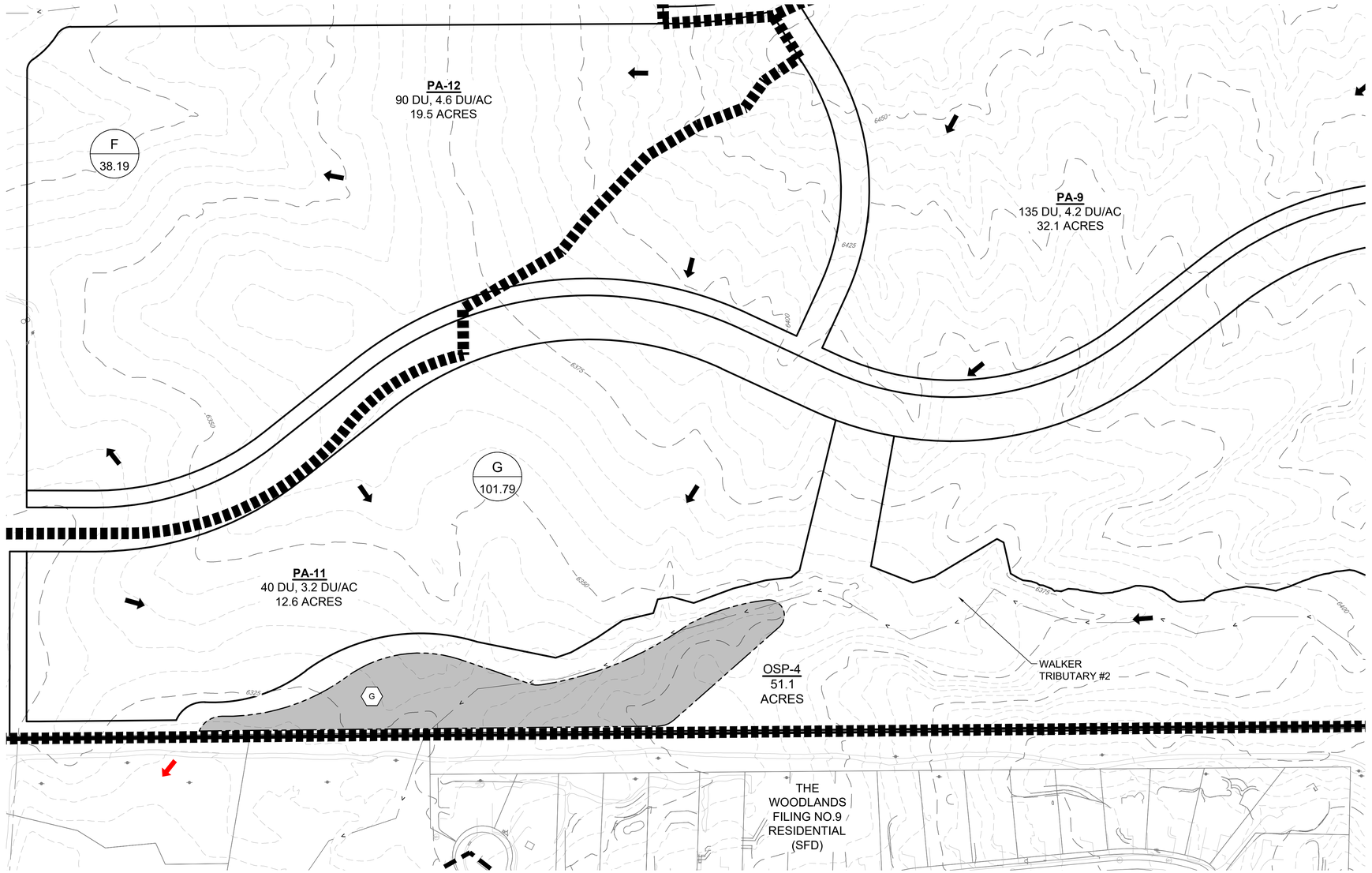
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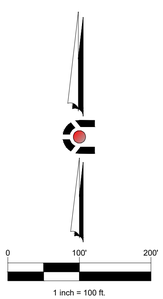
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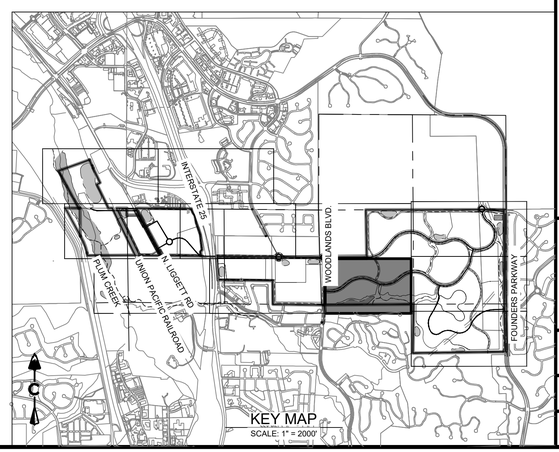




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SCOTT'S TRIBUTARY

OSP-6
11.0
ACRES

H
67.28

PA-7
LOCAL PARK
10.3 ACRES

CASTLE ROCK RIDGELINE (MAJOR BASIN DIVIDE)

PA-1
75 DU, 3.5 DU/AC
21.2 ACRES

PA-1
75 DU, 3.5 DU/AC
21.2 ACRES

L
28.76

L

J

PA-9
135 DU, 4.2 DU/AC
32.1 ACRES

J
44.57

PA-6
RESORT
21.4 ACRES

OSP-7
9.9
ACRES

EAST PLUM CREEK BASIN

CHERRY CREEK BASIN

PA-2
50 DU, 3.5 DU/AC
14.3 ACRES

EXISTING 75' PUBLIC SERVICE EASEMENT (BK 121 PG 480)

EXISTING 10' EASEMENT (BK 569 PG 262)

FOUNDERS PARKWAY

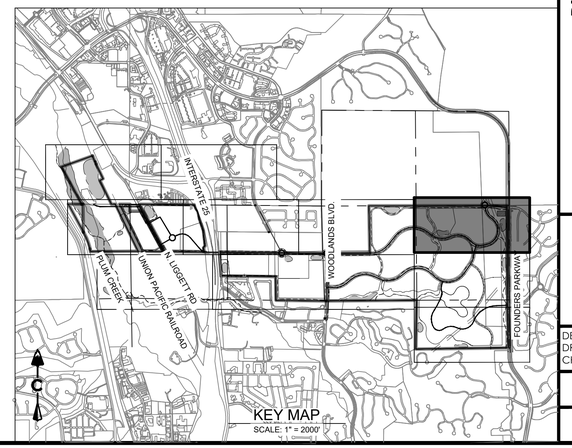
6475
6500
6525
6550

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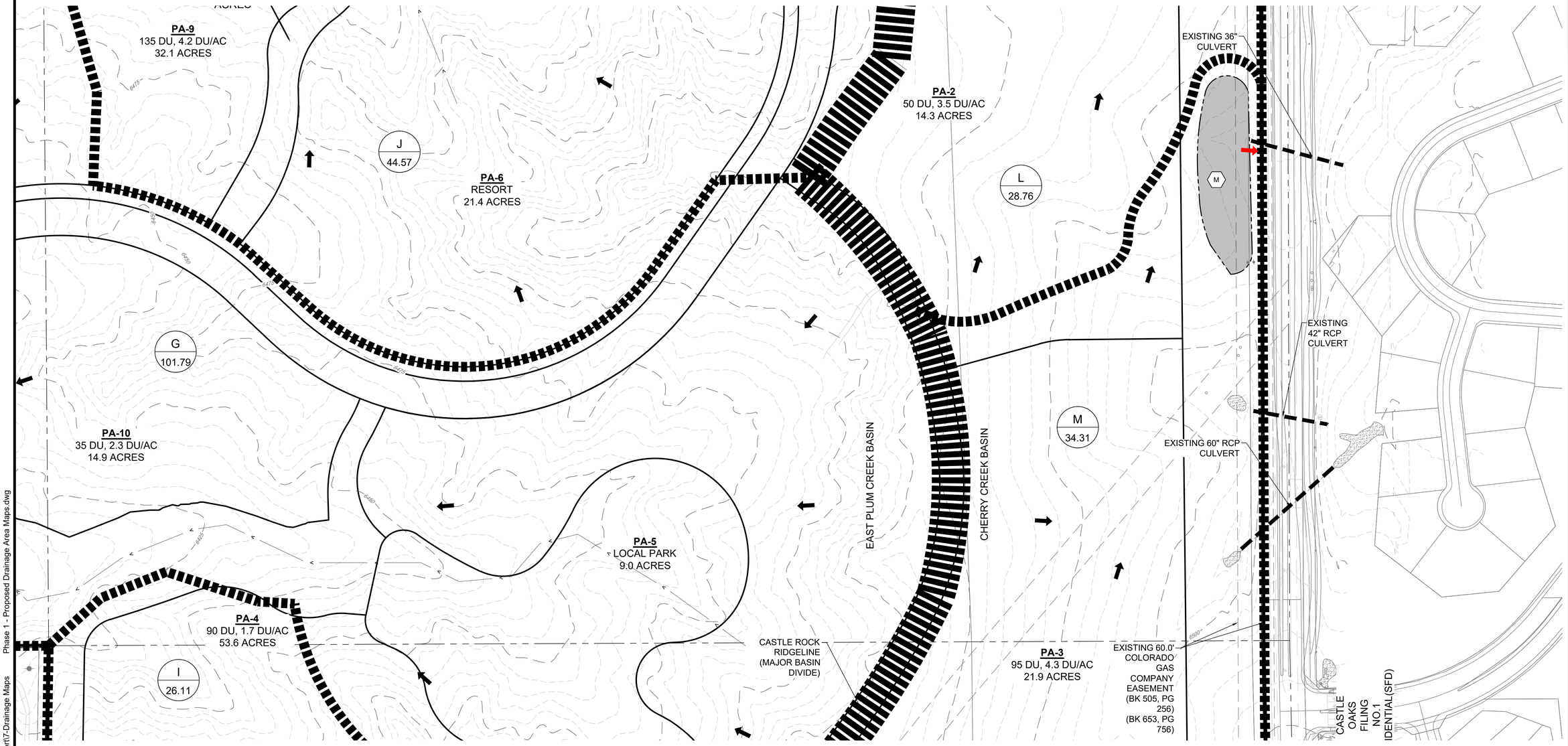
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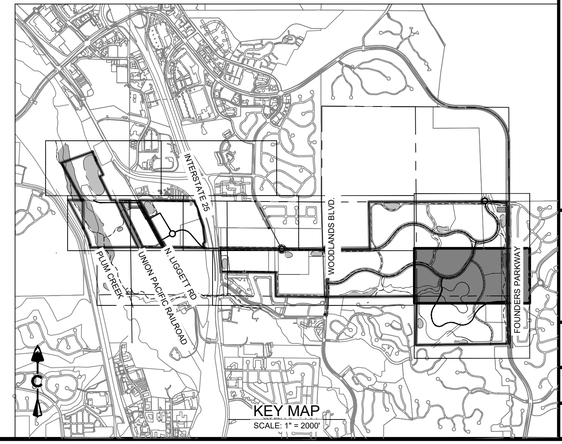
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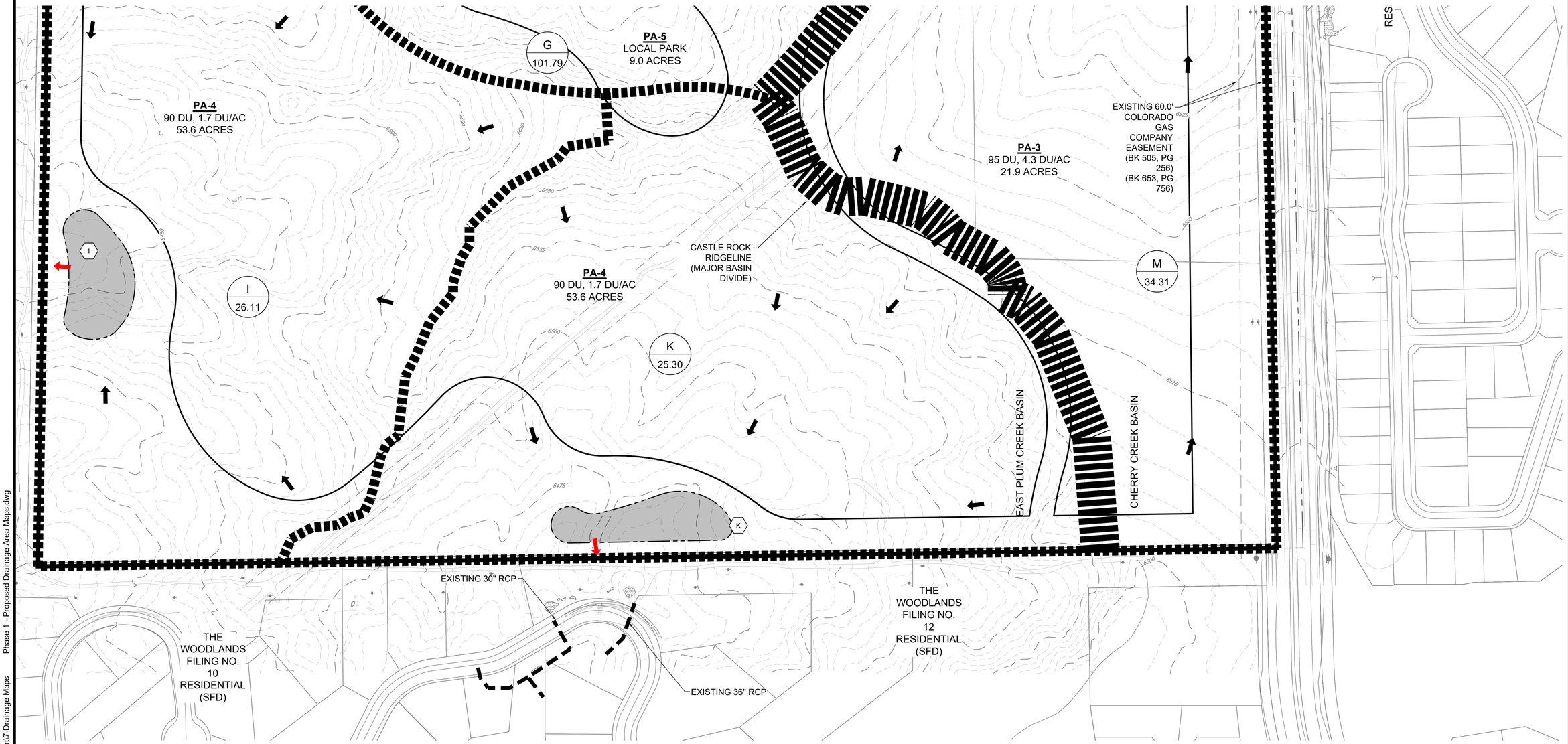
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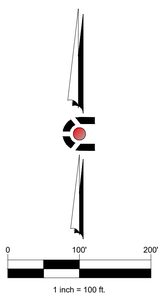
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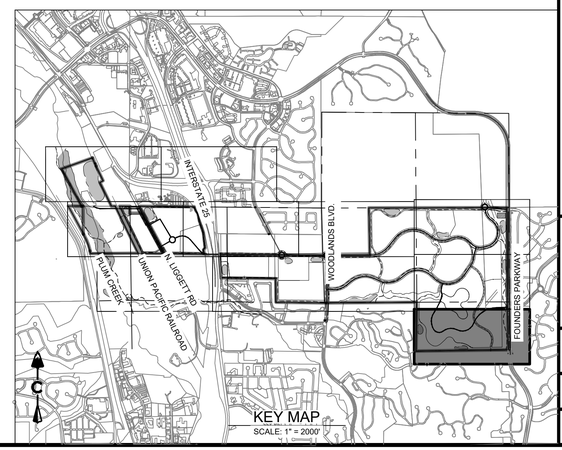




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