



Request for Comments (2nd Submission)

Case Name: Berkley Shores Final Development Plan (FDP), Final Plat and Waiver of Subdivision Standards
Case Number: PRC2019-00019

February 27, 2020

Adams County Planning Commission and the Board of County Commissioners are requesting comments on the following requests:

- 1.) A Final Development Plan (FDP) for 89 single-family attached (72 units) and detached housing (17 units) units on 9.73 acres;
- 2.) A Final Plat for 89 parcels and 18 tracts on 9.73 acres and
- 3.) A Waiver of the Subdvision Standards to allow for a modified street cross section for 63rd Avenue. The right-of-way proposed is 52-feet with a 40-foot flowline to flowline in lieu of a 50-foot right-of-way with a 36-foot flowline dimension.


The Assessor's Parcel Numbers are: **0182508200049, 0182508200050, 018250829001**

Applicant Information: 6300 Lowell, LLC
2100 Downing Street
Denver, CO 80205

Please forward any written comments on this second submission to the Department of Community and Economic Development at 4430 South Adams County Parkway, Suite W2000A Brighton, CO 80601-8216. (720) 523-6858 by **Friday, March 13, 2020** in order that your comments may be taken into consideration in the review of this case. If you would like your comments included verbatim please send your response by way of e-mail to Ltart@adcogov.org.

Unfortunately, due to the large file sizes and inability to email the documents out, the proposed request and additional colored maps can be obtained by viewing them on paper within our offices or by accessing the Adams County web site at www.adcogov.org/planning/currentcases. The name of the case and the number will be located on this page.

Thank you for your review of this case.


Libby Tart, AICP
Case Manager

Level 3 – Storm Drainage Study Report

Berkley Shores

Prepared for:

HDC 6300 Lowell Boulevard, LLLP
2100 Downing Street
Denver, CO 80205
(303) 926.4949 voice
Contact: Mr. Paul Malone

Prepared by:



February 2020
Project No. 18027

ENGINEER CERTIFICATION OF DRAINAGE REPORT

“I hereby certify that this report (plan) for the Drainage design of Berkley Shores was prepared by me or under my direct supervision in accordance with the provisions of Adams County Storm Drainage Design and Technical Criteria for the owners thereof. I understand that Adams County does not and will not assume liability for drainage facilities designed by others.”

Travis J. Frazier, P.E.
Registered Professional Engineer
State of Colorado No. 45342

Date

DEVELOPER CERTIFICATION OF DRAINAGE FACILITIES

“HDC 6300 Lowell Boulevard LLLP hereby certifies that the drainage facilities for Berkley Shores shall be constructed according to the design presented in this report. I understand that Adams County does not and will not assume liability for the drainage facilities designed and/ or certified by my engineer. I understand that Adams County reviews drainage plans pursuant to Colorado Revised Statutes Title 30, Article 28; but cannot, on behalf of Berkley Shores, guarantee that final drainage design review will absolve HDC 6300 Lowell Boulevard LLLP and/or their successors and/or assigns the future liability for improper design. I further understand that approval of the Final Plat and/or Final Development Plan does not imply approval of my engineer’s drainage design.”

Name of Developer (please print)

Date

Authorized Signature

Table of Contents

Table of Contents.....	3
Introduction.....	4
Site Location.....	4
Site Description.....	4
Proposed Project Description.....	4
Flood Hazard and Drainage Studies Relevant to the Site.....	4
Soil Type.....	4
Historic Drainage System.....	5
Major Basins.....	5
Proposed Drainage System and Basins.....	5
Criteria.....	5
Runoff / Proposed Basin Description.....	5
Major Basins.....	5
Sub-basins.....	5
Proposed Water Quality Pond.....	7
Existing Storm Sewer / Irrigation Ditch Re-Routing.....	8
Conclusion.....	8
References.....	9

Introduction

INTRODUCTION

This level 3 storm drainage study report presents an analysis for the proposed drainage patterns and requirements for the proposed Berkley Shores development, hereafter referred to as the Site.

Site Location

The Site is located in the Northwest Quarter of Section 8, Township 3 South, Range 66 West of the 6th Principal Meridian, Adams County, Colorado. The Site is south of W. 64th Ave., east of Lowell Boulevard, north of W. 62nd Ave., and west of the Lake Sangraco. The Site address is 6300 Lowell.

Site Description

The existing site encompasses approximately 9.73 acres and is split into two lots. Native grasses and weeds currently cover the site. The site slopes at about 1%-6% to the southeast, towards the Manhart Ditch. There is an existing irrigation ditch (Manhart Ditch) located on the south side of the site that flows to the east to Lake Sangraco. The ditch will be redirected into the public storm sewer. There are two existing homes and outbuildings located at the north end of the site which will be removed.

Proposed Project Description

The property is proposed to be a residential development with single family homes and townhomes. There will be 72 townhome units and 17 single family detached lots. W.63rd Ave will continue through the site and connect to Lowell Blvd. and private drives will serve the lots. A water quality pond will be built at the southeast corner of the site and discharge into the existing lake. The existing lake at the southeast corner of the site will remain.

Flood Hazard and Drainage Studies Relevant to the Site

The site is contained within FIRM panel #08001C0591H. According to FIRM panel, no part of the site lies within the 100- year flood plain (see Appendix A).

Soil Type

The NRCS soil survey indicates that the soil on site is primarily gravelly land-shale and gravel pits, whose hydrologic soil group is Type A. Approximately 5% of the site is clay loam, whose hydrologic soil group is Type C. A soil map has been included in the appendix for reference.

Historic Drainage System

Major Basins

The site historically drains to the south and outfalls into the Manhart Ditch that runs through the property and outfalls into Lake Sangraco. The southern portion of the site collects in the existing lake. Lowell Blvd. runoff is collected by existing curb and gutter and is collected by existing Type R inlets adjacent and south of the site. The runoff from Lowell Blvd. appears to enter the existing 96" CMP and continue south. Julian St., east of the site, sheet flows to the south to an inlet and swale that also outfalls into Lake Sangraco.

Proposed Drainage System and Basins

Criteria

This report has been prepared in accordance with the Adams County Storm Drainage Design and Stormwater Quality Control Criteria and the *Urban Drainage and Flood Control District Criteria Manual*.

The hydrologic design was computed using the Rational Method as defined by Urban Drainage & Flood Control District. The 5-year storm was used as the minor storm event, while the 100-year storm was used as the major event. The one-hour point rainfall depth used for the 5-year storm was 1.42 inches and 2.71 inches for the 100-year event. The Rational Method was used to analyze fully developed conditions. Cumulative flow calculations were performed using StormCAD and are attached in the appendices. Runoff was computed using a spreadsheet that is in Appendix B.

Runoff / Proposed Basin Description

Major Basins

The proposed major basins consist of the northern end of the site, Basin A (5.11 acres), the existing lake and adjacent areas, Basin B (3.20 acres) and the area adjacent to the expansion of Lowell Blvd., Offsite Basin (0.54 acres). Basin A will be collected on site and treated in the proposed water quality pond. Basin B will follow the historic flow pattern into the existing lake. The Offsite Basin will follow historic flow patterns into existing inlets in Lowell Blvd. This developed area has an overall imperviousness of 69%.

Sub-basins

Basin A1 (2.33 Acres)

Basin A1 consists of the area north of W. 63rd Ave. including the half street section. Flows will sheet flow and collect in the on-site curb and gutter where they will be routed to a Double Type 13 combination inlet in W. 63rd Ave. This basin has an overall imperviousness of 82%.

$$C_5 = 0.67 \quad C_{100} = 0.79$$

$$Q_5 = 6.1 \text{ CFS} \quad Q_{100} = 13.7 \text{ CFS}$$

Basin A1.1 (0.15 Acres)

Basin A1.1 consists of the northern edge of Lots 7-32. Flows will sheet flow and collect in the 18" concrete pan and drain towards Julian Street. These flows will be combined with flows from Basin A1. This basin has an overall imperviousness of 2%.

$$C_5 = 0.05 \quad C_{100} = 0.60$$

$$Q_5 = 0.03 \text{ CFS} \quad Q_{100} = 0.7 \text{ CFS}$$

The combined flows that will be captured at Design Point A1, a Double Type 13 combination inlet, will be 6.1 cfs for the 5-year event and 14.3 cfs for the 100-year event.

Basin A2 (0.62 Acres)

Basin A2 consists of the southern portion of W 63rd Ave. and the adjacent lots. Flows will sheet flow and collect in the on-site curb and gutter where they will be routed to a Single Type 13 Combination inlet. This basin has an overall imperviousness of 78%.

$$C_5 = 0.67 \quad C_{100} = 0.91$$

$$Q_5 = 1.7 \text{ CFS} \quad Q_{100} = 4.4 \text{ CFS}$$

Basin A3 (2.02 Acres)

Basin A3 consists of the southern private drive, residential lots and the water quality pond. Flows will sheet flow and collect in the on-site curb and gutter where they will be routed to a 10ft Type R inlet. This basin has an overall imperviousness of 57%.

$$C_5 = 0.50 \quad C_{100} = 0.82$$

$$Q_5 = 4.0 \text{ CFS} \quad Q_{100} = 12.6 \text{ CFS}$$

All of Basin A will be captured and routed through the water quality pond at the southeast corner of the development. See the Proposed Water Quality Pond section below for details and calculations.

Basin B1 (0.96 Acres)

Basin B1 consists of the southern portion of the single-family lots and park area. The runoff will sheet flow into the existing lake. This basin has an overall imperviousness of 38%.

$$C_5 = 0.39 \quad C_{100} = 0.68$$

$$Q_5 = 1.6 \text{ CFS} \quad Q_{100} = 5.3 \text{ CFS}$$

Basin B2 (3.20 Acres)

Basin B2 consists of the existing lake which will remain undeveloped and a small park adjacent to the lake. This basin has an overall imperviousness of 3%.

$$C_5 = 0.08 \quad C_{100} = 0.52$$

$$Q_5 = 0.9 \text{ CFS} \quad Q_{100} = 11.8 \text{ CFS}$$

Basin OS1 (0.54 Acres)

Basin OS1 consists of portions of the single family and townhome lots and landscape area adjacent to Lowell Blvd. The runoff will sheet flow to the curb & gutter in Lowell Blvd. and collected by existing inlets. The proposed piping of the Manhart Ditch will carry this flow to design point OS1, where a 15' Type R inlet captures them and directs flows south to Lake Sangraco. This basin has an overall imperviousness of 46%.

$$C_5 = 0.46 \quad C_{100} = 0.72$$

$$Q_5 = 1.2 \text{ CFS} \quad Q_{100} = 3.5 \text{ CFS}$$

Proposed Water Quality Pond

A proposed water quality pond will be installed within Tract C. The pond has been sized to accommodate the water quality capture volume (WQCV) for proposed major basin A. The pond has a Water Quality Capture Volume of 0.115 acres as determined by the Urban Drainage spreadsheet UD-Detention_v3.07. The water quality pond will outfall into the existing pond within Tract A. The pond will also provide additional freeboard before overtopping.

The existing pond will act as the stormwater storage facility. During the initial design process, the State of Colorado determined that the existing pond on the Site was a Pre-1981 groundwater surface area pond and is exempt from evaporative replacement requirements. See Appendix D for the State of Colorado letter for additional details. Based on the detention calculations, the 100-year volume required for the site will raise the existing pond water surface elevation by less than 4" (0.629 acre-ft over ~2 acres). Based on water surface studies of the existing lake and Lake Sangraco, *6300 Lowell Water Level Report* prepared by

Lamp Rynearson dated July 25, 2019, the two lakes are hydraulically connected. As a result, water entering the lake will equalize with Lake Sangraco. Lake Sangraco outfalls directly to Clear Creek, the major receiving water for the Site. The runoff entering the existing pond will enter the groundwater table and follow the historic path, through Lake Sangraco, to Clear Creek. Calculations can be found in Appendix C.

POND TABLE			
	ELEV.	V_REQUIRED (AC-FT)	Q RELEASE (CFS)
WQCV	5220.53	0.115	0.1
100-YEAR	5220.53	N/A	30.9
OVERFLOW	5221.75	N/A	N/A

Since the proposed development will drain into the existing pond and enter Lake Sangraco, the historical discharge point of the site, via groundwater, the proposed development will be in accordance to the requirements of the Adams County Storm Drainage Design *and Stormwater Quality Control Criteria* and the *Urban Drainage and Flood Control District Criteria Manual*.

Existing Storm Sewer / Irrigation Ditch Re-Routing

Currently, the Manhart Ditch flows through the property to Lake Sangraco. The proposed development will pipe the existing ditch into the adjusted inlet within Lowell Boulevard. An agreement will be made between the site, ditch company, and Adams County for the ditch/storm runoff re-routing.

Conclusion

As stated before, the site currently drains to the Manhart Ditch which outfalls into Lake Sangraco and eventually into the groundwater table to Clear Creek. A water quality pond will be built to treat the runoff from the developed area. This water quality pond will outfall into the existing pond on the property (within Tract C) that will act as the stormwater storage facility. Since the existing lake on the property and Lake Sangraco are hydraulically connected, the runoff from the Site will follow the historical drainage pattern, through groundwater and Lake Sangraco, to Clear Creek. Since the existing pond has adequate capacity for the proposed runoff and is connected to Lake Sangraco, there will be no negative affects to the surrounding infrastructure.

References

REFERENCES

- 1. Adams County Storm Drainage Design and Stormwater Quality Control Criteria, October 17, 2008.*
- 2. Urban Drainage and Flood Control District, Denver, Colorado, Urban Storm Drainage Criteria Manual, Volume 1-3, latest online addition.*
- 3. 6300 Lowell Water Level Report prepared by Lamp Rynearson dated July 25, 2019*

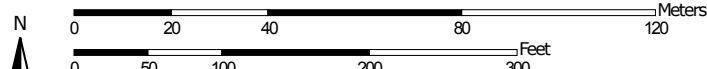
Appendix A - Vicinity Map, FIRM Map, Soils Map

Hydrologic Soil Group—Adams County Area, Parts of Adams and Denver Counties, Colorado
(6300 Lowell)



Soil Map may not be valid at this scale.

Map Scale: 1:1,560 if printed on A portrait (8.5" x 11") sheet.




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: Adams County Area, Parts of Adams and Denver Counties, Colorado
 Survey Area Data: Version 15, Sep 13, 2018

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

Date(s) aerial images were photographed: Jun 10, 2014—Aug 21, 2014

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
Gr	Gravelly land-Shale outcrop complex	A	4.1	41.3%
Lw	Loamy alluvial land, moderately wet	C	0.3	2.7%
MISLD	Gravel pits	A	4.2	42.2%
PIB	Platner loam, 0 to 3 percent slopes	C	0.2	1.6%
W	Water		1.2	12.2%
Totals for Area of Interest			10.0	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.

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

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.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS1980 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.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov/> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NNGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov/>.

Base map information shown on this FIRM was provided by the Adams County and Commerce City GIS departments. The coordinate system used for the production of the digital FIRM is Universal Transverse Mercator, Zone 13N, referenced to North American Datum of 1983 and the GRS 80 spheroid, Western Hemisphere.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://www.fema.gov/>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-338-2627) or visit the FEMA website at <http://www.fema.gov/>.

This digital Flood Insurance Rate Map (FIRM) was produced through a cooperative partnership between the State of Colorado Water Conservation Board, the Urban Drainage and Flood Control District, and the Federal Emergency Management Agency (FEMA). The State of Colorado Water Conservation Board and the Urban Drainage and Flood Control District have implemented a long-term approach of floodplain management to reduce the costs associated with flooding. As part of this effort, both the State of Colorado and the Urban Drainage and Flood Control District have joined in Cooperating Technical Partner agreements with FEMA to produce this digital FIRM.

Additional flood hazard information and resources are available from local communities, the Colorado Water Conservation Board, and the Urban Drainage and Flood Control District.



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 Area 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)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities
- Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

(A) Cross section line

(23) Transsect line

97°07'30".32"2230" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

4750000 N 1000-meter Universal Transverse Mercator grid ticks, zone 13

6000000 M 5000-foot grid ticks: Alabama State Plane coordinate system, east zone (FIPSZONE 0101), Transverse Mercator

DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 River Mile

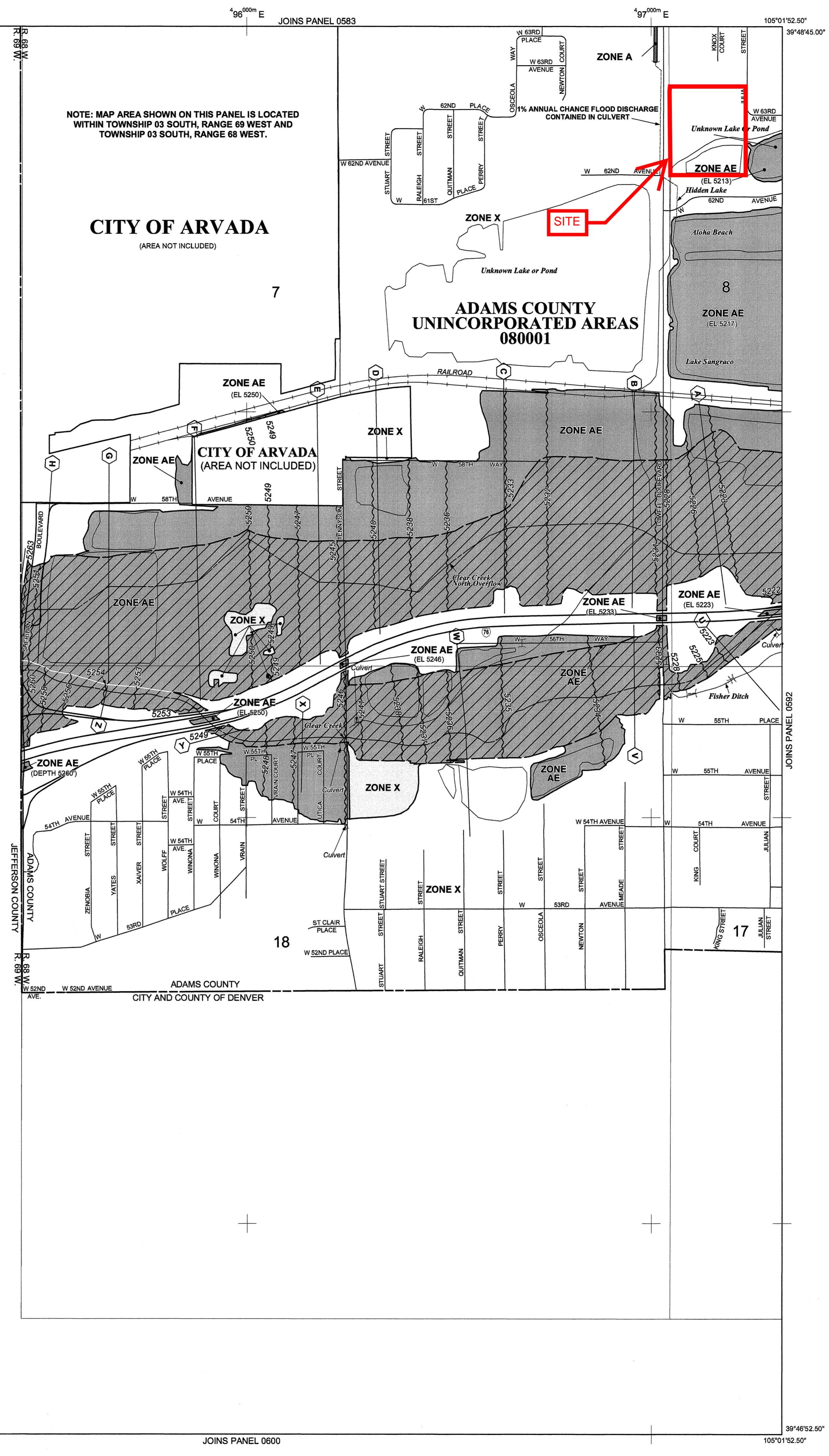
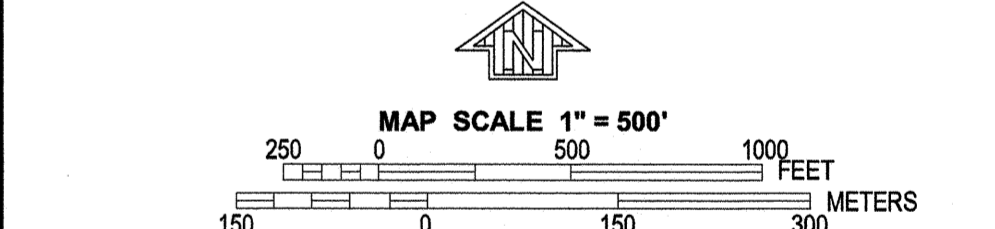
MAP REPOSITORIES Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP August 16, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL March 5, 2007 - to update map format.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

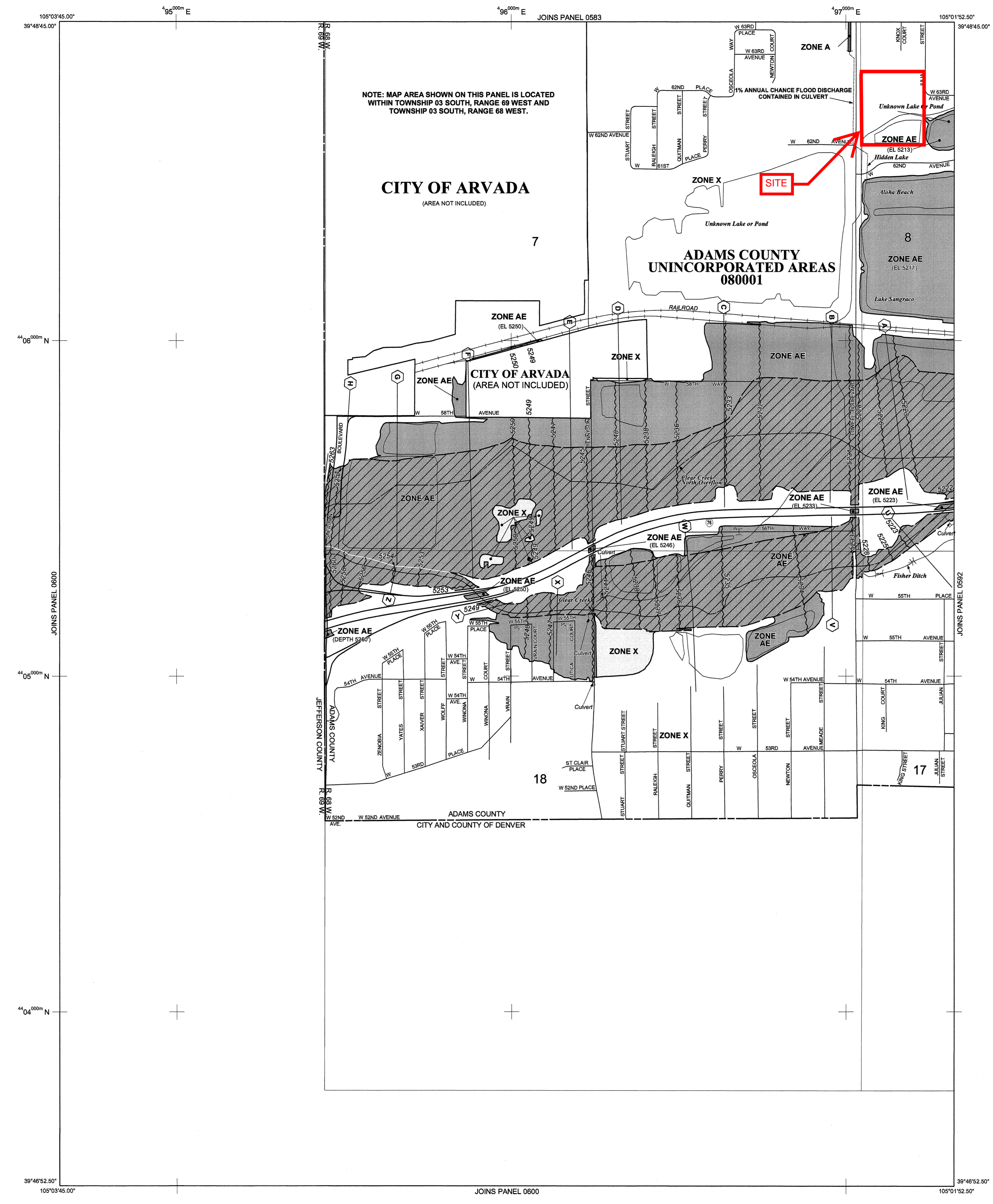


NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 03 SOUTH, RANGE 69 WEST AND TOWNSHIP 03 SOUTH, RANGE 68 WEST.

CITY OF ARVADA
(AREA NOT INCLUDED)

ADAMS COUNTY UNINCORPORATED AREAS 08001

ADAMS COUNTY CITY AND COUNTY OF DENVER



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0591H

FIRM
FLOOD INSURANCE RATE MAP
ADAMS COUNTY,
COLORADO
AND INCORPORATED AREAS

PANEL 591 OF 1150
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:
COMMUNITY ADAMS COUNTY
NUMBER 08001
PANEL 0591
SUFFIX H

Notice to User: The Map Number shown below should be used when placing map orders. The Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER 08001C0591H
MAP REVISED MARCH 5, 2007

Federal Emergency Management Agency

Appendix B - Hydrologic Calculation



SF-1 RUNOFF COEFFICIENTS - DEVELOPED

PROJECT NAME: 6300 Lowell
 PROJECT NUMBER: 18027
 CALCULATED BY: RO
 CHECKED BY: TJF

DATE: 11/27/2019

LAND USE:	Paved Area	Lawn Area	Walk/Alley Area	SF Detached Area	SF Attached Area
IMPERVIOUS %	100%	2%	90%	45%	75%

Calculations assume Type A soils per NRCS

OVERALL SITE STUDY AREA

DESIGN BASIN	DESIGN POINT	(AC)	(AC)	(AC)	(AC)	(AC)	TOTAL AREA (AC)	Cd(2)	Cd(5)	Cd(10)	Cd(100)	Impervious %
A1	A1	0.75	0.07	0.16		1.36	2.33	0.64	0.67	0.68	0.79	82%
A1.1	A1.1		0.15				0.15	0.01	0.05	0.15	0.60	2%
A2	A2	0.25	0.07	0.07		0.23	0.62	0.63	0.67	0.71	0.91	78%
A3	A3	0.63	0.47	0.03	0.63	0.26	2.02	0.44	0.50	0.55	0.82	57%
A BASINS		1.63	0.76	0.26	0.63	1.84	5.11	0.55	0.60	0.64	0.87	69%
		31.8%	14.9%	5.0%	12.3%	36.1%	100.0%					
B1	B1		0.34	0.18	0.44		0.96	0.34	0.39	0.48	0.68	38%
B2	B2		3.18	0.03			3.20	0.02	0.08	0.22	0.52	3%
B BASINS		0.00	3.52	0.21	0.44	0.00	4.17	0.10	0.15	0.28	0.56	11%
		0.0%	84.4%	5.0%	10.6%	0.0%	100.0%					
OS1	OS1	0.03	0.23	0.15	0.07	0.06	0.54	0.41	0.46	0.54	0.72	46%
OFFSITE BASINS		0.03	0.23	0.15	0.07	0.06	0.54					46%
		6.3%	41.7%	27.6%	12.5%	11.8%	100.0%					
OVERALL STUDY AREA		1.66	4.51	0.61	1.14	1.91	9.82	0.38	0.43	0.52	0.70	43%
		16.9%	45.9%	6.3%	11.6%	19.4%	100.0%					

Table 6-4. Runoff coefficient equations based on NRCS soil group and storm return period

NRCS Soil Group	Storm Return Period						
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year
A	$C_A = 0.84i^{1.302}$	$C_A = 0.86i^{1.276}$	$C_A = 0.87i^{1.232}$	$C_A = 0.88i^{1.124}$	$C_A = 0.85i+0.025$	$C_A = 0.78i+0.110$	$C_A = 0.65i+0.254$
B	$C_B = 0.84i^{1.169}$	$C_B = 0.86i^{1.088}$	$C_B = 0.81i+0.057$	$C_B = 0.63i+0.249$	$C_B = 0.56i+0.328$	$C_B = 0.47i+0.426$	$C_B = 0.37i+0.536$
C/D	$C_{C/D} = 0.83i^{1.122}$	$C_{C/D} = 0.82i+0.035$	$C_{C/D} = 0.74i+0.132$	$C_{C/D} = 0.56i+0.319$	$C_{C/D} = 0.49i+0.393$	$C_{C/D} = 0.41i+0.484$	$C_{C/D} = 0.32i+0.588$

Where:

i = % imperviousness (expressed as a decimal)

C_A = Runoff coefficient for Natural Resources Conservation Service (NRCS) HSG A soils

C_B = Runoff coefficient for NRCS HSG B soils

$C_{C/D}$ = Runoff coefficient for NRCS HSG C and D soils.



STANDARD FORM SF-2 - DEVELOPED
Time of Concentration

PROJECT NAME: 6300 Lowell
 PROJECT NUMBER: 18027
 CALCULATED BY: RO
 CHECKED BY: TJF

DATE: 11/27/2019

SUB-BASIN DATA			INITIAL TIME (T _i)			TRAVEL TIME (T _t)						t _c CHECK (URBANIZED BASINS)			FINAL t _c		
DESIGN BASIN (1)	AREA Ac (2)	C _s (3)	LENGTH Ft* (4)	SLOPE % (5)	T _i Min. (6)	LENGTH Ft. (7)	SLOPE % (8)	C _v (9)	Land Surface (10)	VEL fps (11)	T _t Min. (12)	COMP. t _c (13)	TOTAL LENGTH (14)	$T_c = (18-15i)^{0.5} + \frac{L_t}{60(24i+12)S_0^{0.5}}$ (15)	Min.	C10	C100
A1	2.33	0.67	140	2.0%	7.5	480	3.7%	20.0	Paved Areas	3.8	2.1	9.5	620	5.8	9.5	0.68	0.79
A1.1	0.15	0.05	20	2.5%	6.3	450	3.0%	20.0	Paved Areas	3.5	2.2	8.5	470	17.9	8.5	0.15	0.60
A2	0.62	0.67	60	2.5%	4.5	700	2.1%	20.0	Paved Areas	2.9	4.0	8.5	760	6.6	8.5	0.71	0.91
A3	2.02	0.50	50	2.5%	5.7	700	3.0%	20.0	Paved Areas	3.5	3.4	9.1	750	9.7	9.1	0.55	0.82
B1	0.96	0.39	50	2.0%	7.3	20	3.0%	7.0	Short Pasture/Lawn	1.2	0.3	7.6	70	12.2	7.6	0.48	0.68
B2	3.20	0.08	50	2.0%	10.5	20	3.0%	7.0	Short Pasture/Lawn	1.2	0.3	10.8	70	17.6	10.8	0.22	0.52
OS1	0.54	0.46	30	2.5%	4.8	150	3.0%	20.0	Paved Areas	3.5	0.7	5.5	30	11.1	5.5	0.54	0.72

* L = 500' max for non-urban land uses and 300' max for urban land uses

Table RO-2—Conveyance Coefficient, C_v

Type of Land Surface	Conveyance Coefficient, C _v
Heavy meadow	2.5
Tillage/field	5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

$$T_i = \frac{0.395(1.1-C)L^{1/2}}{S^{1/3}}$$

$$T_t = \frac{L}{60V}$$

$$t_c = \frac{L}{180} + 10$$

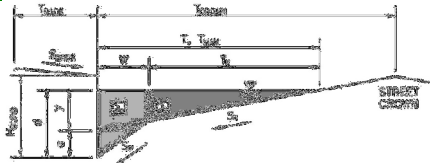
$$V = C_v S_w^{0.5}$$

Appendix C - Hydraulic Calculations

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

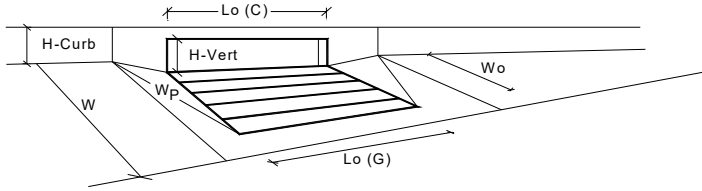
Project: 6300 Lowell
 Inlet ID: INLET A1



Gutter Geometry (Enter data in the blue cells)													
Maximum Allowable Width for Spread Behind Curb	T _{BACK} = <input style="width: 50px;" type="text" value="5.0"/> ft												
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S _{BACK} = <input style="width: 50px;" type="text" value="0.020"/> ft/ft												
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n _{BACK} = <input style="width: 50px;" type="text" value="0.020"/>												
Height of Curb at Gutter Flow Line	H _{CURB} = <input style="width: 50px;" type="text" value="6.00"/> inches												
Distance from Curb Face to Street Crown	T _{CROWN} = <input style="width: 50px;" type="text" value="18.0"/> ft												
Gutter Width	W = <input style="width: 50px;" type="text" value="2.00"/> ft												
Street Transverse Slope	S _X = <input style="width: 50px;" type="text" value="0.020"/> ft/ft												
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S _W = <input style="width: 50px;" type="text" value="0.083"/> ft/ft												
Street Longitudinal Slope - Enter 0 for sump condition	S _O = <input style="width: 50px;" type="text" value="0.000"/> ft/ft												
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} = <input style="width: 50px;" type="text" value="0.013"/>												
Max. Allowable Spread for Minor & Major Storm	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"></td> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td style="width: 10%;"></td> </tr> <tr> <td>T_{MAX} =</td> <td style="border: 1px solid black; text-align: center;"><input style="width: 40px;" type="text" value="8.0"/></td> <td style="border: 1px solid black; text-align: center;"><input style="width: 40px;" type="text" value="12.0"/></td> <td style="text-align: right;">ft</td> </tr> </table>		Minor Storm	Major Storm		T _{MAX} =	<input style="width: 40px;" type="text" value="8.0"/>	<input style="width: 40px;" type="text" value="12.0"/>	ft				
	Minor Storm	Major Storm											
T _{MAX} =	<input style="width: 40px;" type="text" value="8.0"/>	<input style="width: 40px;" type="text" value="12.0"/>	ft										
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"></td> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td style="width: 10%;"></td> </tr> <tr> <td>d_{MAX} =</td> <td style="border: 1px solid black; text-align: center;"><input style="width: 40px;" type="text" value="6.0"/></td> <td style="border: 1px solid black; text-align: center;"><input style="width: 40px;" type="text" value="12.0"/></td> <td style="text-align: right;">inches</td> </tr> <tr> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> </table>		Minor Storm	Major Storm		d _{MAX} =	<input style="width: 40px;" type="text" value="6.0"/>	<input style="width: 40px;" type="text" value="12.0"/>	inches		<input type="checkbox"/>	<input type="checkbox"/>	
	Minor Storm	Major Storm											
d _{MAX} =	<input style="width: 40px;" type="text" value="6.0"/>	<input style="width: 40px;" type="text" value="12.0"/>	inches										
	<input type="checkbox"/>	<input type="checkbox"/>											
Check boxes are not applicable in SUMP conditions													
MINOR STORM Allowable Capacity is based on Depth Criterion													
MAJOR STORM Allowable Capacity is based on Depth Criterion													
Q _{allow} =	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"></td> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td style="width: 10%;"></td> </tr> <tr> <td></td> <td style="border: 1px solid black; text-align: center;"><input style="width: 40px;" type="text" value="SUMP"/></td> <td style="border: 1px solid black; text-align: center;"><input style="width: 40px;" type="text" value="SUMP"/></td> <td style="text-align: right;">cfs</td> </tr> </table>		Minor Storm	Major Storm			<input style="width: 40px;" type="text" value="SUMP"/>	<input style="width: 40px;" type="text" value="SUMP"/>	cfs				
	Minor Storm	Major Storm											
	<input style="width: 40px;" type="text" value="SUMP"/>	<input style="width: 40px;" type="text" value="SUMP"/>	cfs										

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017

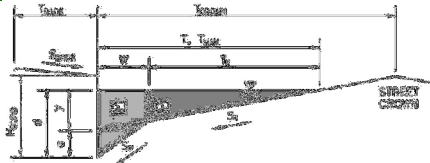


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT/Denver 13 Combination		
Local Depression (additional to continuous gutter depression 'a' from above)	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	2	2	
Water Depth at Flowline (outside of local depression)	6.3	8.8	inches
Grate Information	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	3.00	3.00	feet
Width of a Unit Grate	1.73	1.73	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	0.43	0.43	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)	3.30	3.30	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	0.60	0.60	
Curb Opening Information	MINOR	MAJOR	
Length of a Unit Curb Opening	3.00	3.00	feet
Height of Vertical Curb Opening in Inches	6.50	6.50	inches
Height of Curb Orifice Throat in Inches	5.25	5.25	inches
Angle of Throat (see USDCM Figure ST-5)	0.00	0.00	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.70	3.70	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.66	0.66	
Low Head Performance Reduction (Calculated)	MINOR	MAJOR	
Depth for Grate Midwidth	0.551	0.756	ft
Depth for Curb Opening Weir Equation	0.36	0.57	ft
Combination Inlet Performance Reduction Factor for Long Inlets	0.75	1.00	RF _{Combination}
Curb Opening Performance Reduction Factor for Long Inlets	1.00	1.00	RF _{Curb}
Grated Inlet Performance Reduction Factor for Long Inlets	0.75	1.00	RF _{Grate}
Total Inlet Interception Capacity (assumes clogged condition)	MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	6.2	14.6	cfs
Q PEAK REQUIRED =	6.1	14.3	cfs

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

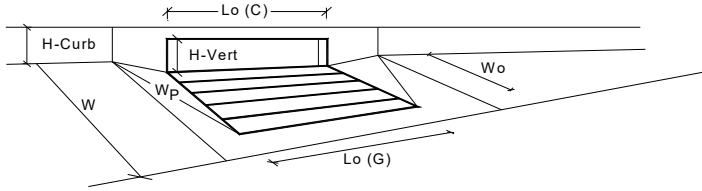
Project: 6300 Lowell
 Inlet ID: INLET A2



Gutter Geometry (Enter data in the blue cells)													
Maximum Allowable Width for Spread Behind Curb	T _{BACK} = <input style="width: 50px;" type="text" value="5.0"/> ft												
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S _{BACK} = <input style="width: 50px;" type="text" value="0.020"/> ft/ft												
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n _{BACK} = <input style="width: 50px;" type="text" value="0.020"/>												
Height of Curb at Gutter Flow Line	H _{CURB} = <input style="width: 50px;" type="text" value="6.00"/> inches												
Distance from Curb Face to Street Crown	T _{CROWN} = <input style="width: 50px;" type="text" value="18.0"/> ft												
Gutter Width	W = <input style="width: 50px;" type="text" value="2.00"/> ft												
Street Transverse Slope	S _X = <input style="width: 50px;" type="text" value="0.020"/> ft/ft												
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S _W = <input style="width: 50px;" type="text" value="0.083"/> ft/ft												
Street Longitudinal Slope - Enter 0 for sump condition	S _O = <input style="width: 50px;" type="text" value="0.000"/> ft/ft												
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} = <input style="width: 50px;" type="text" value="0.020"/>												
Max. Allowable Spread for Minor & Major Storm	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"></td> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td style="width: 10%;"></td> </tr> <tr> <td>T_{MAX} =</td> <td style="border: 1px solid black; text-align: center;"><input style="width: 40px;" type="text" value="8.0"/></td> <td style="border: 1px solid black; text-align: center;"><input style="width: 40px;" type="text" value="12.0"/></td> <td style="text-align: right;">ft</td> </tr> </table>		Minor Storm	Major Storm		T _{MAX} =	<input style="width: 40px;" type="text" value="8.0"/>	<input style="width: 40px;" type="text" value="12.0"/>	ft				
	Minor Storm	Major Storm											
T _{MAX} =	<input style="width: 40px;" type="text" value="8.0"/>	<input style="width: 40px;" type="text" value="12.0"/>	ft										
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"></td> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td style="width: 10%;"></td> </tr> <tr> <td>d_{MAX} =</td> <td style="border: 1px solid black; text-align: center;"><input style="width: 40px;" type="text" value="6.0"/></td> <td style="border: 1px solid black; text-align: center;"><input style="width: 40px;" type="text" value="12.0"/></td> <td style="text-align: right;">inches</td> </tr> <tr> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> </table>		Minor Storm	Major Storm		d _{MAX} =	<input style="width: 40px;" type="text" value="6.0"/>	<input style="width: 40px;" type="text" value="12.0"/>	inches		<input type="checkbox"/>	<input type="checkbox"/>	
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MINOR STORM Allowable Capacity is based on Depth Criterion													
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Q _{allow} =	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"></td> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td style="width: 10%;"></td> </tr> <tr> <td></td> <td style="border: 1px solid black; text-align: center;"><input style="width: 40px;" type="text" value="SUMP"/></td> <td style="border: 1px solid black; text-align: center;"><input style="width: 40px;" type="text" value="SUMP"/></td> <td style="text-align: right;">cfs</td> </tr> </table>		Minor Storm	Major Storm			<input style="width: 40px;" type="text" value="SUMP"/>	<input style="width: 40px;" type="text" value="SUMP"/>	cfs				
	Minor Storm	Major Storm											
	<input style="width: 40px;" type="text" value="SUMP"/>	<input style="width: 40px;" type="text" value="SUMP"/>	cfs										

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



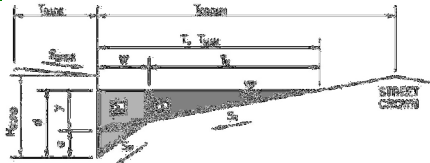
Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT/Denver 13 Combination		
Local Depression (additional to continuous gutter depression 'a' from above)	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	1	1	
Water Depth at Flowline (outside of local depression)	6.0	7.0	inches
Grate Information	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
Length of a Unit Grate	3.00	3.00	feet
Width of a Unit Grate	1.73	1.73	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	0.43	0.43	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)	3.30	3.30	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	0.60	0.60	
Curb Opening Information	MINOR	MAJOR	
Length of a Unit Curb Opening	3.00	3.00	feet
Height of Vertical Curb Opening in Inches	6.50	6.50	inches
Height of Curb Orifice Throat in Inches	5.25	5.25	inches
Angle of Throat (see USDCM Figure ST-5)	0.00	0.00	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.70	3.70	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.66	0.66	
Low Head Performance Reduction (Calculated)	MINOR	MAJOR	
Depth for Grate Midwidth	0.523	0.606	ft
Depth for Curb Opening Weir Equation	0.33	0.42	ft
Combination Inlet Performance Reduction Factor for Long Inlets	0.94	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	0.94	1.00	
Total Inlet Interception Capacity (assumes clogged condition)	MINOR	MAJOR	
Q_a	3.6	5.0	cfs
Q _{PEAK REQUIRED}	1.7	4.4	cfs

Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

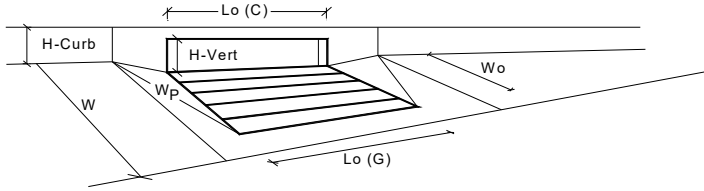
Project: 6300 Lowell
 Inlet ID: INLET A3



Gutter Geometry (Enter data in the blue cells)					
Maximum Allowable Width for Spread Behind Curb	T _{BACK} = 5.0 ft				
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S _{BACK} = 0.020 ft/ft				
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n _{BACK} = 0.020				
Height of Curb at Gutter Flow Line	H _{CURB} = 6.00 inches				
Distance from Curb Face to Street Crown	T _{CROWN} = 18.0 ft				
Gutter Width	W = 2.00 ft				
Street Transverse Slope	S _X = 0.020 ft/ft				
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S _W = 0.083 ft/ft				
Street Longitudinal Slope - Enter 0 for sump condition	S _O = 0.000 ft/ft				
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} = 0.020				
Max. Allowable Spread for Minor & Major Storm	T _{MAX} = <table border="1"><tr><th>Minor Storm</th><th>Major Storm</th></tr><tr><td>8.0</td><td>12.0</td></tr></table> ft	Minor Storm	Major Storm	8.0	12.0
Minor Storm	Major Storm				
8.0	12.0				
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} = <table border="1"><tr><th>Minor Storm</th><th>Major Storm</th></tr><tr><td>6.0</td><td>12.0</td></tr></table> inches	Minor Storm	Major Storm	6.0	12.0
Minor Storm	Major Storm				
6.0	12.0				
Check boxes are not applicable in SUMP conditions	<input type="checkbox"/> <input type="checkbox"/>				
MINOR STORM Allowable Capacity is based on Depth Criterion					
MAJOR STORM Allowable Capacity is based on Depth Criterion					
Q _{allow}	<table border="1"><tr><th>Minor Storm</th><th>Major Storm</th></tr><tr><td>SUMP</td><td>SUMP</td></tr></table> cfs	Minor Storm	Major Storm	SUMP	SUMP
Minor Storm	Major Storm				
SUMP	SUMP				

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017

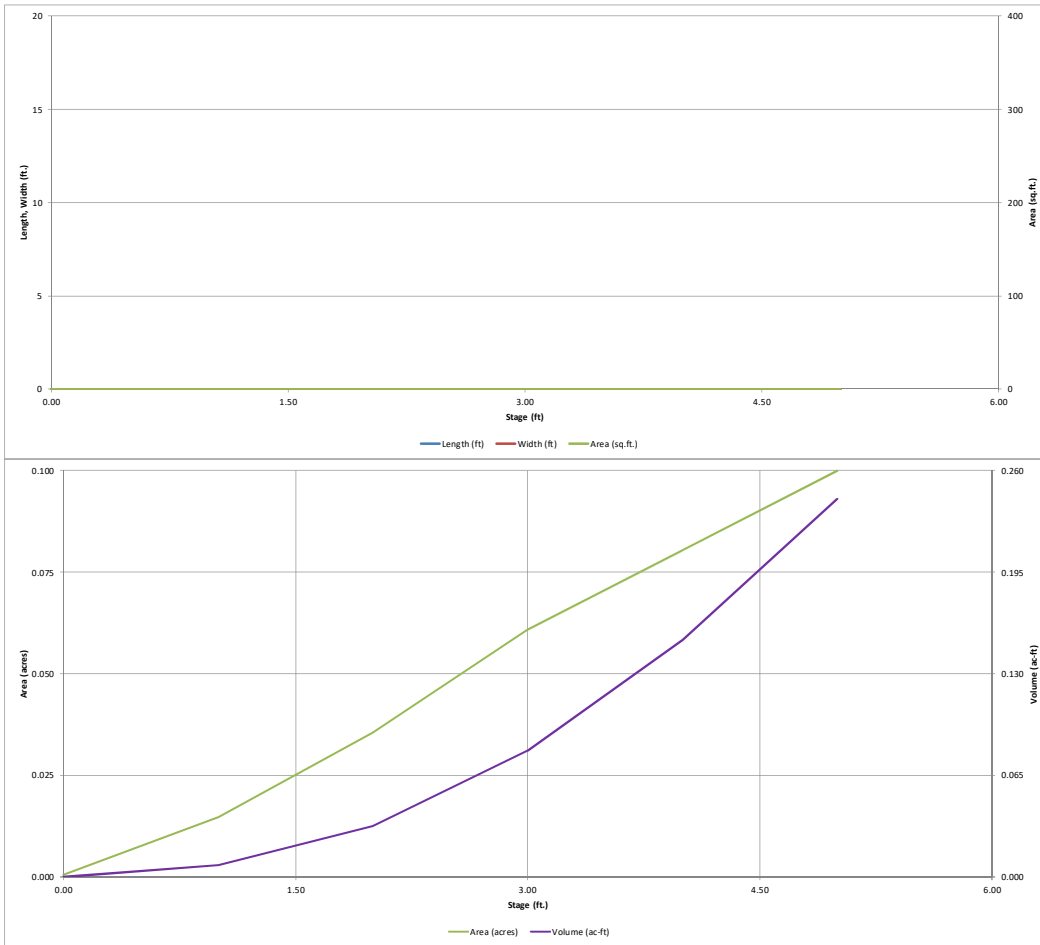


Design Information (Input)	CDOT Type R Curb Opening	
Type of Inlet	CDOT Type R Curb Opening	
Local Depression (additional to continuous gutter depression 'a' from above)		
Number of Unit Inlets (Grate or Curb Opening)	2	
Water Depth at Flowline (outside of local depression)		
Grate Information		
Length of a Unit Grate		
Width of a Unit Grate		
Area Opening Ratio for a Grate (typical values 0.15-0.90)		
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		
Grate Weir Coefficient (typical value 2.15 - 3.60)		
Grate Orifice Coefficient (typical value 0.60 - 0.80)		
Curb Opening Information		
Length of a Unit Curb Opening		
Height of Vertical Curb Opening in Inches		
Height of Curb Orifice Throat in Inches		
Angle of Throat (see USDCM Figure ST-5)		
Side Width for Depression Pan (typically the gutter width of 2 feet)		
Clogging Factor for a Single Curb Opening (typical value 0.10)		
Curb Opening Weir Coefficient (typical value 2.3-3.7)		
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		
Low Head Performance Reduction (Calculated)		
Depth for Grate Midwidth		
Depth for Curb Opening Weir Equation		
Combination Inlet Performance Reduction Factor for Long Inlets		
Curb Opening Performance Reduction Factor for Long Inlets		
Grated Inlet Performance Reduction Factor for Long Inlets		
Total Inlet Interception Capacity (assumes clogged condition)		
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		

	MINOR	MAJOR	
Type =	CDOT Type R Curb Opening		
a_{local} =	3.00	3.00	inches
No =	2	2	
Ponding Depth =	6.0	6.5	inches
	MINOR	MAJOR	<input checked="" type="checkbox"/> Override Depths
$L_o (G)$ =	N/A	N/A	feet
W_o =	N/A	N/A	feet
A_{ratio} =	N/A	N/A	
$C_r (G)$ =	N/A	N/A	
$C_w (G)$ =	N/A	N/A	
$C_o (G)$ =	N/A	N/A	
	MINOR	MAJOR	
$L_o (C)$ =	5.00	5.00	feet
H_{vert} =	6.00	6.00	inches
H_{throat} =	6.00	6.00	inches
Theta =	63.40	63.40	degrees
W_p =	2.00	2.00	feet
$C_r (C)$ =	0.10	0.10	
$C_w (C)$ =	3.60	3.60	
$C_o (C)$ =	0.67	0.67	
	MINOR	MAJOR	
d_{grate} =	N/A	N/A	ft
d_{curb} =	0.33	0.38	ft
RF _{Combination} =	0.57	0.61	
RF _{Curb} =	0.93	0.96	
RF _{Grate} =	N/A	N/A	
	MINOR	MAJOR	
Q_a =	10.5	12.9	cfs
Q _{PEAK REQUIRED} =	4.0	12.6	cfs

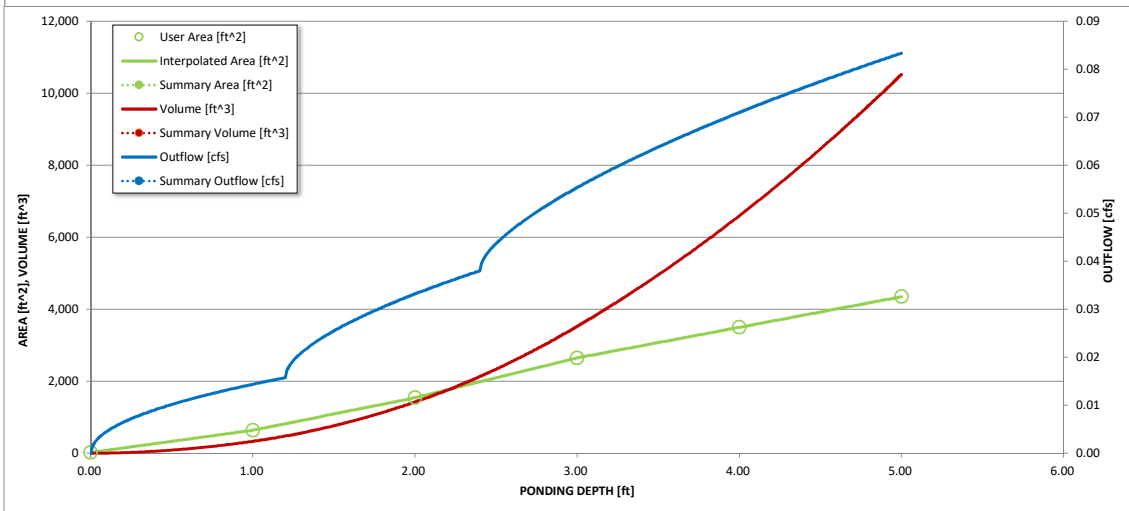
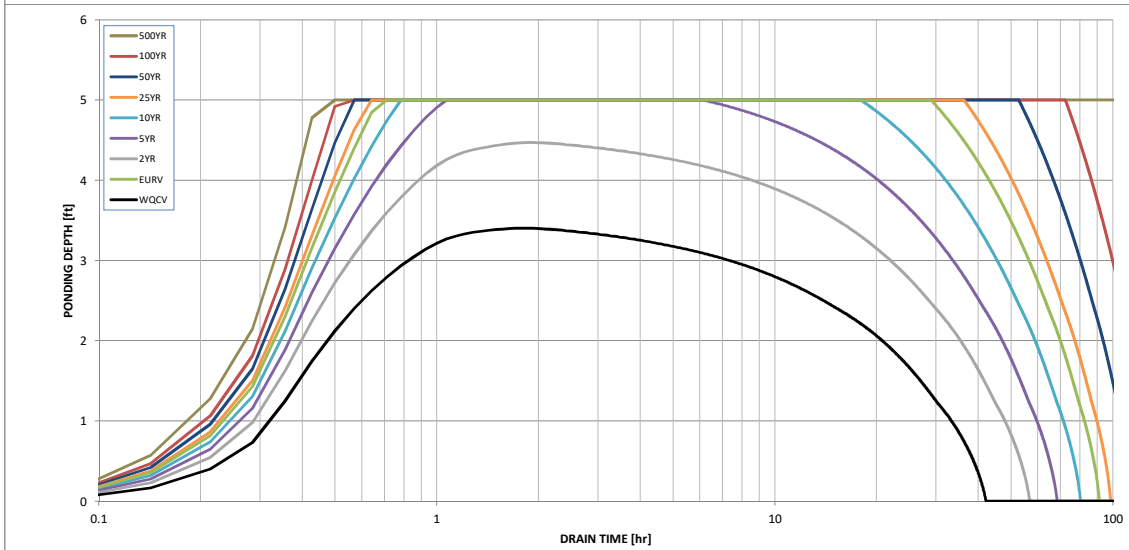
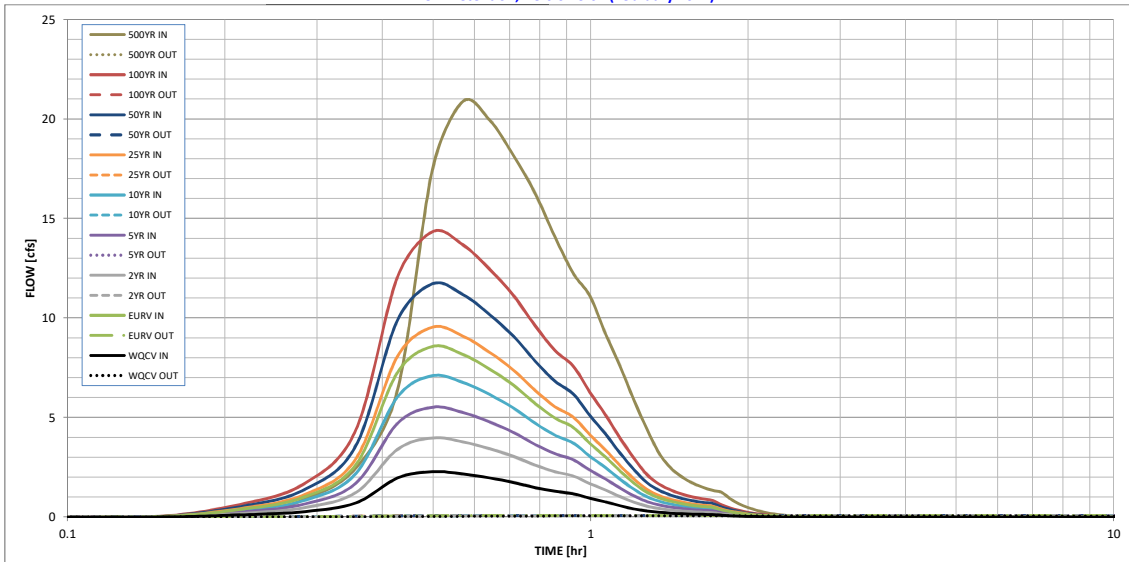
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



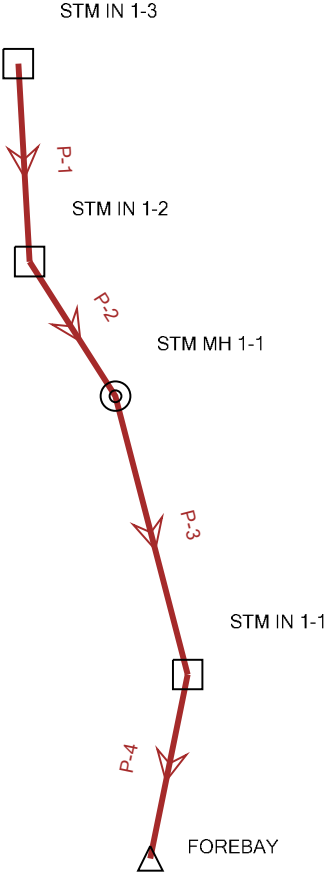
Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)



S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

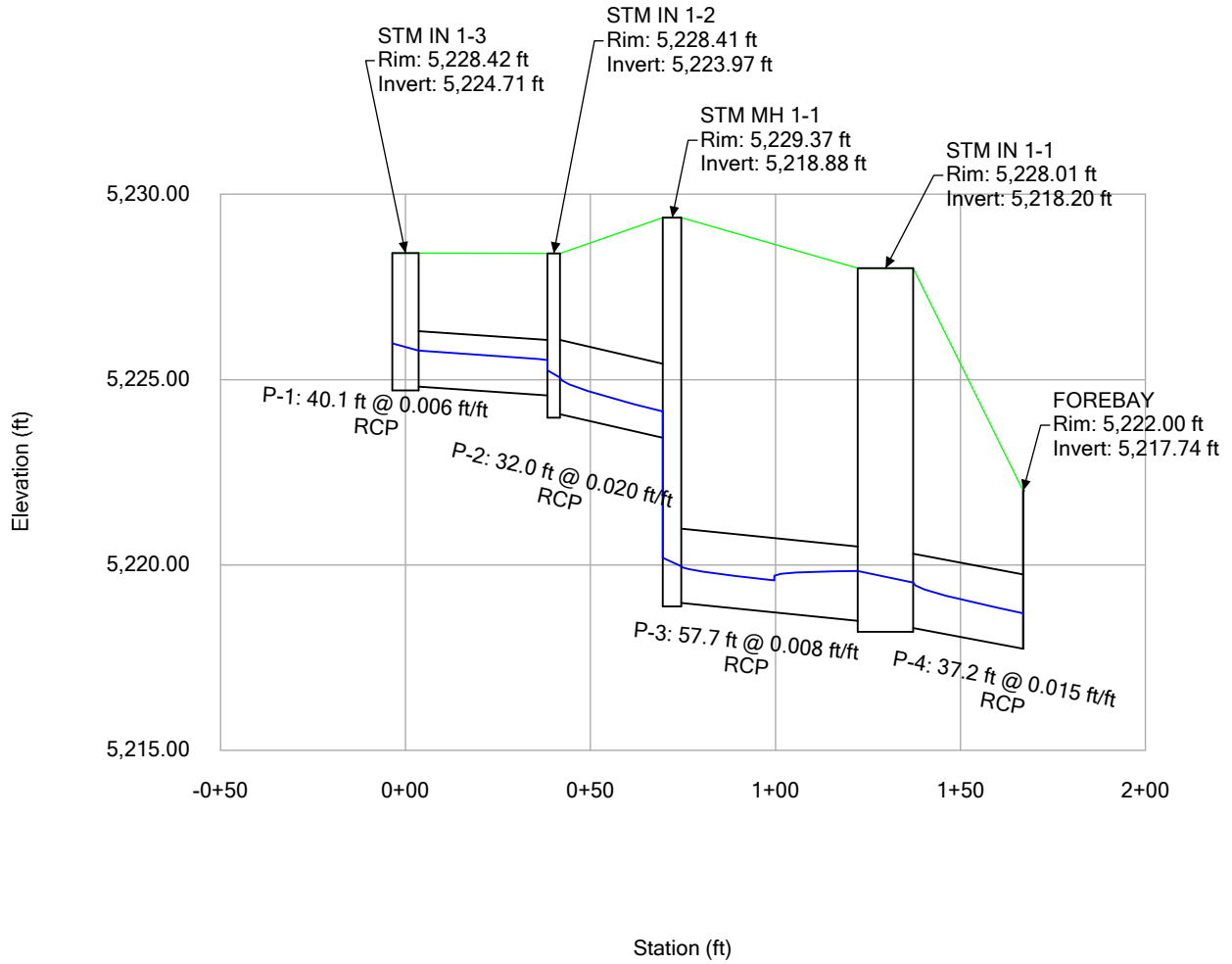
Scenario: Base



5-YR

Profile Report

Engineering Profile - STM IN 1-3 to FOREBAY (18027-StormCAD_100-yr_updated.stsw)



5-YR

FlexTable: Catch Basin Table

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Headloss Coefficient (Standard)	Flow (Total Out) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
STM IN 1-3	5,228.42	5,224.71	0.500	6.10	5,225.98	5,225.78	5,226.37	5,226.18
STM IN 1-2	5,228.41	5,223.97	0.500	7.70	5,225.25	5,225.06	5,225.66	5,225.44
STM IN 1-1	5,228.01	5,218.20	0.600	11.70	5,219.84	5,219.53	5,220.02	5,220.05

5-YR

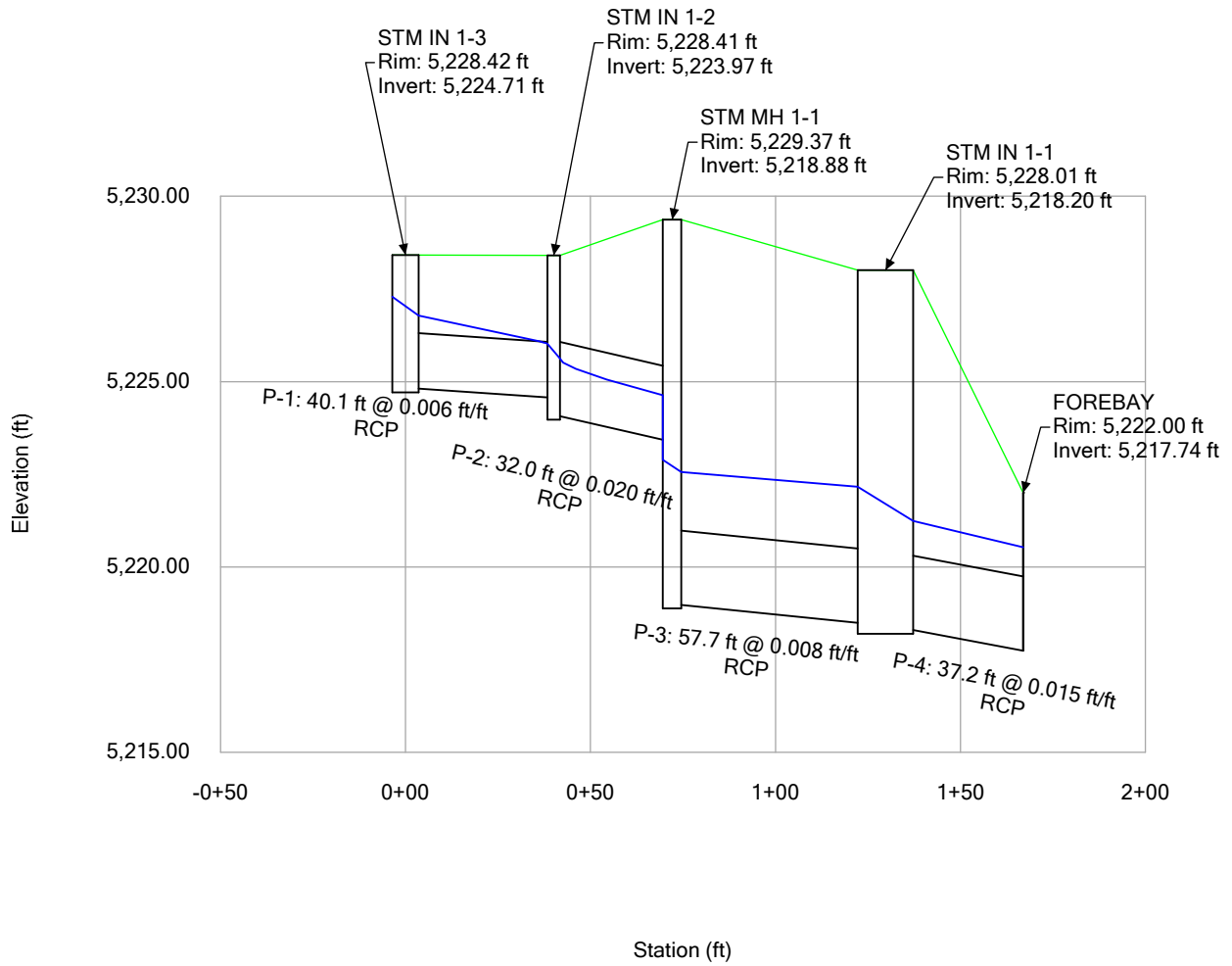
FlexTable: Conduit Table

Label	Start Node	Stop Node	Diameter (in)	Slope (Calculated) (ft/ft)	Length (User Defined) (ft)	Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Energy Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Flow (cfs)
P-1	STM IN 1-3	STM IN 1-2	18.0	0.006	40.1	5.05	5,224.81	5,224.57	5,225.52	5,225.78	5,225.94	5,226.18	6.10
P-2	STM IN 1-2	STM MH 1-1	24.0	0.020	32.0	8.38	5,224.07	5,223.43	5,224.14	5,225.06	5,225.06	5,225.44	7.70
P-3	STM MH 1-1	STM IN 1-1	24.0	0.008	57.7	6.10	5,218.98	5,218.50	5,219.84	5,219.96	5,220.02	5,220.35	7.70
P-4	STM IN 1-1	FOREBAY	24.0	0.015	37.2	8.45	5,218.30	5,217.74	5,218.70	5,219.53	5,219.67	5,220.05	11.70

100-YR

Profile Report

Engineering Profile - STM IN 1-3 to FOREBAY (18027-StormCAD_100-yr_updated.stsw)



100-YR

FlexTable: Catch Basin Table

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Headloss Coefficient (Standard)	Flow (Total Out) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
STM IN 1-3	5,228.42	5,224.71	0.500	14.30	5,227.29	5,226.78	5,228.31	5,227.80
STM IN 1-2	5,228.41	5,223.97	0.500	18.70	5,226.02	5,225.63	5,227.06	5,226.42
STM IN 1-1	5,228.01	5,218.20	0.600	31.30	5,222.17	5,221.24	5,222.72	5,222.78

100-YR

FlexTable: Conduit Table

Label	Start Node	Stop Node	Diameter (in)	Slope (Calculated) (ft/ft)	Length (User Defined) (ft)	Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Energy Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Flow (cfs)
P-1	STM IN 1-3	STM IN 1-2	18.0	0.006	40.1	8.09	5,224.81	5,224.57	5,226.02	5,226.78	5,227.06	5,227.80	14.30
P-2	STM IN 1-2	STM MH 1-1	24.0	0.020	32.0	10.58	5,224.07	5,223.43	5,224.64	5,225.63	5,226.02	5,226.42	18.70
P-3	STM MH 1-1	STM IN 1-1	24.0	0.008	57.7	5.95	5,218.98	5,218.50	5,222.17	5,222.56	5,222.72	5,223.11	18.70
P-4	STM IN 1-1	FOREBAY	24.0	0.015	37.2	9.96	5,218.30	5,217.74	5,220.53	5,221.24	5,222.07	5,222.78	31.30

Appendix D - Reference Documents

July 25, 2019

Travis Frazier, P.E.
Redland
1500 West Canal Court
Littleton, CO 80120

12596 W. Bayaud Ave., Ste. 330
Lakewood, CO 80228
[P] 303.971.0030
[F] 303.971.0077
LampRynearson.com

Re: 6300 Lowell Water Level Report

Dear Travis,

Lamp Rynearson has completed our evaluation of pond levels and we are providing this letter report with our findings.

Per your request, we evaluated the relationship between the pond on the north end of the parcel at 6300 Lowell Blvd (West Pond) and the interaction it has with the pond immediately east of the parcel, Lake Sangraco (East Pond). Both structures are reportedly old gravel pits that are not lined and the only thing separating the ponds on the surface is an earthen embankment. The ponds were believed to be hydraulically connected through the embankment and this study was performed to determine if they are hydraulically connected.

The following field work was performed to aid us in our evaluation:

1. Installation of temporary steel piezometers in each pond to monitor relative pond elevations;
2. Site survey of pond levels and temporary piezometer levels;
3. Installation of Onset data loggers to measure and record water levels every 4 hours;
4. Spot checking and downloading transducer data;
5. Final removal and downloading of transducer data and removal of temporary Piezometers.

Three pressure transducers were installed on February 26, 2019. One in the West Pond, one in the East Pond, and one in the upper casing of the West Pond piezometer (for barometric pressure correction purposes). Piezometers were installed on February 26, 2019 and an initial evaluation of the data was completed on March 10, 2019 indicating a direct correlation between levels in both ponds.

Monitoring continued until June 25, 2019 at which time the transducers were removed, and the temporary piezometers were also removed.

After evaluating the longer-term water level data, we noted some anomalies and we then located information for the Kershaw Ditch (WDID 0700597), which runs along the north side of the West Pond before it reaches a diversion structure that is used to fill the East Pond.

The attached Figures illustrate the relationships between:

1. 6300 Pond
2. Sangraco Lake
3. Kersahaw Ditch Diversions

As shown on Figure 1, during periods of high diversion (>0.55 feet on the staff gauge), the Kershaw Ditch, levels in 6300 Pond increased substantially more than those in Sangraco Lake. Ditch seepage and/or direct diversion into 6300 filled 6300 to a level higher than Sangraco.

There is a hydraulic connection between 6300 and Sangraco and there is a direct correlation with water levels in both structures. Water can and does move from one to the other via subsurface hydraulic connection and the direction of movement depends on elevation of water in the structures at any given time.

If you have any questions regarding this report or the attached Figures, please don't hesitate to contact me.

Sincerely,

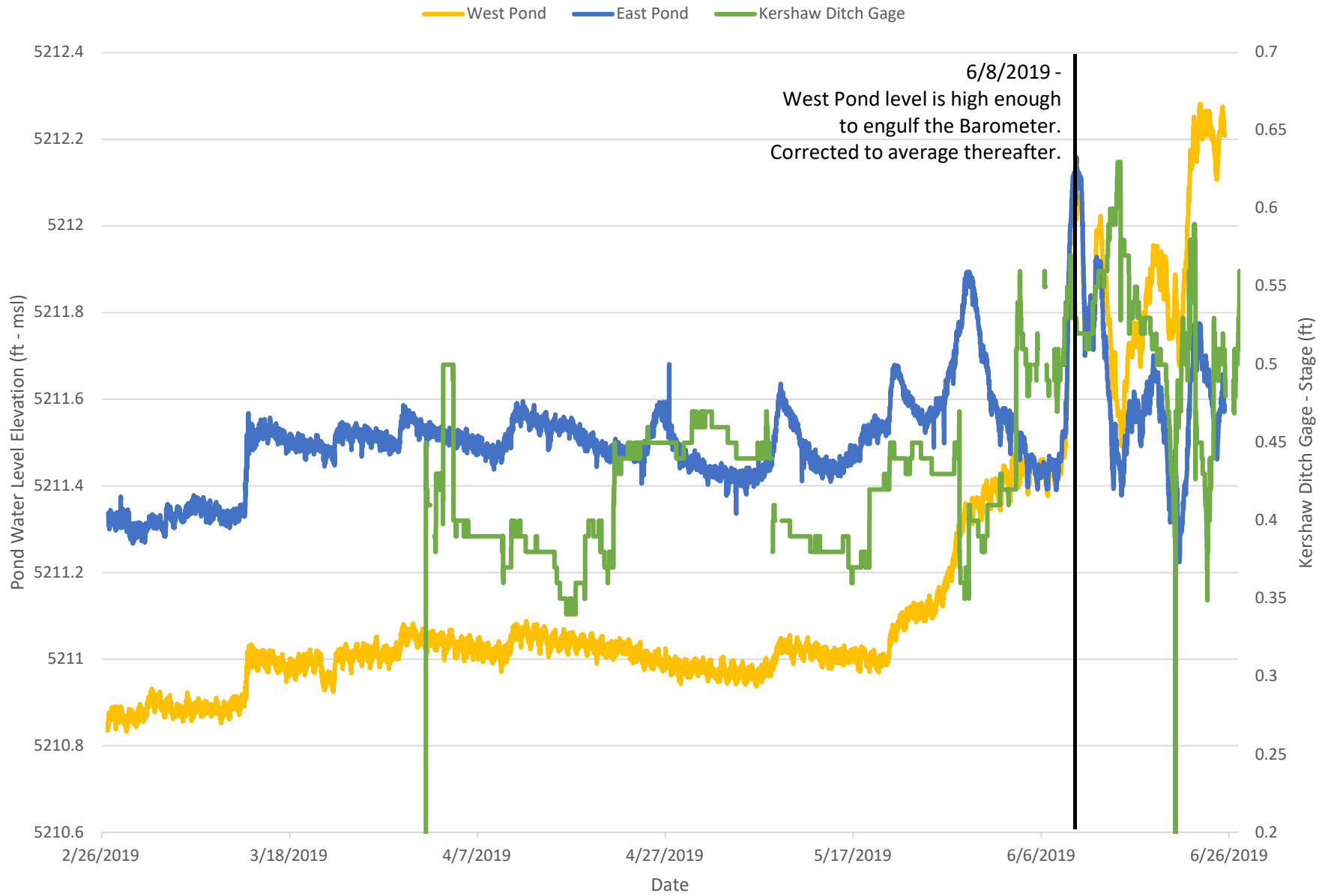
A handwritten signature in black ink, appearing to read "Thomas M. Dea". The signature is fluid and cursive, with a large loop at the end.

Tom Dea



Attachments (2)

Attachments

Figure 1 - 6300 Lowell Pond Level Monitoring Data



LEGEND

-  Kershaw Ditch
-  Ponds and Reservoirs

West Pond Measurement Location

East Pond Measurement Location

Jim Baker Reservoir

Kershaw Ditch

Lake Sangraco

Reservoir Outlet

AERIAL PHOTO DATE: 9/2/2017

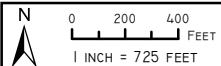


FIGURE 2 - 6300 LOWELL GENERAL LOCATION MAP

LAMP
RYNEARSON



May 8, 2019

Travis Frazier, P.E.
Redland
Transmitted via email: tfrazier@redland.com

Re: Gravel Pit Groundwater Exposure - Pre-81 Determination

Dear Mr. Frazier:

This letter is in reply to information you provided for the 6300 Lowell Pond (“pre-81 Pond”) located in Section 8, Township 3 South, Range 68 West, of the Sixth P.M. You provided a map of the pre-1981 claimed area, which is attached as Figure 1. As shown on Figure 1, the pre-81 Pond is comprised of 2.03 acres. The records of Division of Water Resources (“DWR”) identify the pond as follows:

<u>Structure Name</u>	<u>WDID</u>	<u>DRMS Permit</u>	<u>Well Permit</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>
6300 Lowell Pond	0703102	N/A	N/A	8	3 South	68 West

Based on records you submitted to DWR, and records available to DWR, the Pre-81 Pond was created through a sand and gravel mining operation at some time before 1970, based on an aerial photo from November 4, 1969, which is attached as Figure 2; a Gravel Lease with C.G. Cooley dated December 11, 1950; and a Supplemental Agreement with C.G. Cooley dated January 5, 1951.

The mining operation that created the pre-81 Pond does not appear to have been permitted through the Division of Reclamation Mining and Safety (“DRMS”) as it appears to have been excavated prior to the 1973 Colorado Open Mining Land Reclamation Act which first required sand and gravel mines to operate under a DRMS permit.

The pre-81 Pond exposes groundwater to the atmosphere that is tributary to the South Platte River and as such is classified as a well and is subject to all applicable rules, regulations and statutes governing the withdrawal and use of water in the South Platte River System. Colorado Revised Statutes (“C.R.S.”) prohibit the State Engineer from allowing the operation of a well that causes out-of-priority depletions unless the well is operated in accordance with a plan for augmentation approved by the water judge, or in accordance with a Substitute Water Supply Plan (“SWSP”) approved by the State Engineer (see § 37-92-308(1)(c)(III), C.R.S.). Evaporation of exposed groundwater within the pre-81 Pond will cause depletions to the South Platte River; however, pursuant to § 37-90-137(11)(b), C.R.S., and 2009CW49, a gravel pit operator or property owner does not need to replace depletions that occur due to evaporation from groundwater exposed prior to January 1, 1981 (“pre-81”) as a result of open mining of sand and gravel, regardless of whether mining continued after December 31, 1980. Based on the records submitted to and available to DWR, it has been determined that it is appropriate to designate the 2.03 acre groundwater surface area shown in Figure 1 for the 6300 Lowell Pond as being pre-81, and



Travis Frazier, P.E.

May 8, 2019

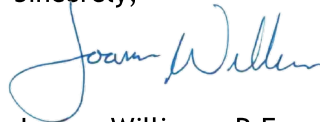
Page 2 of 2

therefore exempt from evaporative replacement requirements. The location of the pre-81 area is permanently tied to the location depicted in Figure 1. Any pre-81 area that is backfilled will lose the pre-81 exemption should it be excavated in the future. Additionally the backfilling of the pre-81 area shall not create a credit to be used elsewhere. Any future expansion of the pre-81 Pond outside of the boundary of the pond, as shown on attached Figure 1, will require replacement of evaporation from the surface area outside of such boundary.

Please note that this exemption is only for depletions caused by evaporation within the pre-81 Pond as shown on attached Figure 1 and does not authorize diversions for any other beneficial use. Any other uses must be approved through a court approved plan for augmentation or a SWSP.

If you have any further questions regarding the status of the 6300 Lowell Pond please contact Corey Deangelis of our Greeley office at (970) 352-8712, or me at (303) 866-3581 x8265.

Sincerely,

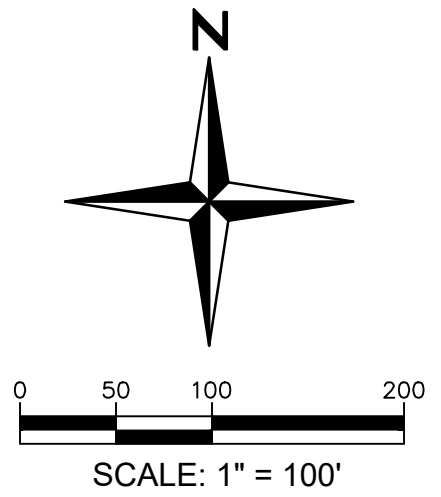
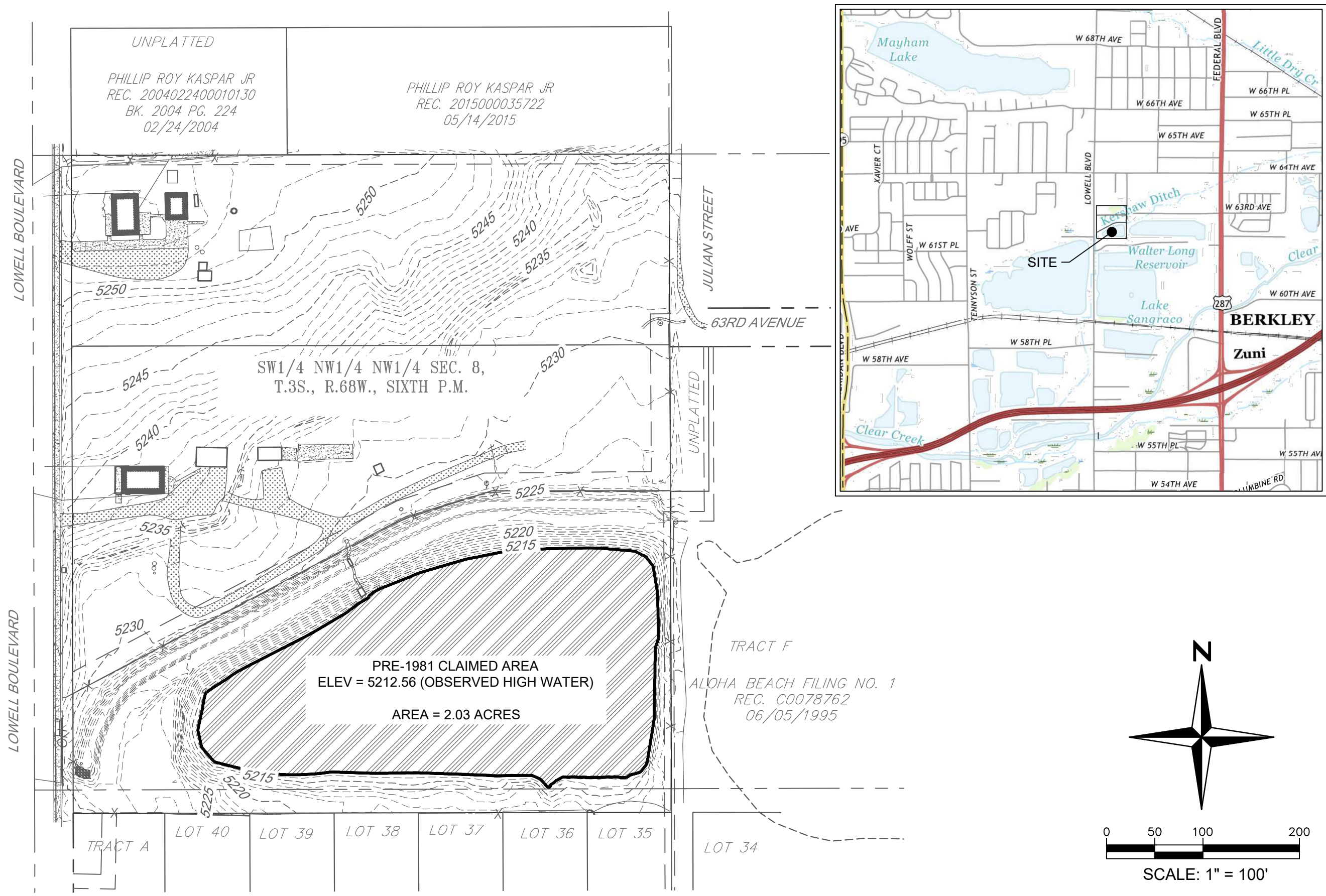


Joanna Williams, P.E.
Water Resource Engineer

Attachments: Figure 1: Map showing Memorialized Pre-81 Boundary
Figure 2: November 4, 1969 Aerial Image

Ec: Corey Deangelis, Division Engineer
Jason Smith, District 7 Water Commissioner

Figure 1



DATE	2019.03.25
DRAWN	TJF
CHECKED	TJF
APPROVED	TJF
PROJECT NO.	18027

PRE-1981 CLAIMED AREA

6300 LOWELL

ADAMS COUNTY

CO

SHEET
1 OF 1

I:\2018\18027 - 6300 Lowell\CADD\Exhibits\18027 Pre-81 Lake Area.dwg tab: 11x17 Mar 26, 2019 - 8:22am tfrazier

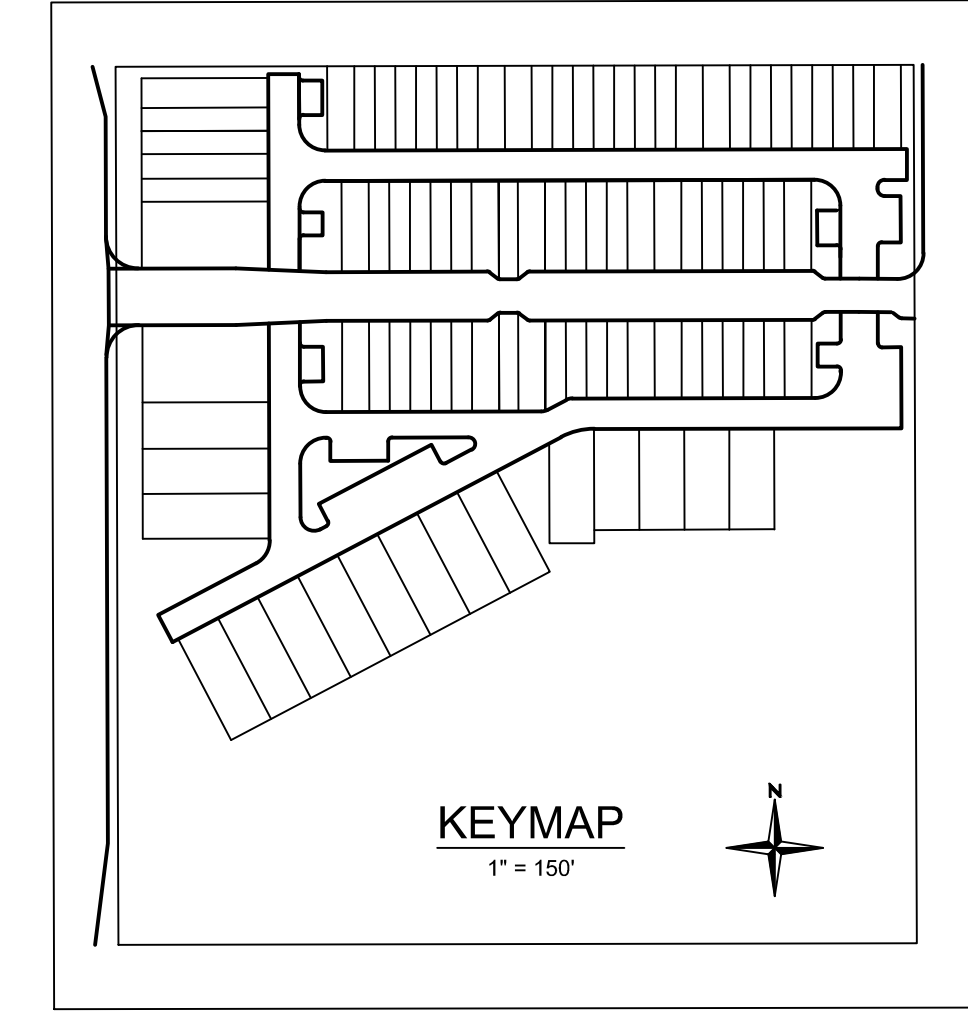
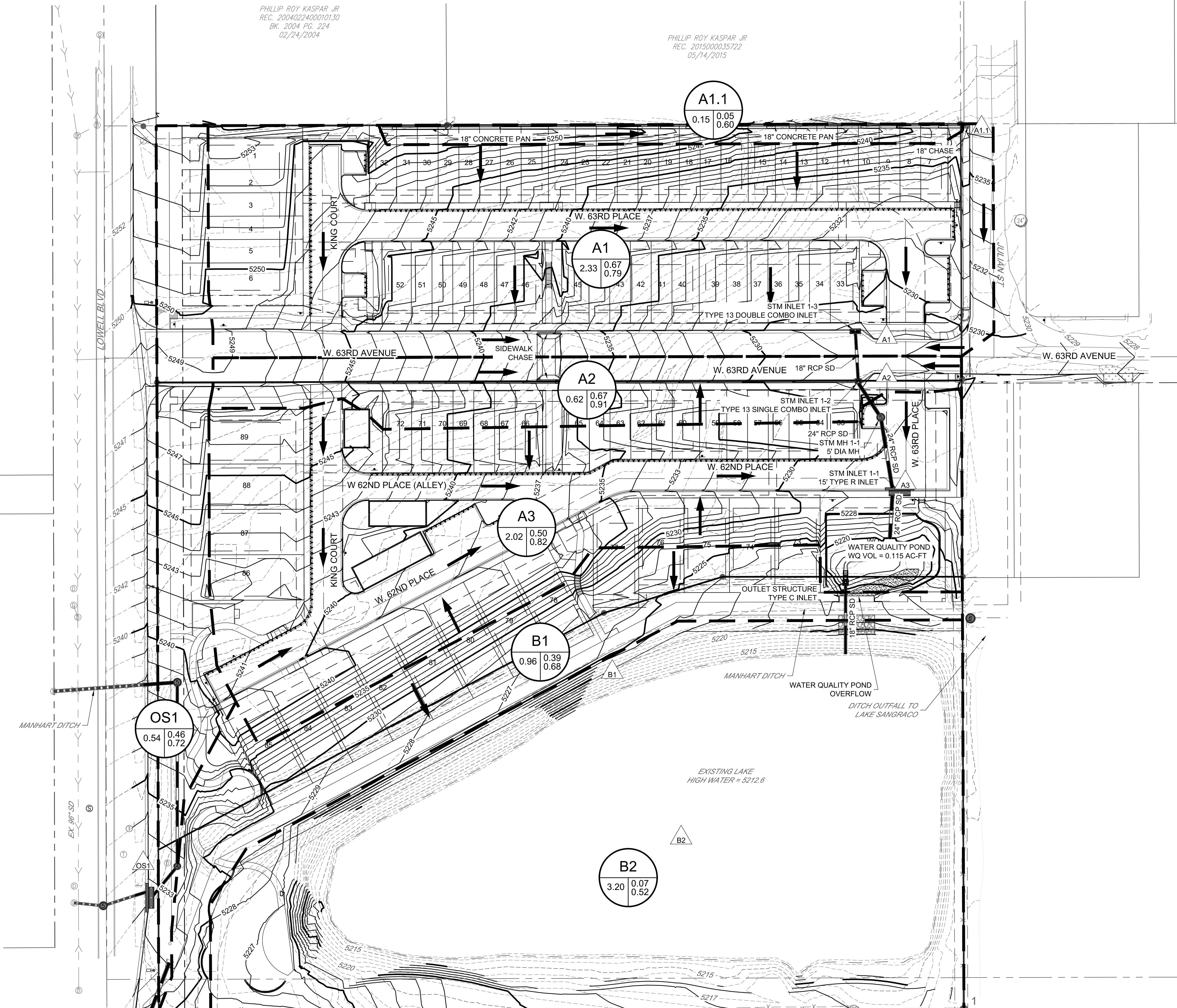
Figure 2
November 4, 1969 Aerial Photo



Appendix E - Drainage Maps

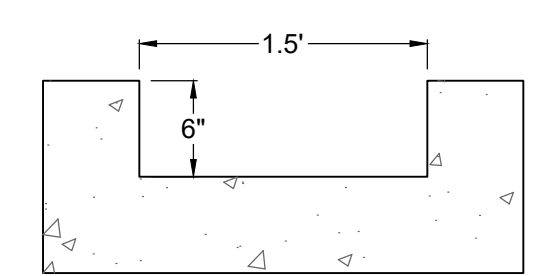
PHILLIP ROY KASPAR JR
REC. 2004022400010130
BK. 2004 PG. 224
02/24/2004

PHILLIP ROY KASPAR JR
REC. 201500035722
05/14/2015



DRAINAGE LEGEND

- 5282 --- EXISTING MINOR CONTOUR
 - 5280 --- EXISTING MAJOR CONTOUR
 - 5281 --- PROPOSED MINOR CONTOUR
 - 5280 --- PROPOSED MAJOR CONTOUR
 - EXISTING STORM SEWER LINE
 - PROPOSED STORM SEWER LINE
 - PROPOSED MANHOLE
 - EXISTING INLET
 - PROPOSED INLET
 - ▲ PROPOSED FLARED END SECTION
 - MAJOR BASIN BOUNDARY
 - MINOR BASIN BOUNDARY
 - EXISTING BASIN BOUNDARY
 - PROPERTY LINE
- A1 → BASIN ID
 0.000 0.00 0.00 → 5 YEAR RUNOFF COEFFICIENT
 0.000 0.00 0.00 → 100 YEAR RUNOFF COEFFICIENT
 0.000 0.00 0.00 → BASIN AREA (ACRES)
- ▲ 00 → PROPOSED DESIGN POINT
 → FLOW ARROW



CONCRETE PAN DETAIL

SUMMARY OF POND VOLUMES

FOREBAY: 0.002 AC-FT
 WQCV: 0.115 AC-FT
 WQ WSEL = 5220.53

Basin	Area (AC)	Runoff Coefficients			Peak Flows (cfs)	
		C5	C100	I (%)	Q5	Q100
A1	2.33	0.67	0.79	82%	6.1	13.7
A1.1	0.15	0.05	0.60	2%	0.0	0.7
A2	0.62	0.67	0.91	78%	1.7	4.4
A3	2.02	0.50	0.82	57%	4.0	12.6
B1	0.96	0.39	0.68	38%	1.6	5.3
B2	3.20	0.08	0.52	3%	0.9	11.8
OS1	0.54	0.46	0.72	46%	1.2	3.5

PROJECT BENCHMARK:

ADAMS COUNTY CONTROL POINT #226 AKA RTD PARK-N-RIDE 4.070000. RECOVERED A 3 1/2" ALUMINUM CAP STAMPED "COLO. DEPT OF HIGHWAYS CONTROL MONUMENT GPS 34 ZBS PLS 11434 4.070000" LOCATED IN THE RTD PARK-N-RIDE LOT AT THE NORTHEASTERLY CORNER OF BROADWAY ST AND W 70TH AVE. 150' MORE OR LESS WEST OF BROADWAY ST AND 300' MORE OR LESS NORTH OF W 70TH AVE.
 ELEVATION = 5169.24 (NAVD 88).



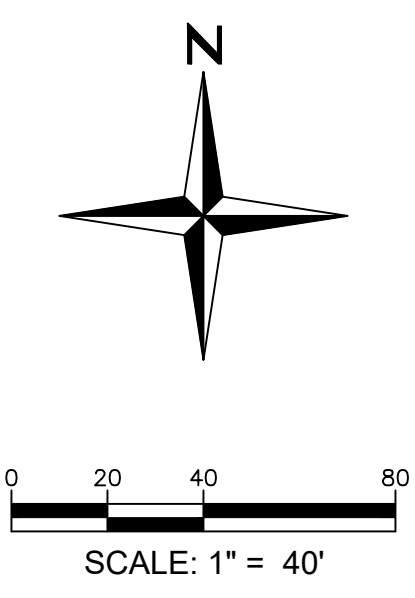
DATE	NO.	NOTES	DRAWN	JG
2015-11-27	1	1ST SUBMITTAL TO ADAMS COUNTY	CHECKED	TF
2020-02-14	2	2ND SUBMITTAL TO ADAMS COUNTY	APPROVED	TF
			PROJECT NO.	18027
			HORIZ SCALE	
			VERT SCALE	

BERKLEY SHORES
 CIVIL CONSTRUCTION DOCUMENTS
DRAINAGE PLAN

SHEET
DRN



Know what's below.
 Call before you dig.



I:\2018\18027 - 6300 Lowell\CADD\Sheet\CD\18027 - Drainage Plan.dwg tab: Drainage Plan.dwg Feb 14, 2020 - 1:17pm regisbay

**Adams County
Community and Economic Development Department
Development Review – Engineering Comments**

Case Number: EGR2019-00052

Case Name: Berkely Shores

Applicant: HDC 6300 LOWELL BOULEVARD, LLLP

Date Initiated: 12/2/2019

Document #: 6030796

No.	Reviewer Initials	Sheet No./ Page No./ Subject	County Comment	Applicant Response (date)
1	ME	General comment	All necessary paperwork such as Commissioners Resolutions, Development Agreements, and Collateral Agreements will need to be on file with the Adams County Public Works Department / Construction Management section prior to the issuance of any building permits.	Noted. Thank you.
2	ME	Condition of Approval	The developer/applicant will be required to enter into a Subdivision Improvements Agreement (SIA) with the County and bond for all public and drainage infrastructure to ensure the public improvements are completed. No building permits will be issued until all public improvements are completed and preliminarily accepted by the County.	Noted. Thank you.
3	ME	General comment	Upon completion of review and approval of these drawings and acceptance of the SIA, the applicant will be required to obtain the necessary permits in order to construct the proposed improvements. This/these permit(s) will be obtained from the Adams County Public Works Department / Construction Management Section.	Noted. Thank you.

4	ME	General comment	<p>All storm sewer pipes within the public right-of-way must be RCP Class III material. In the event that the soil chemistry is not conducive to this type of material, the applicant shall propose solutions to Adams County Public Works Department staff to mitigate the situation if it should arise.</p>	Noted. Thank you.
5	ME	General comment	<p>Flood Insurance Rate Map – FIRM Panel <i>Flood Insurance Rate Map – FIRM Panel #08001C0591H</i>, Federal Emergency Management Agency, January 20, 2016.</p> <p>According to the above references, the “Berkely Shores” site is NOT located within a delineated 100-year flood hazard zone; A floodplain use permit will not be required.</p>	Noted. Thank you.
6	ME	General Comment	<p>A. All necessary Plats will be filed and recorded with the Adams County Clerk and Recorders office prior to the issuance of any Building Permit.</p> <p>B. All necessary paperwork such as Commissioners Resolutions, Development Agreements, Collateral Agreements, BOA decisions, etc. will be on file with the Adams County Public Works Department / Construction Management Section prior to the issuance of any Building Permit.</p> <p>The County has the right to enter the property to conduct inspections of the installation of the facilities.</p>	Noted. Thank you.
7	ME	General Comment (if applicable)	<p>A. The contractor will be held responsible for the cleanliness and safety of all roadways adjacent to this site. If at any time, these roadways are found to be dangerous or not passable due to debris or mud, the Adams County Public Works Department will shut down the project, until the roadway conditions have improved and are deemed acceptable. If the contractor/applicant fails to keep the adjacent roadways clean and free from debris, the Public Works</p>	Noted. Thank you.

		<p>Department has the option to do the required clean up and bill the charges directly to the contractor/applicant.</p> <p>B. Erosion and sediment control measures shall be required during construction. Adams County field inspection personnel shall be able to mandate corrective action to be taken by the developer and/or contractor if any of the following situations occur:</p> <ul style="list-style-type: none">• construction plans lack sufficient detail for erosion protection• it has been determined that the submitted erosion control measures are not applicable to actual field conditions• installed erosion & sediment controls are non-functional <p>C. The contractor shall contact the Adams County Public Works Department / Construction Management section to find out if a preconstruction meeting is required.</p> <p>D. The developer/contractor shall be responsible for repairing or replacing damaged infrastructure adjacent to the site.</p> <p>E. <u>All design and construction drawings submitted to Adams County for review and approval must be signed and stamped by a Professional Engineer. In addition, the drainage study must be signed by the developer.</u></p> <p>F. Asphalt patching shall include the removal of asphalt from the furthest saw cut line to the lip of gutter. A saw cut will be made 1' south of the initial saw cut for the "T" patch.</p> <p>G. If traffic control is necessary; all property and business owners in the area shall be notified. The applicant should contact Adams County Traffic</p>	
--	--	---	--

			<p>Services at 303-853-7137 with any necessary information. After hours contact ADCOM at 303-288-1535. This notification is required for any disturbance to within street ROW.</p> <p>H. Work hours and work schedule shall be coordinated with Adams County Public Works Department / Construction Management Section.</p> <p>I. A Traffic Control Plan may be required to be submitted for approval prior to issuance of construction permits.</p> <p>J. The contractor is responsible for the material testing required during the construction and installation of the approved design drawings.</p>	
8	ME	General Comment	<p>The applicant shall be responsible to ensure compliance with all Federal, State, and Local water quality construction requirements. The project site is within the County's MS4 Stormwater Permit area and the proposed development will disturb more than one (1) acres of ground. The applicant shall be responsible for preparing a Stormwater Management Plan (SWMP) using the Adams County ESC Template and obtaining both a County Stormwater Quality Permit (SWQ) and State Permit COR400000. The installation of erosion and sediment control BMPs is expected for any ground disturbance. Applicant is responsible for providing stormwater quality for all areas of improvement, including roadway improvements. Below is a link to the County SWQ Permit page: http://www.adcogov.org/stormwater-quality-swq-permit-construction-activities</p>	An Erosion and Sediment Control Plan will be included in the next submittal.
9	ME	General comment	The County has the right to enter the property to conduct inspections of the installation of the facilities.	Noted. Thank you.

10	ME	General Comment	Add the Adams County “General Construction Notes” to the plan set. The County’s General Construction Notes can be found on the last page of this document.	The “General Construction Notes” were added to the plan set.
11	ME	General Notification	<p>In compliance with Colorado Revised Statute 37-92-602(8), concerning water rights, all flood control stormwater facilities that detain stormwater must be registered with the Statewide Notification Compliance Portal (SNCP). It is the responsibility of the design engineer to register the stormwater facility on the SNCP. The facility must be registered with the SNCP when the facility becomes operational and prior to the engineer of record submitting the final pond certification to Adams County. The County is required to verify the registration of the stormwater facility within 30 days of posting.</p> <p>The Statewide Notification Compliance Portal can be found at the following web address:</p> <p>https://maperture.digitaldataservices.com/qvh/?viewer=cswdif</p>	The water quality pond will be registered during the approval process.
12	ME	General Notification	<p><u>Street Lighting</u></p> <p>Street lighting is allowed within Adams County Right-of-Way with approval by the County. Owner/Developer is responsible for maintenance and operation of street lights. Street light meter and/or service location is subject to approval by the Building Safety Division. A building permit is required for the installation of all street lighting.</p>	Noted. Thank you.
13	ME	General Comment	If the applicant proposes to import soil to this site, additional permitting is required. Per section 4-05-02-07, of the Adams County Development Standards and Regulations, a Temporary or Conditional Use Permit is required to ensure that only clean, inert soil is imported into any site within Un-incorporated Adams County.	Noted. Thank you.

			This regulation applies to ANY amount of soil imported to a site.	
14	ME	General Comment	<p>LOW IMPACT DEVELOPMENT (LID) STANDARDS AND REQUIREMENTS Section 9-01-03-14:</p> <p>All construction projects shall reduce drainage impacts to the maximum extent practicable, and implement practices such as:</p> <ol style="list-style-type: none"> 1. On-site structural and non-structural BMPs to promote infiltration, evapo-transpiration or use of stormwater, 2. Minimization of Directly Connected Impervious Area (MDCIA), 3. Green Infrastructure (GI), 4. Preservation of natural drainage systems that result in the infiltration, evapo-transpiration or use of stormwater in order to protect water quality and aquatic habitat. 5. Use of vegetation, soils, and roots to slow and filter stormwater runoff. 6. Management of stormwater as a resource rather than a waste product by creating functional, attractive, and environmentally friendly developments. 7. Treatment of stormwater flows as close to the impervious area as possible. <p>LID shall be designed and maintained to meet the standards of these Regulations and the Urban Drainage and Flood Control District's Urban Storm Drainage Criteria Manual, Volume 3.</p>	A water quality pond will route the runoff from the site.
15	ME	General Comment	<p>Sustainable Development Practices Section 3-27-06-05-07-08:</p> <p>To the maximum extent practicable, new buildings are encouraged to incorporate one or more of the following features:</p> <ol style="list-style-type: none"> 1. Opportunities for the integration of renewable energy features in the design of buildings or sites, such as: solar, wind, geothermal, biomass, or low- 	Noted. Thank you.

			<p>impact hydro sources;</p> <p>2. Energy-efficient materials, including recycled materials that meet the requirements of these regulations;</p> <p>3. Materials that are produced from renewable resources;</p> <p>4. Low-Impact Development (LID) stormwater management features;</p> <p>5. A green roof, such as a vegetated roof, or a cool roof;</p> <p>6. Materials and design meeting the U.S. Green Building Council's LEED-NC certification requirements;</p> <p>7. A greywater recycling system.</p>	
16	ME	General Notification	<p><i>Colorado Revised Statutes 2018, Title 9, Article 1.5, 9-1.5-103. Plans and specifications - notice of excavation - duties of excavators - duties of owners and operators - fee – repeal, (10)</i> states that “All new underground facilities, including laterals up to the structure or building being served, installed on or after August 8, 2018, must be electronically locatable when installed”. Therefore, all newly installed underground utilities, including storm sewer, must be electronically locatable in compliance with State Statute and shall be depicted on applicable construction documents. See Adams County tracer wire details for locating storm sewer in the public right-of-way.</p>	Noted. Thank you.
17	ME	Roadway Design	<p>The proposed cross section for W 63rd Ave., as well as the speed table and narrow section at the east end of the site, do not meet the requirements of the approved Adams County roadway cross sections. County staff do not object to the proposed cross section but, County staff cannot approve the variations from the County's Development Standards and Regulations (DSR). The applicant will need to apply for a waiver from subdivision design standards.</p>	A waiver from the subdivision design standards has been included in this submittal.

18	ME	Construction plans	Include minor and major event HGL's on the storm Sewer Plan/Profiles.	Minor and Major HGL's have been added to the storm profile.
19	ME	Construction Plans	All construction documents MUST be stamped and signed by an engineer, licensed in the state of Colorado, when submitted. Future submittal that include documents that are not stamped and signed will be rejected as incomplete.	The construction documents will be stamped and signed at the approval process. This will help differentiate between the plans for review and the final approved plans.
20	ME	Lowell Blvd	<p>The transition on the north end of the proposed Lowell Blvd Improvements does not meet the requirements of Section 7-01-03-08-02 of the County's Development Standards and Regulations (DSR). The transition length would need to be over 290-feet and go through the entrance.</p> <p>County staff feels a better design would be to remove the northern transition and bring the norther curb return, at the entrance, further into Lowell Blvd to line up with the curb and gutter to the north of the site. This would effectively create a right turn lane for entering the project site. The cross walk should remain in its current location.</p>	The transition of Lowell Blvd. north of W 63 rd Ave. has been removed.
21	ME	Lowell Blvd	Include cross section, every 50 feet, for the widening of Lowell Blvd.	A sheet has been added showing cross sections in the widening portion of Lowell Blvd. every 50 feet.
22	ME	Detention Pond	The configuration of the water quality pond needs to be revised. The locating the forebay so close to the micropool and outlet structure will cause short circuiting of the pond. The forebay and micropool/outlet structure need to be separated by as much distance as possible and the low flow trickle channel needs to be much longer.	The micropool and outlet structure have been adjusted in the pond area. The low flow trickle channel is now much longer and the pond will not short circuit.
23	ME	W 63 rd Ave	The bollards at the east end of W 63 rd Ave are not acceptable. The barrier used to close access to the east will need to meet all of the requirements of the Manual on Uniform Traffic Control Devices (MUTCD).	A gate has been added to W. 63 rd Ave. in place of the bollards.

24	ME	Street Signs	The street signs used to identify the public streets (Lowell Blvd, W 63 rd Ave. and Julian St) will need to be the Adams County Standard Design. This does not apply to the private street signs.	Noted. Thank you.
25	ME	Sheet C11.1	The Adams County Standard Curb Cut detail is not ADA compliant. This detail should be replaced with CDOT M-609-1.	The detail has been replaced.
26	ME	Lowell Blvd	The sidewalk at the north end of the Lowell Blvd improvements need to connect to the existing sidewalk north of the site.	A sidewalk connection has been made to the existing sidewalk.
27	ME	Sheet C11.1	The construction plans include a detail for a sidewalk chase(s). The County no longer allows this type of sidewalk chase to be used in public streets. Also, I couldn't find where on the site they are being used.	The sidewalk chases are used at the raised crosswalk section along W. 63 rd Avenue.
28	ME	ESC Plans	Include all Erosion and Sediment Control BMP details in the construction plans.	Erosion and Sediment Control BMP details have been added to the plans.
29	ME	Julian St/W 63 rd Aver. intersection	Add spot elevations for the portion of curb and gutter on the south side of the intersection.	Stations and elevations have been added to the south side curb.
30	ME	Julian St/W 63 rd Aver. intersection	The curb and gutter on the south side of W 63 rd Ave stops at the east boundary of the site. This configuration will collect street storm flows and divert them into the property to the east (addressed at 3390 W 63 rd Ave). The curb and gutter should be extended across this parcel and connected to the existing C&G to the east. This will prevent drainage problem on the parcel to the east.	An asphalt curb has been extended to the existing curb and gutter in W 63 rd Ave. A driveway cut has been added along the asphalt curb and the driveway cut shall tie into the existing grades at 10% max.
31	ME	Drainage Report	The certification page of the drainage report needs to be stamped and signed by the engineer of record and, signed by the applicant/developer.	The Drainage Report shall be signed at the submittal approval.

32	ME	Grading Plans	Add more labels to the existing contours.	Additional contour labels have been added.
33	ME	Drainage Report	The Drainage analysis needs to include all offsite basins. There is a significant area to the north of the site that drains to the north-east corner of the site. This area needs to be included in the drainage analysis and mitigated for.	There are currently additional offsite investigations regarding the existing storm system adjacent to the site. Once the information is available, it will be incorporated into the drainage report.
34	ME	Drainage Report/Plans	There is an existing storm sewer that is located along the west edge of Julian St and, appears to enter the Berkeley Shores property south of the intersection of Julian St and W 63 rd Ave. This storm sewer needs to be shown in the construction plans and, if it does enter the property, connected to the proposed storm sewer outfall for this development.	There are currently additional offsite investigations regarding the existing storm system adjacent to the site. Once the information is available, it will be incorporated into the drainage report.
35	ME	Drainage Report	The drainage report references the Manhart Ditch that runs through the site but, the water surface level analysis for the “Lowell Pond” references the “Kershaw Ditch”. Which is it?	The ditch company and the City of Westminster have given the history of the ditch through the Site. This ditch alignment was originally the “Kershaw Ditch”. This portion of the ditch was abandoned and the “Manhart Ditch” flowed into this original alignment. They are different ditches, same alignment.
36	ME	W 63 rd Ave	The Colorado Department of Transportation has stated that if traffic is increased by 20% or more on W 63 rd Ave., they will require the County to get a new access permit for the W 63 rd Ave. connection to Federal Blvd. The proposed connection to the existing W 63 rd Ave. will be closed and used as an emergency only access. Therefore, the requirement from CDOT to obtain a new access permit is probably going to be removed. CDOT has been notified of the proposed emergency only connection. A response from CDOT has not been received yet.	Noted. Thank you.
		General comment	The listed items above may or may not represent all comments regarding the project. Adams County reserves the right to provide additional comments as the plans progress.	Noted. Thank you.

Current Disposition: **Resubmit**

Condition(s) of Approval:

1. The developer will be required to enter into a Subdivision Improvements Agreement (SIA) with the County and bond for all public and drainage to ensure the public improvements are completed. No building permits will be issued until all public improvements are completed and preliminarily accepted by the County.
2. No building permit will be issued until the all public improvements and the stormwater pond has been constructed and preliminarily accepted by the Public Works Department.

The review is for general compliance with Adams County Standards for the design and construction of public improvements. The sole responsibility for completeness and accuracy of the construction documents shall remain with the Project Principals and Registered Professional Engineer sealing the plans. Adams County does not accept liability for facilities designed by others.

GENERAL CONSTRUCTION NOTES

1. A PRE-CONSTRUCTION MEETING IS REQUIRED PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. TO SCHEDULE A PRE-CONSTRUCTION MEETING CONTACT THE ADAMS COUNTY CONSTRUCTION INSPECTOR SUPERVISOR AT 720-523-6965.
2. ALL CONCRETE CURB, GUTTER AND WALK MUST BE POURED MONOLITHICALLY USING 4,500 psi CONCRETE WITH FIBER MESH.
3. ALL MATERIAL SUBMITTALS MUST BE APPROVED, STAMPED AND SIGNED, BY THE ENGINEER OF RECORD AND, SUBMITTED TO THE ADAMS COUNTY CONSTRUCTION INSPECTOR FOR APPROVAL PRIOR TO CONSTRUCTION/INSTALLATION.
4. THE CONTRACTOR IS REQUIRED TO SUBMIT COPIES OF ALL CONCRETE AND ASPHALT TICKETS TO THE ADAMS COUNTY CONSTRUCTION INSPECTOR.
5. THE CONTRACTOR IS RESPONSIBLE FOR ALL QUALITY CONTROL TESTING AND, IS REQUIRED TO SUBMIT ALL TEST RESULTS TO THE ADAMS COUNTY CONSTRUCTION INSPECTOR.
6. THE CONTRACTOR IS REQUIRED TO REMOVE A MINIMUM OF TWO (2) FEET OF EXISTING ASPHALT FOR ALL CURB AND GUTTER REPLACEMENT.
7. ALL UTILITY CUTS IN EXISTING STREETS ARE REQUIRED TO BE BACKFILLED WITH FLOWFILL AND, PATCHED WITH A MINIMUM OF 9-INCH ASPHALT PATCH.
8. A COPY OF THE GEOTECHNICAL REPORT SPECIFYING THE PAVEMENT THICKNESS DESIGN MUST BE SUBMITTED FOR REVIEW.
9. PERMITS WILL BE REQUIRED FOR THE INSTALLATION OF ALL UTILITIES. THE DEVELOPER/CONTRACTOR/ENGINEER, MUST SUPPLY THE LINEAL FOOTAGES AND THE NUMBER OF SERVICE CUTS REQUIRED FOR ALL UTILITIES.

10. PERMITS WILL BE REQUIRED FOR THE INSTALLATION OF ALL CONCRETE AND ASPHALT FACILITIES. PRIOR TO THE ISSUANCE OF THESE PERMITS, THE DEVELOPER/CONTRACTOR/ENGINEER, MUST SUPPLY THE SQUARE YARDAGE/SQUARE FOOTAGES OF ALL CONCRETE AND ASPHALT BEING INSTALLED.
11. THE SIA MUST BE COMPLETED WITH APPROPRIATE COLLATERAL, ALONG WITH THE PROPOSED PLAT, PRIOR TO THE ISSUANCE OF ANY ROW ACCESS/CONSTRUCTION PERMIT.
12. NO C.O.'S WILL BE ISSUED FOR ANY BUILDING CONSTRUCTION UNTIL ALL ROW IMPROVEMENTS HAVE BEEN COMPLETED AND HAVE BEEN GRANTED PRELIMINARY ACCEPTANCE.
13. UPON COMPLETION OF ALL CONSTRUCTION, A DRAINAGE CERTIFICATION LETTER, AND APPROPRIATE AS-BUILT CONSTRUCTION DRAWINGS AND INFORMATION WILL BE REQUIRED. THIS LETTER WILL BE STAMPED AND SIGNED BY THE ORIGINAL DESIGN ENGINEER.