APPENDIX F

DRAINAGE ANALSIS OF ICE ALTERNATIVES

October 5, 2024

Intersection Control Evaluations (ICE) Drainage Report

Roadway Conceptual Analysis for Chuluota Road from SR 50 to Lake Pickett Road

Orange County Project Number: Y20-830

Submitted to: Orange County Public Works, Florida

SECTION 1.0 – INTRODUCTION

The purpose of this Intersection Control Evaluations (ICE) is to discuss, analyze, and identify the stormwater management plan for the proposed Chuluota Road improvements based on environmental, hydrologic, hydraulic, and economic factors. Stormwater management for water quality treatment and runoff attenuation is proposed by using wet detention ponds. The design of the drainage and stormwater facilities will comply with the standards set forth by the FDOT drainage manual, the St. Johns River Water Management District (SJRWMD) Environmental Resource Permit (ERP) manual and the Orange County Land Development Code.

The roadway project limits have been divided into nine drainage sub-basins. The water quality and attenuation for two of the sub-basins will be provided in existing runoff attenuation systems, while seven of the sub-basins will be provided for in proposed pond sites or expansions of existing ponds. For all sub-basins which will require the construction of a new pond or expansion of an existing pond, at least two alternatives were evaluated. This report evaluates the adequacy of the pond sites using a volumetric analysis, which accounts for the water quality treatment and water quantity attenuation for runoff. Please note the volumetric analyses of the pond sites were performed with preliminary data. Pond sizes and configurations may change during the final design as refinements to the roadway design are made, and topographic survey is obtained.

Additional information such as geotechnical data have been obtained for this report to further refine the pond sizes to verify the right of way needs for the ponds. This report provides pond site alternatives that are hydraulically feasible and environmentally permittable based on the information. Locations were analyzed and evaluated for the following:

- Pond size required at tie down locations
- Stormwater conveyance and hydraulic parameters
- Parcel(s) required for acquisition
- FEMA flood zone(s)
- Wetland impacts
- Listed species impacts
- Contamination
- Cultural resources (archaeological and historical)
- Social impacts
- Other environmental impacts
- Utility conflicts
- Construction/maintenance concerns
- Public opinion
- Aesthetics
- Access issues
- Current land use zoning
- Future land use zoning
- Total cost of each alternative
- Potential risks associated with each alternative
- Recommendations/ranking

SECTION 2.0 – PROJECT DESCRIPTION

The Chuluota Road project area is located within the Big Econlockhatchee River Basin within the jurisdiction of the St. Johns River Water Management District (SJRWMD). The Econlockhatchee River System is considered an Outstanding Florida Waters (OFW). Refer to **Appendix A** for the project location map and USGS quadrangle map.

Orange County is proposing to widen Chuluota Road from East Colonial Drive to Lake Pickett Road to improve roadway capacity. The total project length is approximately 1.93 miles of roadway. The improvements include the widening of Chuluota Road with the construction of four eleven-foot travel lanes, one 10-foot multiuse path, and one 6-foot sidewalk. The lengths of existing turn lanes are anticipated to remain. The roadway corridor spans a mix of commercial, residential, institutional, and pastureland uses. Refer to **Appendix A** for additional information regarding the potential typical sections.

The project vertical datum is the North American Vertical Datum of 1988 (NAVD88), and all elevations contained in this document and the plans reference this datum unless otherwise noted. Conversion from NGVD29 to NAVD88 is -1.1 feet.

In this ICE report, the drainage implications of two intersection alternatives are assessed. The first drainage alternative includes the following options:

- Two-lane roundabout at Cypress Lake Glen Boulevard
- Two-lane roundabout at Corner Lake Drive
- Two-lane roundabout at Long Boat Lane / Cypress Lake Glen Boulevard (North)
- Two-lane roundabout at Lake Pickett Road

The second drainage alternative assesses the same two-lane roundabouts at Cypress Lake Glen Boulevard, Corner Lake Drive, and Long Boat Lane / Cypress Lake Glen Boulevard (North). However, this drainage alternative analyzes a signalized intersection at Lake Pickett Road and Chuluota Road with two bowties along Lake Pickett Road.

SECTION 3.0 – DATA COLLECTION

The pond siting report includes the data used for this analysis. This ICE drainage analysis used the layout for recommended intersection alternatives as described above to assess additional stormwater attenuation, water quality, and floodplain compensation requirements.

SECTION 4.0 – DESIGN CRITERIA

The pond siting report includes the design criteria used for this analysis.

SECTION 5.0 – ENVIRONMENTAL LOOK AROUND

The pond siting report includes the ecological summary report.

SECTION 6.0 – EXISTING & PROPOSED CONDITIONS

The existing and proposed basins are described in the pond siting report. For this ICE analysis, it is assumed the proposed pavement associated with intersection improvements adjacent to these basins will drain to each adjacent basin in final design conditions.

SECTION 7.0 – FLOODPLAIN & ENVIRONMENTAL INFORMATION

Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM's) dated September 25, 2009, portions of the study area are located within Zone A (100 Year) floodplain. There are no Zone AE floodplains within the study area. The Zone A floodplains occur:

- East of Chuluota Road across from Corner Lake Middle School. This Zone A floodplain is isolated.
- North and South of Cypress Lake Glen Boulevard and across Chuluota Road at the intersection. This Zone A floodplain ultimately drains to Lake Pickett.

Please refer to Appendix B for a depiction of the floodplains in the study area. There are no floodways within the project limits. There will be floodplain impacts within the project corridor that will be mitigated by providing compensatory volume in proposed floodplain compensation ponds. The Zone A floodplains have no designated elevation, though the floodplain limits within Chuluota Road for the Zone A floodplain north of Corner Lake Drive are associated with elevations varying between 69.8 and 70.8 ft NAVD88 as estimated from LiDAR data. Therefore, potentially raising the road profile to elevation 70.0 ft NAVD88 and widening the road would constitute floodplain fill. Note that no survey is available nor is a proposed roadway profile, so the amount of floodplain compensation required is preliminary.

Under the non-roundabout alternative, there is 0.03 ac-ft of floodplain impact between STA 22+00 and 26+00, and there is 1.87 ac-ft of floodplain impacts between 73+00 and 90+00. With the ICE alternatives, there is an estimated total of 2.13 ac-ft of floodplain impacts between STA 73+00 and 90+00. The same estimated floodplain impact volume (2.13 ac-ft) is anticipated for each ICE alternative.

Net Fill Summary				
Station to Station			Updated PSR Volume (Ac-Ft)	ICE Alternatives Volume (Ac-Ft)
22+00.00	TO	26+00.00	0.03	0.03
73+00.00	TO	90+00.00	1.87	2.13
Total			1.90	2.16

Calculations supporting the floodplain compensatory volume required and those provided are included in Appendix C. A floodplain compensatory pond (FC-1) is proposed across from Corner Lake Middle School. No changes to the size of this floodplain compensatory pond will be necessary with roundabouts. A second floodplain compensatory pond (FC-2) is proposed adjacent to wetlands south of Lake Pickett Road and east of Chuluota Road. The footprint of this pond without roundabouts was 1.87 acres. **With the roundabouts, FC-2 will need to be increased to 2.13 acres.**

A wetland survey was performed by MSE Group, LLC, and the potential wetland/surface water impacts were quantified for each pond option in the pond siting report. There are no archaeological or historical impacts. A contamination report is included in the pond siting report.

SECTION 8.0 – STORMWATER PONDS

POND SIZING AND LOCATION

In the pond siting report submitted on October 2022, the County-preferred Alternative is for Pond 3C to provide attenuation and water quality for Drainage Basins 1, 2, and 3, and for Pond 4C to provide attenuation and water quality for Drainage Basin 4. See Appendix D for the following pond sizing calculations.

The parcel size for Pond 3C is 40.22 acres and is owned by First Baptist Church of Oviedo, and the pond footprint with tie-downs is approximately 7.14 acres for the non-roundabout option and 8.17 acres for the ICE alternatives. The proposed pond site is adjacent to the west side of Chuluota Road. The outfall from the proposed pond is conveyed west to the existing wetland and eventually to Corner Lake. There are no wetlands within the proposed footprint of this pond site location. The seasonal high-water table is 67.0 ft NAVD88 based on a combination of LiDAR and a wetland delineation. A wet detention pond is proposed at this location due to the high-water table. Preliminary pond sizing calculations indicate that Drainage Basins 1, 2, and 3 require a total of 5.56 ac-ft of treatment and attenuation volume to accommodate the proposed roadway configuration and pond footprint without roundabouts. With the ICE alternatives, 6.10 ac-ft of treatment and attenuation volume is required. Pond sizing calculations were also completed to provide the required volume at one foot below the inside maintenance berm. The ability to convey runoff from Basin 1 north may require Chuluota Road to be raised in the vicinity of the SR50 intersection. Alternatively, a portion of Basin 1 can continue to drain to the FDOT drainage systems on SR50 such that peak discharges into FDOT right-of-way is maintained or reduced, and the remainder of Basin 1 can be conveyed to Pond 3C. This pond alternative assumes that the crown of Chuluota Road can be raised to elevation 70 ft NAVD88 in the vicinity of Pond 3C. If the profile of the road in this sag can be raised to a higher elevation, the footprint for Pond 3C can be reduced in size, though the floodplain compensation pond may need to increase in size.

The parcel size for Pond 4C is 2.046 acres and is located on the northeast corner of Chuluota Road and Lake Pickett Road, and the estimated pond footprint is approximately 1.22 acres with either the roundabout option at Lake Pickett Road or with the signalized intersection and bowtie option. The pond footprint is approximately the same size without the roundabouts or bowties. The parcel will require acquisition because of proposed improvements to Lake Pickett Road as part of another project, so the County is interested in using this parcel for stormwater and water quality needs for Chuluota Road Basin 4. A portion of the adjacent county right-of-way that will be used for a trail will also be needed to site pond 4C at this location. The outfall from the proposed pond is conveyed south to Lake Picket Road. There are no wetlands in this pond site location. The measured seasonal high-water table is 4.9 feet below existing ground. Pond 4C is proposed as a wet detention pond. Preliminary pond sizing calculations indicate that Basin 4 requires a total of 1.58 ac-ft of treatment and attenuation volume to accommodate the proposed roadway configuration and pond footprint. Pond sizing calculations were also completed to provide the required volume at one foot below the inside maintenance berm.

SECTION 9.0 – RESULTS

Pond 3C is the recommended pond for Drainage Basin 1, 2, and 3. This pond site requires the partial acquisition of the commercial parcel under the ownership of First Baptist Church of Oviedo Inc. The parcel size is listed at 40.22 acres and the proposed pond 3C footprint is approximately 8.17 acres.

Pond 4C is an alternative pond for Drainage Basin 4. It is located on the northeast corner of Chuluota Road and Lake Pickett Road. The parcel will require acquisition because of proposed improvements to Lake Pickett Road as part of another project, so the County is interested in using this parcel for stormwater and water quality needs for Chuluota Road Basin 4. The parcel size is listed at 2.046 acres, and the proposed pond 4C footprint is 1.22 acres. A portion of the adjacent county right-of-way that will be used to a trail will also be needed to site pond 4C at this location. If that is not possible, this pond will need to be sited within the property southeast of Chuluota Road and Lake Pickett Road.

SECTION 10.0 – CONCLUSIONS

The proposed pond sites have been analyzed using a volumetric analysis, which accounts for water quality treatment and water quantity for runoff attenuation including floodplain compensation. The analysis completed in this report verifies whether the existing parcels can accommodate pond sites with adequate volume when considering the estimated seasonal high-water elevations, ground elevations, and potential natural contouring.

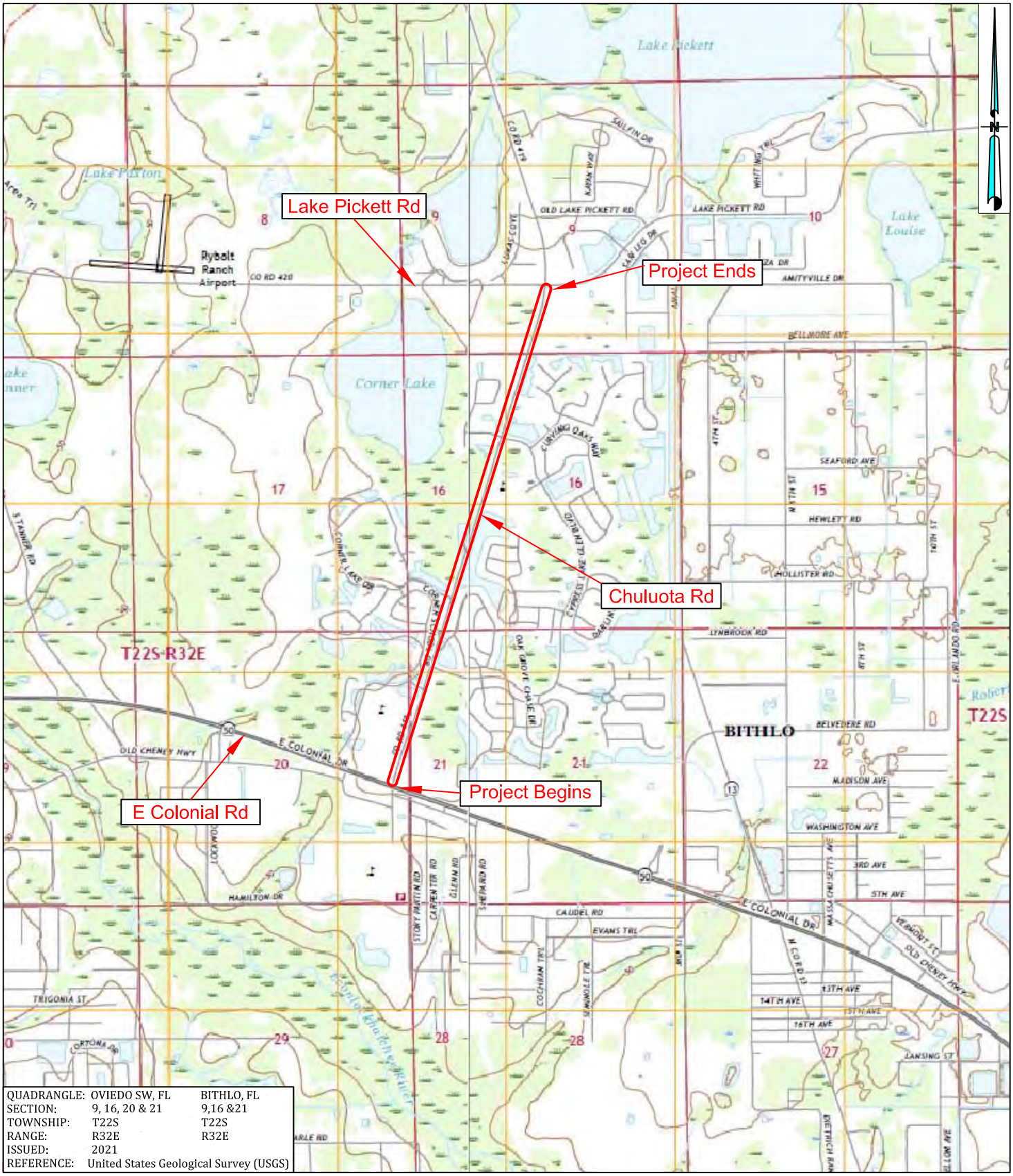
A floodplain compensatory pond (FC-1) is proposed across from Corner Lake Middle School. No changes to the size of this floodplain compensatory pond will be necessary with roundabouts. A second floodplain compensatory pond (FC-2) is proposed adjacent to wetlands south of Lake Pickett Road and east of Chuluota Road. The footprint of this pond without roundabouts was 1.87 acres. With the roundabouts, FC-2 will need to be increased to 2.13 acres. Note that no survey is available nor is a proposed roadway profile, so the amount of floodplain compensation required is preliminary.

For Basins 1, 2, and 3, the preferred pond site if Pond 3C due to the lower cost estimation compared to the other options. Additionally, the pond may be sited such that there are no wetland impacts. The proposed Pond 3C is also expected to accommodate proposed intersection improvements, though the pond will be slightly larger than without roundabout alternatives. The pond sizing assumes that Chuluota Road can be raised to at least elevation 70 NAVD88. If it can be raised higher, the Pond 3C footprint can likely be reduced, though the floodplain compensation pond FC-2 will need to increase in size.

For Basin 4, the preferred pond site is Pond 4C due to its low footprint and potential lower cost with and without the roundabout or bowtie alternatives. A portion of the adjacent county right-of-way that will be used to a trail will also be needed to site pond 4C at this location. If that is not possible, this pond will need to be sited within the property southeast of Chuluota Road and Lake Pickett Road.

Appendix A

Drainage Maps



NOT TO SCALE

Approximate Project Location

REVISIONS				NAMES	DATES
DATES	BY	DESCRIPTION	DRAWN BY:	MB	09-29-2021
			CHECKED BY:	GNN	09-29-2021
			DESIGNED BY:	N/A	N/A
			CHECKED BY:	N/A	N/A
			APPROVED BY:		

NADIC
GODWIN N. NNADI, Ph.D., P.E.
FL REGISTRATION NO. 50637
NADIC ENGINEERING SERVICES, INC.
601 N. HART BOULEVARD
ORLANDO, FL 32818
PH (407) 521-4771 FAX (407) 521-4772
CERTIFICATE OF AUTHORIZATION NO. 8214

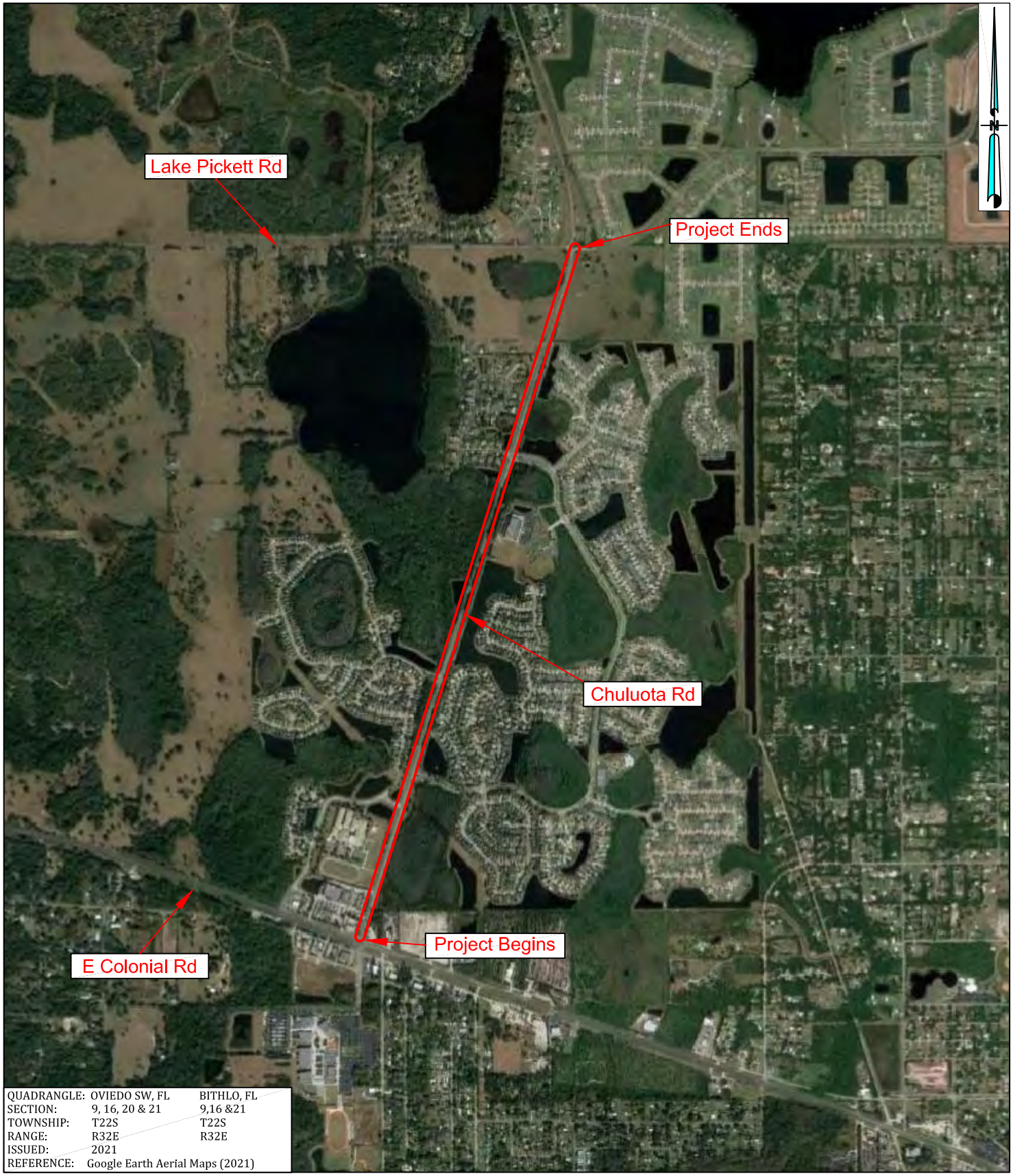
ORANGE COUNTY, FLORIDA

COUNTY	CONTRACT No.
ORANGE	Y20-830-CH

FIGURE 2
USGS QUADRANGLE MAP

PROJECT NAME:
CHULOUTA ROAD ROADWAY CONCEPTUAL ANALYSIS (RCA)

NADIC PROJECT NO.: PR.GEO.RD20027



QUADRANGLE:	OVIEDO SW, FL	BITHLO, FL
SECTION:	9, 16, 20 & 21	9,16 &21
TOWNSHIP:	T22S	T22S
RANGE:	R32E	R32E
ISSUED:	2021	
REFERENCE:	Google Earth Aerial Maps (2021)	

NOT TO SCALE

Approximate Project Location

REVISIONS				NAMES	DATES
DATES	BY	DESCRIPTION	DRAWN BY:	MB	10-04-2021
			CHECKED BY:	GNN	10-04-2021
			DESIGNED BY:	N/A	N/A
			CHECKED BY:	N/A	N/A
			APPROVED BY:		

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CERTIFICATE OF AUTHORIZATION NO. 8214

ORANGE COUNTY, FLORIDA

COUNTY	CONTRACT No.
ORANGE	Y20-830-CH

FIGURE 1
VICINITY MAP

PROJECT NAME:
CHULOUTA ROAD
ROADWAY CONCEPTUAL ANALYSIS (RCA)

NADIC PROJECT NO.: PR.GEO.RD20027

Appendix B

FEMA FIRMette Maps

National Flood Hazard Layer FIRMette

FEMA

81°7'43"W 28°34'58"N

81°7'5"W 28°34'26"N

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

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

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

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/2/2024 at 10:19 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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National Flood Hazard Layer FIRMette

FEMA

81°7'33"W 28°35'24"N

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

1:6,000

81°6'56"W 28°34'52"N

Basemap Imagery Source: USGS National Map 2023

Legend

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

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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

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National Flood Hazard Layer FIRMette

FEMA

81°8'2"W 28°34'3"N

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

1:6,000

81°7'25"W 28°33'31"N

Basemap Imagery Source: USGS National Map 2023

Legend

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

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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

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

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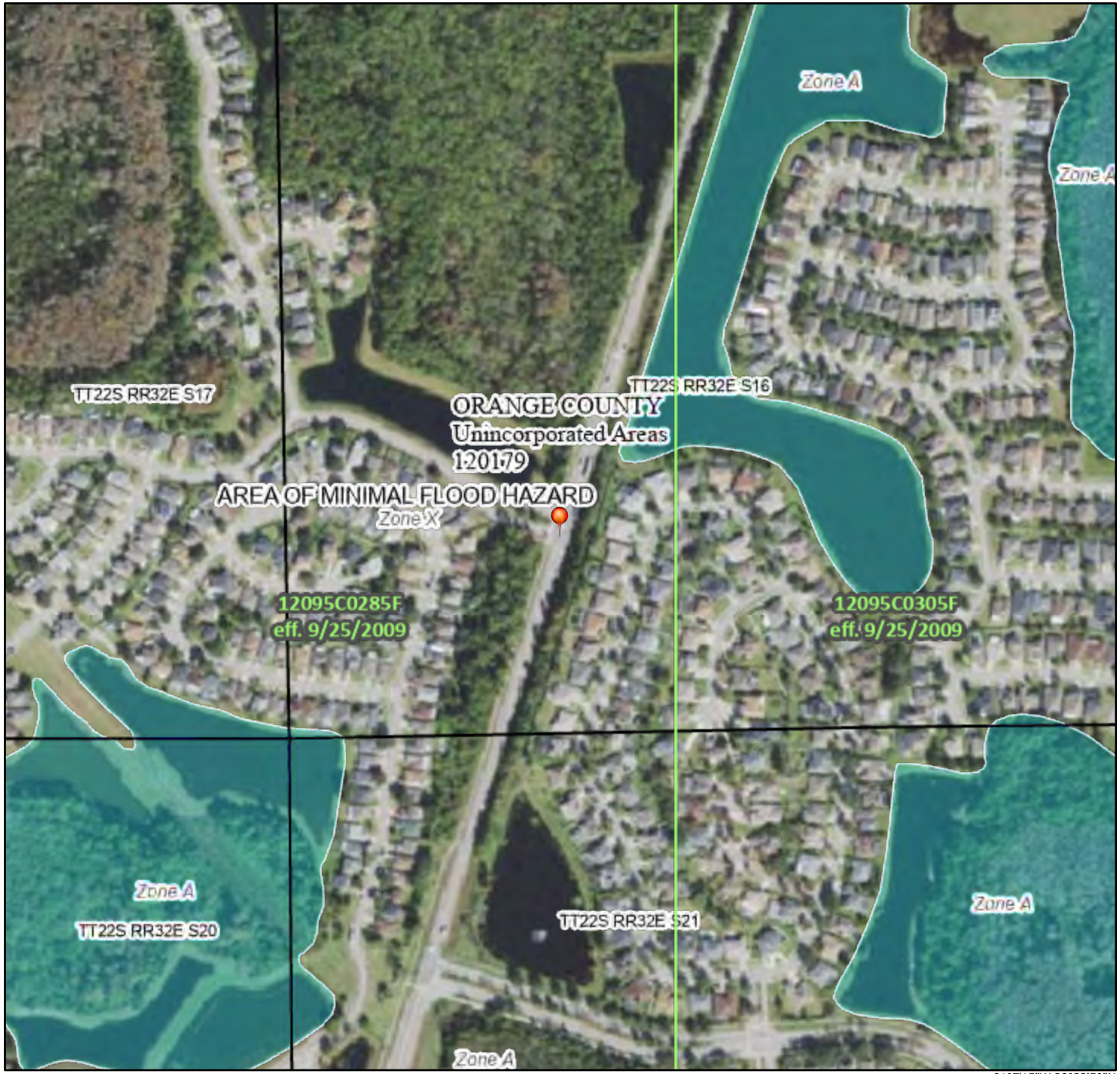
National Flood Hazard Layer FIRMette

FEMA

81°7'53"W 28°34'30"N



81°7'15"W 28°33'59"N

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

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

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

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
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- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
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- Area of Undetermined Flood Hazard *Zone D*

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- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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Appendix C

Floodplain Compensation Calculations

Updated PSR Floodplain Encroachment Calculations

Net Fill Summary				
Station to Station			Original PSR Volume (Ac-Ft)	Updated PSR Volume (Ac-Ft)
22+00.00	TO	26+00.00	0.03	0.03
73+00.00	TO	90+00.00	0.77	1.87
Total			0.80	1.89

Net Fill - Sta. 22+00 to 26+00					
Station	Xsect Area (SF)	Average End Area (SF)	Length (FT)	Volume (CF)	Volume (Ac-Ft)
22+00.00	0.07	3.44	100	344	0.01
23+00.00	6.81	5.86	100	586	0.01
24+00.00	4.92	2.93	100	293	0.01
25+00.00	0.94	0.47	100	47	0.00
26+00.00	0.00	0.00	100	0	0.00
Total Flood Compensation Required					0.03

Net Fill - Sta. 73+00 to 84.80						
Station to Station			Fill Area Raising Road to 70 ft (SF, Profile View)	Average Floodplain Impact Width (FT)	Volume (CF)	Volume (Ac-Ft)
73+00.00	TO	75+10.00	283.50	27.10	7681	0.18
77+20.00	TO	84+80.00	774.75	84.10	65153	1.50
Total Flood Compensation Required					72834	1.67

Net Fill - Sta. 85+00 to 90+00					
Station	Xsect Area (SF)	Average End Area (SF)	Length (FT)	Volume (CF)	Volume (Ac-Ft)
85+00.00	10.36	9.53	100	953	0.02
86+00.00	8.71	16.67	100	1667	0.04
87+00.00	24.62	20.98	100	2098	0.05
88+00.00	17.34	20.94	100	2094	0.05
89+00.00	24.55	16.26	100	1626	0.04
Total Flood Compensation Required					0.19

ICE Alternatives Floodplain Encroachment Calculations

Net Fill Summary				
Station to Station			Original PSR Volume (Ac-Ft)	ICE Alts. Volume (Ac-Ft)
22+00.00	TO	26+00.00	0.03	0.03
73+00.00	TO	90+00.00	0.77	2.13
Total			0.80	2.15

Net Fill - Sta. 22+00 to 26+00					
Station	Xsect Area (SF)	Average End Area (SF)	Length (FT)	Volume (CF)	Volume (Ac-Ft)
22+00.00	0.07	3.44	100	344	0.01
23+00.00	6.81	5.86	100	586	0.01
24+00.00	4.92	2.93	100	293	0.01
25+00.00	0.94	0.47	100	47	0.00
26+00.00	0.00	0.00	100	0	0.00
Total Flood Compensation Required					0.03

Net Fill - Sta. 73+00 to 84.80						
Station to Station			Fill Area (SF)	Average Impact Width (FT)	Volume (CF)	Volume (Ac-Ft)
73+00.00	TO	75+10.00	283.50	27.10	7681	0.18
77+20.00	TO	84+80.00	774.75	84.10	65153	1.50
Total Flood Compensation Required					72834	1.67

Net Fill - Sta. 85+00 to 90+00					
Station	Xsect Area (SF)	Average End Area (SF)	Length (FT)	Volume (CF)	Volume (Ac-Ft)
85+00.00	10.36	9.53	100	953	0.02
86+00.00	8.71	16.67	100	1667	0.04
87+00.00	24.62	20.98	100	2098	0.05
88+00.00	17.34	20.94	100	2094	0.05
89+00.00	24.55	16.26	100	1626	0.04
Total Flood Compensation Required					0.19

ICE Alts. Additional Net Fill - Sta. 79+00 to 84+80					
Station to Station			Fill Depth Required (FT)	Additional Impact Area (ac)	Volume (Ac-Ft)
79+00.00	TO	84+80.00	0.5	0.52	0.26
Total Flood Compensation Required					0.26

Updated PSR Proposed Flood Comp Pond Sta. 22+00 to 26+00						
Description	**Stage (ft)**	**Pond Area (ac)**	**Total Volume (ac.ft.)**	**Height**	**Inc. Vol (ac-ft)**	**Cum. Vol (ac-ft)**
DHW	70.00	0.03				0.00
			0.03	0.50	0.02	
	70.50	0.04				0.02
			0.03	0.50	0.02	
Top of Bank	71.00	0.05				0.03
			Total (ac-ft)			**0.03**
			Total Flood Compensation Required between (ac-ft)			**0.03**
			Compensation Still Needed (ac-ft)			**0.00**

Updated PSR Proposed Flood Comp Pond Sta. 73+00 to 90+00						
Description	**Stage (ft)**	**Pond Area (ac)**	**Total Volume (ac.ft.)**	**Height**	**Inc. Vol (ac-ft)**	**Cum. Vol (ac-ft)**
DHW	70.00	1.85				0.00
			1.87	0.50	0.94	
	70.50	1.89				0.94
			1.87	0.50	0.94	
Top of Bank	71.00	1.93				1.87
			Total (ac-ft)			**1.87**
			Total Flood Compensation Required between (ac-ft)			**1.87**
			Compensation Still Needed (ac-ft)			**0.00**

ICE Alts. Proposed Flood Comp Pond Sta. 22+00 to 26+00						
Description	**Stage (ft)**	**Pond Area (ac)**	**Total Volume (ac.ft.)**	**Height**	**Inc. Vol (ac-ft)**	**Cum. Vol (ac-ft)**
DHW	70.00	0.03				0.00
			0.03	0.50	0.02	
	70.50	0.04				0.02
			0.03	0.50	0.02	
Top of Bank	71.00	0.05				0.03
					Total (ac-ft)	**0.03**
					Total Flood Compensation Required between (ac-ft)	**0.03**
					Compensation Still Needed (ac-ft)	**0.00**

ICE Alts. Proposed Flood Comp Pond Sta. 73+00 to 90+00						
Description	**Stage (ft)**	**Pond Area (ac)**	**Total Volume (ac.ft.)**	**Height**	**Inc. Vol (ac-ft)**	**Cum. Vol (ac-ft)**
DHW	70.00	2.10				0.00
			2.13	0.50	1.06	
	70.50	2.15				1.06
			2.13	0.50	1.06	
Top of Bank	71.00	2.20				2.13
					Total (ac-ft)	**2.13**
					Total Flood Compensation Required between (ac-ft)	**2.13**
					Compensation Still Needed (ac-ft)	**0.00**

Appendix D

Pond Sizing Calculations

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 1A
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Basin Designation 1A (Existing)
Type Evaluation Pre-Developed

Drainage Area begins at Station 10+70
and continues until Station 17+00

Existing Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			37,352	0.86

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I_Ex = Impervious Area (ac)
P = Pervious Area (ac)
At = Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = _____ ft
R = _____ ft

At = (R*L) / 43560
At = 1.28 ac

I_Ex = 0.86 ac

P = At-I_Ex
P = 0.42 ac

From existing Drainage Map:
Off = 0.15 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 1A
Subject Post-Developed CN and SCS Runoff Volume Calculation

Basin Designation 1A (Proposed)
Type Evaluation Post-Developed

Drainage Area begins at Station 10+70
and continues until Station 17+00

Proposed Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			51,760	1.19

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I = Impervious Area (ac)
P = Pervious Area (ac)
At = Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = _____ ft
R = _____ ft

Atp = (R*L) / 43560
Atp = 1.28 ac

I = 1.19 ac
I_New = I - I_Ex
I_New = 0.33 ac

P = Atp-I
P = 0.09 ac

From existing Drainage Map:
Off = 0.15 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*

Basin No. 1A

Subject Pre-Developed CN and SCS Runoff Volume Calculation

Existing Condition

Basin Designation	1A (Existing)		
Type Evaluation	Pre-Developed		
Basin Size	1.28 ac	Total Drainage Area	1.60 ac
Rainfall Depth	8.40 in		

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P - (0.2S))^2}{P + (0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin

**For this analysis, all soils are assumed to be D soils for grass.*

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	0.86	84.03
Grass, Good Condition	A	39	0.00	0.00
Grass, Good Condition	D	80	0.42	33.81
	Total Area =		1.28	117.84

Offsite

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	0.15	14.70
Grass, Good Condition (offsite)	D	80	0.17	13.60
	Total Area =		0.32	28.30

Basin		Offsite	
CN=	92.06	CN=	88.44
S=	0.86 in	S=	1.31 in
R=	7.45 in	R=	7.01 in
V=	0.79 ac-ft	V=	0.19 ac-ft

Total Volume= 0.98 ac-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 1A
Subject Post-Developed CN and SCS Runoff Volume Calculation

Proposed Condition

Basin Designation 1A (Proposed)
Type Evaluation Post-Developed
Basin Size 1.28 ac
Total Drainage Area 1.60 ac
Rainfall Depth 8.40 in

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P - (0.2S))^2}{P + (0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin **For this analysis, all soils are assumed to be D soils for grass.*

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	1.19	116.45
Grass, Good Condition	A	39	0.00	0.00
Grass, Good Condition	D	80	0.09	7.35
	Total Area =		1.28	123.79

Offsite

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	0.15	14.70
Grass, Good Condition (offsite)	D	80	0.17	13.60
	Total Area =		0.32	28.30

Basin		Offsite	
CN=	96.71	CN=	88.44
S=	0.34 in	S=	1.31 in
R=	8.01 in	R=	7.01 in
V=	0.85 ac-ft	V=	0.19 ac-ft

Total Volume= 1.04 ac-ft

Post Developed Volume - Pre Developed Volume =

0.06 ac-ft = 2614 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 1A
Subject Treatment Volume Calculation

SJRWMD Treatment Volume Requirement

Water Quality Volume for a Wet Detention System is based upon 2.5" times the additional onsite impervious area and 1" times the total offsite drainage area. The project is located within the Econ River Basin and requires an additional 50% treatment volume.

Vt = 2.5 inches of runoff times the new impervious area
Vt = (I-New * 2.5 in) / 12
Vt = 0.07 ac-ft

Is Offsite Area Contributing to the Basin (yes or no)? Yes

Offsite Area, Off = 0.32 ac
Vt(off) = (Off * 1.0 in) / 12
Vt(off) = 0.03 ac-ft

Did the existing basin receive treatment (Yes or No)? No

Will the existing treatment system will be impacted by the proposed improvements (yes or no)? No

Existing Required Treatment area for basin = 0 ac

Existing Required Treatment Volume for basin, Vt(Ex) = 0 ac-ft

Treatment Volume Required = [Vt + Vt(Off)+Vt(Ex)]
Treatment Volume Required = 0.10 ac-ft

Is Basin Part of an OFW (yes or no)? Yes (If Yes, then add an additional 50% Treatment Volume)
(Econ River Basin)

Total Basin Required Treatment Volume = 0.15 ac-ft

Total Peak Storage Volume Requirement

The Total Peak Storage Volume Required is:

Volume (peak) = Treatment Volume + Estimated Peak Attenuation Volume

Treatment Volume =	0.15 ac-ft	=	6,534 cubic feet
Attenuation Volume =	0.06 ac-ft	=	2,614 cubic feet
Volume (peak) =	0.21 ac-ft	=	9,148 cubic feet

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 1B
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Basin Designation 1B (Existing)
Type Evaluation Pre-Developed

Drainage Area begins at Station 10+70
and continues until Station 12+10

Existing Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			10,367	0.24

L = Approximate Roadway Length (ft)
R = Approximate Average Right-of-Way Width in Basin (ft)
I_Ex = Impervious Area (ac)
P = Pervious Area (ac)
At = Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = _____ ft
R = _____ ft

At = (R*L) / 43560
At = 0.30 ac

I_Ex = 0.24 ac

P = At-I_Ex
P = 0.06 ac

From existing Drainage Map:
Off = 0.20 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*

Basin No. 1B

Subject Post-Developed CN and SCS Runoff Volume Calculation

Basin Designation 1B (Proposed)
Type Evaluation Post-Developed

Drainage Area begins at Station 10+70
and continues until Station 12+10

Proposed Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			11,342	0.26

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I = Impervious Area (ac)
P = Pervious Area (ac)
Atp = Proposed Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = _____ ft
R = _____ ft

Atp = (R*L) / 43560
Atp = 0.30 ac

I = 0.26 ac
I_New = I - I_Ex
I_New = 0.02 ac

P = Atp-I
P = 0.04 ac

From existing Drainage Map:
Off = 0.20 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 1B
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Existing Condition

Basin Designation 1B (Existing)
Type Evaluation Pre-Developed
Basin Size 0.30 ac
Total Drainage Area 0.50 ac
Rainfall Depth 8.40 in

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P - (0.2S))^2}{P + (0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin **For this analysis, all soils are assumed to be D soils for grass.*

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	0.24	23.32
Grass, Good Condition	A	39	0.00	0.00
Grass, Good Condition	D	80	0.06	5.04
	Total Area =		0.30	28.36

Offsite

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	0.20	19.60
Grass, Good Condition (offsite)	D	80	0.00	0.00
	Total Area =		0.20	19.60

Basin		Offsite	
CN=	94.23	CN=	98
S=	0.61 in	S=	0.2 in
R=	7.71 in	R=	8.16 in
V=	0.19 ac-ft	V=	0.14 ac-ft

Total Volume= 0.33 ac-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 1B
Subject Post-Developed CN and SCS Runoff Volume Calculation

Proposed Condition

Basin Designation 1B (Proposed)
Type Evaluation Post-Developed
Basin Size 0.30 ac
Total Drainage Area 0.50 ac
Rainfall Depth 8.40 in

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P - (0.2S))^2}{P + (0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin **For this analysis, all soils are assumed to be D soils for grass.*

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	0.26	25.52
Grass, Good Condition	A	39	0.00	0.00
Grass, Good Condition	D	80	0.04	3.25
	Total Area =		0.30	28.76

Offsite

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	0.20	19.60
Grass, Good Condition (offsite)	D	80	0.00	0.00
	Total Area =		0.20	19.60

Basin		Offsite	
CN=	95.57	CN=	98
S=	0.46 in	S=	0.2 in
R=	7.87 in	R=	8.16 in
V=	0.20 ac-ft	V=	0.14 ac-ft

Total Volume= 0.34 ac-ft

Post Developed Volume - Pre Developed Volume =

0.01 ac-ft = 436 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 1B
Subject Treatment Volume Calculation

SJRWMD Treatment Volume Requirement

Water Quality Volume for a Wet Detention System is based upon 2.5" times the additional onsite impervious area and 1" times the total offsite drainage area. The project is located within the Econ River Basin and requires an additional 50% treatment volume.

Vt = 2.5 inches of runoff times the new impervious area
Vt = (I-New * 2.5 in) / 12
Vt = 0.00 ac-ft

Is Offsite Area Contributing to the Basin (yes or no)? Yes

Offsite Area, Off = 0.20 ac

Vt(off) = (Off * 1.0 in) / 12

Vt(off) = 0.02 ac-ft

Did the existing basin receive treatment (Yes or No)? No

Will the existing treatment system will be impacted by the proposed improvements (yes or no)? No

Existing Required Treatment area for basin = 0 ac

Existing Required Treatment Volume for basin, Vt(Ex) = 0 ac-ft

Treatment Volume Required = [Vt + Vt(Off)+Vt(Ex)]
Treatment Volume Required = 0.02 ac-ft

Is Basin Part of an OFW (yes or no)? Yes (If Yes, then add an additional 50% Treatment *(Econ River Basin)*

Total Basin Required Treatment Volume = 0.03 ac-ft

Total Peak Storage Volume Requirement

The Total Peak Storage Volume Required is:

Volume (peak) = Treatment Volume + Estimated Peak Attenuation Volume

Treatment Volume =	0.03 ac-ft	=	1,307 cu-ft
Attenuation Volume =	0.01 ac-ft	=	436 cu-ft
Volume (peak) =	0.04 ac-ft	=	1,742 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 2A
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Basin Designation 2A (Existing)
Type Evaluation Pre-Developed

Drainage Area begins at Station 17+00
and continues until Station 17+00

Existing Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			42,224	0.97

Existing Schoolview Way Configuration				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			0	0

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I_Ex = Impervious Area (ac)
P = Pervious Area (ac)
At = Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = _____ ft
R = _____ ft

At = (R*L) / 43560
At = 1.60 ac

I_Ex = 0.97 ac

P = At-I_Ex
P = 0.63 ac

From existing Drainage Map:
Off = 0.00 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 2A
Subject Post-Developed CN and SCS Runoff Volume Calculation

Basin Designation 2A (Proposed)
Type Evaluation Post-Developed

Drainage Area begins at Station 17+00
and continues until Station 29+70

Proposed Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			51,743	1.19

Proposed Schoolview Way Configuration				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			0	0

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I = Impervious Area (ac)
P = Pervious Area (ac)
At = Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = ft
R = ft

Atp = (R*L) / 43560
Atp = 1.60 ac

From existing Drainage Map:
Off = 0.00 ac

I = 1.19 ac
I_New = I - I_Ex
I_New = 0.22 ac

P = Atp-I
P = 0.41 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 2A
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Existing Condition

Basin Designation 2A (Existing)
Type Evaluation Pre-Developed
Basin Size 1.60 ac
Rainfall Depth 8.40 in

Total Drainage Area 1.60 ac

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P-(0.2S))^2}{P+(0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	0.97	94.99
Grass, Good Condition	A	39	0.00	0
Grass, Good Condition	D	80	0.63	50.66
	Total Area =		1.60	145.65

Existing Pond Area **For this analysis, all soils are assumed to be D soils for grass.*

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	0.00	0.00
Grass, Good Condition	A/D	80	0.00	0.00
Existing Pond 1 at DHW	-	100	0.00	0.00
Existing Pond 3 at DHW	-	100	0.00	0.00
	Total Area =		0.00	0.00

Proposed Intersection Area **For this analysis, all soils are assumed to be D soils for grass.*

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Grass, Good Condition	A/D	80	0.00	0.00
Grass, Good Condition	A/D	80	0.00	0.00
	Total Area =		0.00	0.00

Basin		Pond		Intersection	
CN=	90.89	CN=		CN=	
S=	1 in	S=	in	S=	in
R=	7.31 in	R=	in	R=	in
V=	0.98 ac-ft	V=	ac-ft	V=	ac-ft

Total Volume= 0.98 ac-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 2A
Subject Post-Developed CN and SCS Runoff Volume Calculation

Proposed Condition

Basin Designation 2A (Proposed)
Type Evaluation Post-Developed
Basin Size 1.60 ac
Total Drainage Area 1.60 ac
Rainfall Depth 8.40 in

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P-(0.2S))^2}{P+(0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	1.19	116.4100739
Grass, Good Condition	A	39	0.00	0
Grass, Good Condition	D	80	0.41	33.17829201
	Total Area =		1.60	149.5883659

Existing Pond Area **For this analysis, all soils are assumed to be D soils for grass.*

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Grass, Good Condition	A/D	80	0.00	0.00
Pond 2A at DHW	-	100	0.00	0.00
	Total Area =		0.00	0.00

Proposed Intersection Area **For this analysis, all soils are assumed to be D soils for grass.*

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	0.00	0.00
Grass, Good Condition	A/D	80	0.00	0.00
	Total Area =		0.00	0.00

Basin		Pond		Intersection	
CN=	93.34	CN=		CN=	
S=	0.71 in	S=	in	S=	in
R=	7.60 in	R=	in	R=	in
V=	1.02 ac-ft	V=	ac-ft	V=	ac-ft

Total Volume= 1.02 ac-ft

Post Developed Volume - Pre Developed Volume =

0.04 ac-ft = 1719 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 2A
Subject Treatment Volume Calculation

SJRWMD Treatment Volume Requirement

Water Quality Volume for a Wet Detention System is based upon 2.5" times the additional onsite impervious area and 1" times the total offsite drainage area. The project is located within the Econ River Basin and requires an additional 50% treatment volume.

Vt = 2.5 inches of runoff times the new impervious area
Vt = (I-New * 2.5 in) / 12
Vt = 0.05 ac-ft

Is Offsite Area Contributing to the Basin (yes or no)? No

Offsite Area, Off = 0.00 ac
Vt(off) = (Off * 1.0 in) / 12
Vt(off) = 0.00 ac-ft

Did the existing basin receive treatment (Yes or No)? No

Will the existing treatment system will be impacted by the proposed improvements (yes or no)? No

Existing Required Treatment area for basin = 0 ac

Existing Required Treatment Volume for basin, Vt(Ex) = 0 ac-ft

Treatment Volume Required = [Vt + Vt(Off)+Vt(Ex)]
Treatment Volume Required = 0.05 ac-ft

Is Basin Part of an OFW (yes or no)? Yes (If Yes, then add an additional 50% Treatment Volume)
(Econ River Basin)

Total Basin Required Treatment Volume = 0.08 ac-ft

Step No. 3, Pond 2 - Total Peak Storage Volume Requirement

The Total Peak Storage Volume Required is:

Volume (peak) = Treatment Volume + Estimated Peak Attenuation Volume

Treatment Volume =	0.08 ac-ft	=	3,267 cu-ft
Attenuation Volume =	0.04 ac-ft	=	1,719 cu-ft
Volume (peak) =	0.11 ac-ft	=	4,986 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 2B Original PSR
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Basin Designation 2B (Existing)
Type Evaluation Pre-Developed

Drainage Area begins at Station 12+70
and continues until Station 47+85

Existing Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			185,536	4.26

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I_Ex = Impervious Area (ac)
P = Pervious Area (ac)
At = Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = _____ ft
R = _____ ft

At = (R*L) / 43560
At = 9.11 ac

I_Ex = 4.26 ac

P = At-I_Ex
P = 4.85 ac

From existing Drainage Map:
Off = 0.00 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 2B Original PSR
Subject Post-Developed CN and SCS Runoff Volume Calculation

Basin Designation 2B (Proposed)
Type Evaluation Post-Developed

Drainage Area begins at Station 12+70
and continues until Station 47+85

Proposed Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			269,839	6.19

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I = Impervious Area (ac)
P = Pervious Area (ac)
Atp = Proposed Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = _____ ft
R = _____ ft

Atp = (R*L) / 43560
Atp = 9.11 ac

I = 6.19 ac
I_New = I - I_Ex
I_New = 1.94 ac

P = Atp-I
P = 2.92 ac

From existing Drainage Map:
Off = 0.00 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 2B Original PSR
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Existing Condition

Basin Designation	2B (Existing)
Type Evaluation	Pre-Developed
Basin Size	9.11 ac
Rainfall Depth	8.40 in

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P - (0.2S))^2}{P + (0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	4.26	417.41
Grass, Good Condition	A	39	0.00	0.00
Grass, Good Condition	D	80	4.85	388.38
	Total Area =		9.11	805.80

Offsite

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Grass, Good Condition (offsite)	D	80	0.38	30.40
				30.40

Basin		Offsite	
CN=	88.41	CN=	80
S=	1.31 in	S=	2.5 in
R=	7.01 in	R=	6.68 in
V=	5.32 ac-ft	V=	0.21 ac-ft

Total Volume= 5.54 ac-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 2B Original PSR
Subject Post-Developed CN and SCS Runoff Volume Calculation

Proposed Condition

Basin Designation	2B (Proposed)
Type Evaluation	Post-Developed
Basin Size	9.11 ac
Rainfall Depth	8.40 in

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P - (0.2S))^2}{P + (0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	6.19	607.08
Grass, Good Condition	A	39	0.00	0.00
Grass, Good Condition	D	80	2.92	233.55
	Total Area =		9.11	840.63

Offsite

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Grass, Good Condition (offsite)	D	80	0.32	25.60
		Total	0.32	25.60

Basin		Offsite	
CN=	92.23	CN=	80
S=	0.84 in	S=	2.5 in
R=	7.47 in	R=	6.00 in
V=	5.67 ac-ft	V=	0.16 ac-ft

Total Volume= 5.83 ac-ft

Post Developed Volume - Pre Developed Volume =

Total 0.30 ac-ft = 13,068 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 2B Original PSR
Subject Treatment Volume Calculation

SJRWMD Treatment Volume Requirement

Water Quality Volume for a Wet Detention System is based upon 2.5" times the additional onsite impervious area and 1" times the total offsite drainage area. The project is located within the Econ River Basin and requires an additional 50% treatment volume.

Vt = 2.5 inches of runoff times the new impervious area
Vt = (I-New * 2.5 in) / 12
Vt = 0.4 ac-ft

Is Offsite Area Contributing to the Basin (yes or no)? Yes

Offsite Area, Off = 0.32 ac
Vt(off) = (Off * 1.0 in) / 12
Vt(off) = 0.03 ac-ft

Did the existing basin receive treatment (Yes or No)? No

Will the existing treatment system will be impacted by the proposed improvements (yes or no)? No

Existing Required Treatment area for basin = 0 ac

Existing Required Treatment Volume for basin, Vt(Ex) = 0 ac-ft

Treatment Volume Required = [Vt + Vt(Off)+Vt(Ex)]
Treatment Volume Required = 0.43 ac-ft

Is Basin Part of an OFW (yes or no)? Yes (If Yes, then add an additional 50% Treatment Volume)
(Econ River Basin)

Total Basin Required Treatment Volume = 0.65 ac-ft

Total Peak Storage Volume Requirement

The Total Peak Storage Volume Required is:

Volume (peak) = Treatment Volume + Estimated Peak Attenuation Volume

Treatment Volume =	0.65 ac-ft	=	28,096 cu-ft
Attenuation Volume =	0.30 ac-ft	=	13,068 cu-ft
Volume (peak) =	0.95 ac-ft	=	41,164 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 2B ICE Alternatives
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Basin Designation 2B (Existing)
Type Evaluation Pre-Developed

Drainage Area begins at Station 12+70
and continues until Station 47+85

Existing Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			167,987	3.86

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I_Ex = Impervious Area (ac)
P = Pervious Area (ac)
At = Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = _____ ft
R = _____ ft

At = (R*L) / 43560
At = 9.20 ac

I_Ex = 3.86 ac

P = At-I_Ex
P = 5.34 ac

From existing Drainage Map:
Off = 0.00 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 2B ICE Alternatives
Subject Post-Developed CN and SCS Runoff Volume Calculation

Basin Designation 2B (Proposed)
Type Evaluation Post-Developed

Drainage Area begins at Station 12+70
and continues until Station 47+85

Proposed Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			276,011	6.34

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I = Impervious Area (ac)
P = Pervious Area (ac)
Atp = Proposed Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)
L = _____ ft
R = _____ ft

Atp = (R*L) / 43560
Atp = 9.20 ac

I = 6.34 ac
I_New = I - I_Ex
I_New = 2.48 ac

P = Atp-I
P = 2.86 ac

From existing Drainage Map:
Off = 0.00 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 2B ICE Alternatives
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Existing Condition

Basin Designation	2B (Existing)
Type Evaluation	Pre-Developed
Basin Size	9.20 ac
Rainfall Depth	8.40 in

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P - (0.2S))^2}{P + (0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	3.86	377.93
Grass, Good Condition	A	39	0.00	0.00
Grass, Good Condition	D	80	5.34	427.14
	Total Area =		9.20	805.07

Offsite

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Grass, Good Condition (offsite)	D	80	0.38	30.40
				30.40

Basin		Offsite	
CN=	87.55	CN=	80
S=	1.42 in	S=	2.5 in
R=	6.91 in	R=	6.75 in
V=	5.29 ac-ft	V=	0.21 ac-ft

Total Volume= 5.51 ac-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 2B ICE Alternatives
Subject Post-Developed CN and SCS Runoff Volume Calculation

Proposed Condition

Basin Designation	2B (Proposed)
Type Evaluation	Post-Developed
Basin Size	9.20 ac
Rainfall Depth	8.40 in

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P - (0.2S))^2}{P + (0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	6.34	620.96
Grass, Good Condition	A	39	0.00	0.00
Grass, Good Condition	D	80	2.86	228.75
	Total Area =		9.20	849.71

Offsite

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Grass, Good Condition (offsite)	D	80	0.32	25.87
		Total	0.32	25.87

Basin		Offsite	
CN=	92.4	CN=	80
S=	0.82 in	S=	2.5 in
R=	7.49 in	R=	6.00 in
V=	5.74 ac-ft	V=	0.16 ac-ft

Total Volume= 5.90 ac-ft

Post Developed Volume - Pre Developed Volume =

Total 0.39 ac-ft = 16,988 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 2B ICE Alternatives
Subject Treatment Volume Calculation

SJRWMD Treatment Volume Requirement

Water Quality Volume for a Wet Detention System is based upon 2.5" times the additional onsite impervious area and 1" times the total offsite drainage area. The project is located within the Econ River Basin and requires an additional 50% treatment volume.

Vt = 2.5 inches of runoff times the new impervious area
Vt = (I-New * 2.5 in) / 12
Vt = 0.52 ac-ft

Is Offsite Area Contributing to the Basin (yes or no)? Yes

Offsite Area, Off = 0.32 ac
Vt(off) = (Off * 1.0 in) / 12
Vt(off) = 0.03 ac-ft

Did the existing basin receive treatment (Yes or No)? No

Will the existing treatment system will be impacted by the proposed improvements (yes or no)? No

Existing Required Treatment area for basin = 0 ac

Existing Required Treatment Volume for basin, Vt(Ex) = 0 ac-ft

Treatment Volume Required = [Vt + Vt(Off)+Vt(Ex)]
Treatment Volume Required = 0.55 ac-ft

Is Basin Part of an OFW (yes or no)? Yes (If Yes, then add an additional 50% Treatment Volume)
(Econ River Basin)

Total Basin Required Treatment Volume = 0.83 ac-ft

Total Peak Storage Volume Requirement

The Total Peak Storage Volume Required is:

Volume (peak) = Treatment Volume + Estimated Peak Attenuation Volume

Treatment Volume =	0.83 ac-ft	=	35,937 cu-ft
Attenuation Volume =	0.39 ac-ft	=	16,988 cu-ft
Volume (peak) =	1.22 ac-ft	=	52,925 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 3 Original PSR
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Basin Designation 3 (Existing)
Type Evaluation Pre-Developed

Drainage Area begins at Station 47+85
and continues until Station 97+55

Existing Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			284,269	6.53

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I_Ex = Impervious Area (ac)
P = Pervious Area (ac)
At = Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = _____ ft
R = _____ ft

At = (R*L) / 43560
At = 13.77 ac

I_Ex= 6.526 ac

P = At-I_Ex
P = 7.249 ac

From existing Drainage Map:
Off = 0.00 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 3 Original PSR
Subject Post-Developed CN and SCS Runoff Volume Calculation

Basin Designation 3 (Proposed)
Type Evaluation Post-Developed

Drainage Area begins at Station 47+85
and continues until Station 97+55

Proposed Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			507,609	11.65

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I = Impervious Area (ac)
P = Pervious Area (ac)
Atp = Proposed Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = _____ ft
R = _____ ft

Atp = (R*L) / 43560
Atp = 13.77 ac

I = 11.65 ac
I_New = I - I_Ex
I_New = 5.13 ac

P = Atp-I
P = 2.12 ac

From existing Drainage Map:
Off = 0.00 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 3 Original PSR
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Existing Condition

Basin Designation 3 (Existing)
Type Evaluation Pre-Developed
Basin Size 13.77 ac
Total Drainage Area 19.21 ac
Rainfall Depth 8.40 in

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P - (0.2S))^2}{P + (0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin **For this analysis, all soils are assumed to be D soils for grass.*

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	6.53	639.54
Grass, Good Condition	A	39	0.00	0.00
Grass, Good Condition	D	80	7.25	579.92
	Total Area =		13.77	1219.46

Offsite

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Grass, Good Condition (offsite)	D	80	0.23	18.40
Grass, Good Condition (offsite)	D	80	0.70	56.00
	Total Area =		0.93	74.40

Proposed Pond Location **For this analysis, all soils are assumed to be all D*

Soil Land Use Description	Soil Group	CN	Area (ac)
Pond Area at DHW (Woods, good)	A/D	77	4.51

Basin	Offsite	Pond
CN= 88.53	CN= 80	CN= 77
S= 1.3 in	S= 2.5 in	S= 2.99 in
R= 7.02 in	R= 6.00 in	R= 5.64 in
V= 8.06 ac-ft	V= 0.47 ac-ft	V= 2.12 ac-ft

Total Volume= 10.64 ac-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 3 Original PSR
Subject Post-Developed CN and SCS Runoff Volume Calculation

Proposed Condition

Basin Designation 3 (Proposed)
Type Evaluation Post-Developed
Basin Size 13.77 ac
Total Drainage Area 19.21 ac
Rainfall Depth 8.40 in

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P - (0.2S))^2}{P + (0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin **For this analysis, all soils are assumed to be D soils for grass.*

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	11.65	1142.00
Grass, Good Condition	A	39	0.00	0.00
Grass, Good Condition	D	80	2.12	169.74
	Total Area =		13.77	1311.75

Offsite

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Grass, Good Condition (offsite)	D	80	0.23	18.40
Grass, Good Condition (offsite)	D	80	0.70	56.00
	Total Area =		0.93	74.40

Proposed Pond Location **For this analysis, all soils are assumed to be all D*

Soil Land Use Description	Soil Group	CN	Area (ac)
Pond Area at DHW (Water)	-	100	4.51

Basin	Offsite	Pond
CN= 95.23	CN= 80	CN= 100
S= 0.5 in	S= 2.5 in	S= 0 in
R= 7.83 in	R= 6.00 in	R= 8.40 in
V= 8.99 ac-ft	V= 0.47 ac-ft	V= 3.16 ac-ft

Total Volume= 12.61 ac-ft

Post Developed Volume - Pre Developed Volume =

1.97 ac-ft = 85,813 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 3 Original PSR
Subject Treatment Volume Calculation

SJRWMD Treatment Volume Requirement

Water Quality Volume for a Wet Detention System is based upon 2.5" times the additional onsite impervious area and 1" times the total offsite drainage area. The project is located within the Econ River Basin and requires an additional 50% treatment volume.

Vt = 2.5 inches of runoff times the new impervious area
Vt = (I-New * 2.5 in) / 12
Vt = 1.07 ac-ft

Is Offsite Area Contributing to the Basin (yes or no)? Yes

Offsite Area, Off = 5.44 ac
Vt(off) = (Off * 1.0 in) / 12
Vt(off) = 0.45 ac-ft

Did the existing basin receive treatment (Yes or No)? No

Will the existing treatment system will be impacted by the proposed improvements (yes or no)? No

Existing Required Treatment area for basin = 0 ac

Existing Required Treatment Volume for basin, Vt(Ex) = 0 ac-ft

Treatment Volume Required = [Vt + Vt(Off)+Vt(Ex)]
Treatment Volume Required = 1.52 ac-ft

Is Basin Part of an OFW (yes or no)? Yes (If Yes, then add an additional 50% Treatment Volume)
(Econ River Basin)

Total Basin Required Treatment Volume = 2.28 ac-ft

Total Peak Storage Volume Requirement

The Total Peak Storage Volume Required is:

Volume (peak) = Treatment Volume + Estimated Peak Attenuation Volume

Treatment Volume =	2.28 ac-ft	=	99,317 cu-ft
Attenuation Volume =	1.97 ac-ft	=	85,813 cu-ft
Volume (peak) =	4.25 ac-ft	=	185,130 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 3 ICE Alternatives
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Basin Designation 3 (Existing)
Type Evaluation Pre-Developed

Drainage Area begins at Station 47+85
and continues until Station 97+55

Existing Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			284,269	6.53

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I_Ex = Impervious Area (ac)
P = Pervious Area (ac)
At = Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = _____ ft
R = _____ ft

At = (R*L) / 43560
At = 19.49 ac

I_Ex= 6.526 ac

P = At-I_Ex
P = 12.96 ac

From existing Drainage Map:
Off = 0.00 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 3 ICE Alternatives
Subject Post-Developed CN and SCS Runoff Volume Calculation

Basin Designation 3 (Proposed)
Type Evaluation Post-Developed

Drainage Area begins at Station 47+85
and continues until Station 97+55

Proposed Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			507,609	11.65

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I = Impervious Area (ac)
P = Pervious Area (ac)
Atp = Proposed Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = _____ ft
R = _____ ft

Atp = (R*L) / 43560
Atp = 19.49 ac

I = 11.65 ac
I_New = I - I_Ex
I_New = 5.13 ac

P = Atp-I
P = 7.83 ac

From existing Drainage Map:
Off = 0.00 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 3 ICE Alternatives
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Existing Condition

Basin Designation 3 (Existing)
Type Evaluation Pre-Developed
Basin Size 19.49 ac
Total Drainage Area 25.74 ac
Rainfall Depth 8.40 in

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P - (0.2S))^2}{P + (0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin **For this analysis, all soils are assumed to be D soils for grass.*

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	6.53	639.54
Grass, Good Condition	A	39	0.00	0.00
Grass, Good Condition	D	80	12.96	1036.80
	Total Area =		19.49	1676.34

Offsite

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Grass, Good Condition (offsite)	D	80	0.23	18.40
Grass, Good Condition (offsite)	D	80	0.70	56.00
	Total Area =		0.93	74.40

Proposed Pond Location **For this analysis, all soils are assumed to be all D*

Soil Land Use Description	Soil Group	CN	Area (ac)
Pond Area at DHW (Woods, good)	A/D	77	5.32

Basin	Offsite	Pond
CN= 86.03	CN= 80	CN= 77
S= 1.62 in	S= 2.5 in	S= 2.99 in
R= 6.73 in	R= 6.00 in	R= 5.64 in
V= 10.92 ac-ft	V= 0.47 ac-ft	V= 2.50 ac-ft

Total Volume= 13.89 ac-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 3 ICE Alternatives
Subject Post-Developed CN and SCS Runoff Volume Calculation

Proposed Condition

Basin Designation 3 (Proposed)
Type Evaluation Post-Developed
Basin Size 19.49 ac
Total Drainage Area 25.74 ac
Rainfall Depth 8.40 in

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P - (0.2S))^2}{P + (0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin **For this analysis, all soils are assumed to be D soils for grass.*

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	11.65	1142.00
Grass, Good Condition	A	39	0.00	0.00
Grass, Good Condition	D	80	7.83	626.62
	Total Area =		19.49	1768.63

Offsite

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Grass, Good Condition (offsite)	D	80	0.23	18.40
Grass, Good Condition (offsite)	D	80	0.70	56.00
	Total Area =		0.93	74.40

Proposed Pond Location **For this analysis, all soils are assumed to be all D*

Soil Land Use Description	Soil Group	CN	Area (ac)
Pond Area at DHW (Water)	-	100	5.32

Basin	Offsite	Pond
CN= 90.76	CN= 80	CN= 100
S= 1.02 in	S= 2.5 in	S= 0 in
R= 7.29 in	R= 6.00 in	R= 8.40 in
V= 11.84 ac-ft	V= 0.47 ac-ft	V= 3.72 ac-ft

Total Volume= 16.02 ac-ft

Post Developed Volume - Pre Developed Volume =

2.14 ac-ft = 93,218 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 3 ICE Alternatives
Subject Treatment Volume Calculation

SJRWMD Treatment Volume Requirement

Water Quality Volume for a Wet Detention System is based upon 2.5" times the additional onsite impervious area and 1" times the total offsite drainage area. The project is located within the Econ River Basin and requires an additional 50% treatment volume.

Vt = 2.5 inches of runoff times the new impervious area
Vt = (I-New * 2.5 in) / 12
Vt = 1.07 ac-ft

Is Offsite Area Contributing to the Basin (yes or no)? Yes

Offsite Area, Off = 6.25 ac
Vt(off) = (Off * 1.0 in) / 12
Vt(off) = 0.52 ac-ft

Did the existing basin receive treatment (Yes or No)? No

Will the existing treatment system will be impacted by the proposed improvements (yes or no)? No

Existing Required Treatment area for basin = 0 ac

Existing Required Treatment Volume for basin, Vt(Ex) = 0 ac-ft

Treatment Volume Required = [Vt + Vt(Off)+Vt(Ex)]
Treatment Volume Required = 1.59 ac-ft

Is Basin Part of an OFW (yes or no)? Yes (If Yes, then add an additional 50% Treatment Volume)
(Econ River Basin)

Total Basin Required Treatment Volume = 2.39 ac-ft

Total Peak Storage Volume Requirement

The Total Peak Storage Volume Required is:

Volume (peak) = Treatment Volume + Estimated Peak Attenuation Volume

Treatment Volume =	2.39 ac-ft	=	103,891 cu-ft
Attenuation Volume =	2.14 ac-ft	=	93,218 cu-ft
Volume (peak) =	4.53 ac-ft	=	197,109 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 4-200 Round-a-bout
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Basin Designation 4-200 (Existing)
Type Evaluation Pre-Developed

Drainage Area begins at Station 110+50
and continues until Station 111+92

Existing Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			10,424	0.24

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I_Ex = Impervious Area (ac)
P = Pervious Area (ac)
At = Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = _____ ft
R = _____ ft

At = (R*L) / 43560
At = 0.41 ac

I_Ex = 0.24 ac

P = At-I_Ex
P = 0.17 ac

From existing Drainage Map:
Off = 0.13 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 4-200 Round-a-bout
Subject Post-Developed CN and SCS Runoff Volume Calculation

Basin Designation 4-200 (Proposed)
Type Evaluation Post-Developed

Drainage Area begins at Station 110+50
and continues until Station 111+92

Proposed Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			13,334	0.31

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I = Impervious Area (ac)
P = Pervious Area (ac)
Atp = Proposed Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = _____ ft
R = _____ ft

Atp = (R*L) / 43560
Atp = 0.41 ac

I = 0.31
I_New = I - I_Ex
I_New = 0.07 ac

P = Atp-I
P = 0.10 ac

From existing Drainage Map:
Off = 0.13 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 4-200 Round-a-bout
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Existing Condition

Basin Designation 4-200 (Existing)
Type Evaluation Pre-Developed
Basin Size 0.41 ac
Total Drainage Area 4.52 ac
Rainfall Depth 8.40 in

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P - (0.2S))^2}{P + (0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	0.24	23.45
Grass, Good Condition	A	39	0.17	6.53
	Total Area =		0.41	29.98

Offsite

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Offsite)	-	98	0.13	12.74
Grass, Good Condition (Offsite)	A	39	0.15	5.85
	Total Area =		0.28	18.59

Basin 4-100 **For this analysis, all soils are assumed to be D soils for grass.*

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area	-	98	0.92	90.22
Grass, Good Condition	A/D	80	2.91	232.80
	Total Area =		3.83	323.03

Basin	Offsite	Basin 4-100
CN= 73.71	CN= 66.39	CN= 84.33
S= 3.57 in	S= 5.06 in	S= 1.86 in
R= 5.25 in	R= 4.38 in	R= 6.52 in
V= 0.18 ac-ft	V= 0.10 ac-ft	V= 2.08 ac-ft

Total Volume= 2.36 ac-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 4-200 Round-a-bout
Subject Post-Developed CN and SCS Runoff Volume Calculation

Proposed Condition

Basin Designation 4-200 (Proposed)
Type Evaluation Pre-Developed
Basin Size Area (ac) ac
Total Drainage Area 4.52 ac
Rainfall Depth 8.40 in

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P - (0.2S))^2}{P + (0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	0.31	30.00
Grass, Good Condition	A	39	0.10	3.92
	Total Area =		0.41	33.92

Offsite

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Offsite)	-	98	0.13	12.74
Grass, Good Condition (Offsite)	A	39	0.15	5.85
	Total Area =		0.28	18.59

Basin 4-100 **For this analysis, all soils are assumed to be D soils for grass.*

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area	-	98	1.73	169.50
Grass, Good Condition	A/D	80	2.10	168.09
	Total Area =		3.83	337.59

Basin		Offsite		Basin 4-100	
CN=	83.4	CN=	66.39	CN=	88.13
S=	1.99 in	S=	5.06 in	S=	1.35 in
R=	6.41 in	R=	4.38 in	R=	6.97 in
V=	0.22 ac-ft	V=	0.10 ac-ft	V=	2.23 ac-ft

Total Volume= 2.55 ac-ft

Post Developed Volume - Pre Developed Volume =

0.19 ac-ft = 8276 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 4-200 Round-a-bout
Subject Treatment Volume Calculation

SJRWMD Treatment Volume Requirement

Water Quality Volume for a Wet Detention System is based upon 2.5" times the additional onsite impervious area and 1" times the total offsite drainage area. The project is located within the Econ River Basin and requires an additional 50% treatment volume.

Vt = 2.5 inches of runoff times the new impervious area
Vt = (I-New * 2.5 in) / 12
Vt = 0.18 ac-ft

Is Offsite Area Contributing to the Basin (yes or no)? No

Offsite Area, Off = 0.00 ac
Vt(off) = (Off * 1.0 in) / 12
Vt(off) = 0.00 ac-ft

**Offsite routed around system thus no offsite water quality provided.*

Did the existing basin receive treatment (Yes or No)? No

Will the existing treatment system will be impacted by the proposed improvements (yes or no)? No

Existing Required Treatment area for basin = 0 ac

Existing Required Treatment Volume for basin, Vt(Ex) = 0 ac-ft

Treatment Volume Required = [Vt + Vt(Off)+Vt(Ex)]
Treatment Volume Required = 0.18 ac-ft

Is Basin Part of an OFW (yes or no)? Yes (If Yes, then add an additional 50% Treatment Volume)
(Econ River Basin)

Total Basin Required Treatment Volume = 0.27 ac-ft

Total Peak Storage Volume Requirement

The Total Peak Storage Volume Required is:

Volume (peak) = Treatment Volume + Estimated Peak Attenuation Volume

Treatment Volume =	0.27 ac-ft	=	11761 cu-ft
Attenuation Volume =	0.19 ac-ft	=	828 cu-ft
Volume (peak) =	0.46 ac-ft	=	20,038 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 4-200 Bowtie
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Basin Designation 4-200 (Existing)
Type Evaluation Pre-Developed

Drainage Area begins at Station 110+50
and continues until Station 111+92

Existing Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			10,424	0.24

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I_Ex = Impervious Area (ac)
P = Pervious Area (ac)
At = Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = _____ ft
R = _____ ft

At = (R*L) / 43560
At = 0.41 ac

I_Ex = 0.24 ac

P = At-I_Ex
P = 0.17 ac

From existing Drainage Map:
Off = 0.13 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 4-200 Bowtie
Subject Post-Developed CN and SCS Runoff Volume Calculation

Basin Designation 4-200 (Proposed)
Type Evaluation Post-Developed

Drainage Area begins at Station 110+50
and continues until Station 111+92

Proposed Impervious Area Tabulation				
Description	Width	Length	Product (sq. ft)	Product (ac)
Total Impervious Area =			10,694	0.25

L = Approximate Roadway Length (ft)
R = Average Right-of-Way Width in Basin (ft)
I = Impervious Area (ac)
P = Pervious Area (ac)
Atp = Proposed Total Existing Onsite Basin Area (ac) (Excluding Pond Area)
Off = Total Offsite Impervious Area (ac)

L = _____ ft
R = _____ ft

Atp = (R*L) / 43560
Atp = 0.41 ac

I = 0.25
I_New = I - I_Ex
I_New = 0.01 ac

P = Atp-I
P = 0.16 ac

From existing Drainage Map:
Off = 0.13 ac

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 4-200 Bowtie
Subject Pre-Developed CN and SCS Runoff Volume Calculation

Existing Condition

Basin Designation 4-200 (Existing)
Type Evaluation Pre-Developed
Basin Size 0.41 ac
Total Drainage Area 4.52 ac
Rainfall Depth 8.40 in

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P - (0.2S))^2}{P + (0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	0.24	23.45
Grass, Good Condition	A	39	0.17	6.53
	Total Area =		0.41	29.98

Offsite

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Offsite)	-	98	0.13	12.74
Grass, Good Condition (Offsite)	A	39	0.15	5.85
	Total Area =		0.28	18.59

Basin 4-100 **For this analysis, all soils are assumed to be D soils for grass.*

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area	-	98	0.92	90.22
Grass, Good Condition	A/D	80	2.91	232.80
	Total Area =		3.83	323.03

Basin	Offsite	Basin 4-100
CN= 73.71	CN= 66.39	CN= 84.33
S= 3.57 in	S= 5.06 in	S= 1.86 in
R= 5.25 in	R= 4.38 in	R= 6.52 in
V= 0.18 ac-ft	V= 0.10 ac-ft	V= 2.08 ac-ft

Total Volume= 2.36 ac-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 4-200 Bowtie
Subject Post-Developed CN and SCS Runoff Volume Calculation

Proposed Condition

Basin Designation 4-200 (Proposed)
Type Evaluation Pre-Developed
Basin Size Area (ac) ac
Total Drainage Area 4.52 ac
Rainfall Depth 8.40 in

Weighted, CN = $\frac{\text{Product}}{\text{Area}}$

Soil Storage, S = $\frac{1000}{CN} - 10$

Runoff, R = $\frac{(P - (0.2S))^2}{P + (0.8S)}$

Runoff Volume, V = $\frac{\text{R}}{12}$ x Area

Basin

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Roadway and Sidewalk)	-	98	0.25	24.06
Grass, Good Condition	A	39	0.16	6.29
	Total Area =		0.41	30.35

Offsite

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area (Offsite)	-	98	0.13	12.74
Grass, Good Condition (Offsite)	A	39	0.15	5.85
	Total Area =		0.28	18.59

Basin 4-100 **For this analysis, all soils are assumed to be D soils for grass.*

Soil Land Use Description	Soil Group	CN	Area (ac)	Product
Impervious Area	-	98	2.02	198.28
Grass, Good Condition	A/D	80	1.81	144.59
	Total Area =		3.83	342.88

Basin		Offsite		Basin 4-100	
CN=	74.61	CN=	66.39	CN=	89.51
S=	3.4 in	S=	5.06 in	S=	1.17 in
R=	5.36 in	R=	4.38 in	R=	7.14 in
V=	0.18 ac-ft	V=	0.10 ac-ft	V=	2.28 ac-ft

Total Volume= 2.56 ac-ft

Post Developed Volume - Pre Developed Volume =

0.20 ac-ft = 8712 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Basin No. 4-200 Bowtie
Subject Treatment Volume Calculation

SJRWMD Treatment Volume Requirement

Water Quality Volume for a Wet Detention System is based upon 2.5" times the additional onsite impervious area and 1" times the total offsite drainage area. The project is located within the Econ River Basin and requires an additional 50% treatment volume.

Vt = 2.5 inches of runoff times the new impervious area
Vt = (I-New * 2.5 in) / 12
Vt = 0.23 ac-ft

Is Offsite Area Contributing to the Basin (yes or no)? No

Offsite Area, Off = 0.00 ac
Vt(off) = (Off * 1.0 in) / 12
Vt(off) = 0.00 ac-ft

**Offsite routed around system thus no offsite water quality provided.*

Did the existing basin receive treatment (Yes or No)? No

Will the existing treatment system will be impacted by the proposed improvements (yes or no)? No

Existing Required Treatment area for basin = 0 ac

Existing Required Treatment Volume for basin, Vt(Ex) = 0 ac-ft

Treatment Volume Required = [Vt + Vt(Off)+Vt(Ex)]
Treatment Volume Required = 0.23 ac-ft

Is Basin Part of an OFW (yes or no)? Yes (If Yes, then add an additional 50% Treatment Volume)
(Econ River Basin)

Total Basin Required Treatment Volume = 0.35 ac-ft

Total Peak Storage Volume Requirement

The Total Peak Storage Volume Required is:

Volume (peak) = Treatment Volume + Estimated Peak Attenuation Volume

Treatment Volume =	0.35 ac-ft	=	15028 cu-ft
Attenuation Volume =	0.20 ac-ft	=	871 cu-ft
Volume (peak) =	0.55 ac-ft	=	23,740 cu-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Pond No.: 3C Original PSR
Subject: Pond Calculations

Step No. 1, Pond 3C Original PSR - Pond Type

Geotechnical analysis for the project took one boring within the limits of Pond 3C Original PSR. The results are shown below.

Average Ground Surface Elevation =	67.5	ft NAVD88
Seasonal High Water Table Elevation =	67.0	ft NAVD88
Seasonal High Water Table depth =	0.5	ft

Based upon the existing SHWT the pond will be a

Wet Pond or Dry Pond

Step No. 2, Pond 3C Original PSR - Storage Height Estimate (based upon Average Wet Season Water Elevation)

The Average Wet Seasonal Water Elevation and the existing ground elevation is taken from the a combination of LiDAR and a wetland delineation (see Appendix). The Berm Elevation is assumed to be equal to the low elevation along a LiDAR cut Chuluota Road's centerline. Therefore the treatment volume and the peak attenuation volume are constrained to the following storage height (SH) or CH (See Step No. 5).

SH = Store Berm Elevation - Freeboard - Seasonal High Water Table Elevation

Existing Ground Elevation =	67.5	ft NGVD88
Berm Elevation =	69.40	ft NGVD88
Freeboard =	1.00	ft
Seasonal High Water Table EL =	67.0	ft NGVD88
SH =	1.40	ft

Note: Check CH (Step No. 5) before calculating pond configuration

Pond 3C Original PSR would receive water from Basins 1A/B, 2A/B, and 3.

Volume 1A =	9,147.60	cu-ft	=	0.21 ac-ft
Volume 1B =	1,742.40	cu-ft	=	0.04 ac-ft
Volume 2A =	4,986.13	cu-ft	=	0.11 ac-ft
Volume 2B =	41,164.20	cu-ft	=	0.95 ac-ft
Volume 3 =	185,130.00	cu-ft	=	4.25 ac-ft
Total =	242,170.33	cu-ft	=	5.56 ac-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Pond No.: *3C Original PSR*
Subject: *Pond Calculations*

Step No. 3, Pond 3C Original PSR - Pond Configuration

Use the formula for a rectangular box to determine the water surface area of a pond with vertical sides.

Volume = Length * Width * Height

Where: V = Volume from Step No. 3
L = Length of Pond
W = Width of Pond
H = Height (Lesser Height SH or CH from Step No.'s 2 or 6)

Assume that the width (W) is half of the Length (L), therefore L/W = 2

Volume = 242,170 cu-ft = L * W *H where L = 2* W

H = 1.3 ft
W = 306 ft
L = 612 ft

Step No. 4, Pond 3C Original PSR - Accounting for the Pond Side Slopes

Pond Side Slope assumed to be 1:4

L(top) = 2 * (SH * Side Slope) + L
W(top) = 2 * (SH * Side Slope) + W

Where: L(top) = Length of the pond at the top slope
W(top) = Width of the pond at top slope
L = Length of Pond from Step No. 4
W = Width of Pond from Step No. 4

L(top) = 622 ft
W(top) = 316 ft

Area @ Peak Design Stage = L(top) * W(top)
Area @ Peak Design Stage = 4.51 ac Inside of Berm

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Pond No.: *3C Original PSR*
Subject: *Pond Calculations*

Step No. 5, Pond 3C Original PSR - Accounting for Energy Loss

Urban section with closed storm sewer system therefore 10-year attenuation constrained to the following height (CH).

CH = Low point in gutter - Clearance - Estimated Energy Loss - Average Wet Season Water Elevation

Low Point in the gutter =	69.395	ft NGVD88	Assumes the low point in the road is raised to 70 FT NAVD88. Proposed gutter is 0.605 FT below crown.
Distance from Low Point to Pond =	100	ft	
Clearance =	1.00	ft	Assume Minor Losses
Estimated Energy Loss =	0.1	ft	Assume 0.05% Slope
Average Wet Season Water Elevation =	67.0	ft NGVD88	From Step No. 2
CH =	1.295	ft	

Step No. 6, Pond 3C Original PSR - Accounting for Maintenance Berms

Desired Maintenance Berm Width =	20.00	ft	
Freeboard Buffer Width =	4	ft	all sides
Top of Berm Elevation =	69.395	ft	
Existing Ground Elevation =	67.5	ft	
Tie Down Buffer Width =	7.58	ft	all sides
Additional Buffer Width =	5.00	ft	all sides
Length = L(top) + 2 * (Berm Width + Tie Down Buffer Width + Freeboard Buffer Width + Additional Buffer Width) =	695.08	ft	
Width = W(top) + 2 * (Berm Width + Tie Down Buffer Width + Freeboard Buffer Width + Additional Buffer Width) =	389	ft	
Pond Area Requirement =	**6.21**	ac	

Increasing Pond Area by: 15% to account for preceding information being preliminary (range between 10 and 20 percent).

Total Pond Area Requirement = 7.14 ac

Note: This estimate is for pond size only, further estimates for pond access and conveyance are site specific and should be added to the "Pond Area Requirement" estimated above.

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Pond No.: 3C ICE Alternatives
Subject: Pond Calculations

Step No. 1, Pond 3C ICE Alternatives - Pond Type

Geotechnical analysis for the project took one boring within the limits of Pond 3C ICE Alternatives. The results are shown below.

Average Ground Surface Elevation =	67.5	ft NAVD88
Seasonal High Water Table Elevation =	67.0	ft NAVD88
Seasonal High Water Table depth =	0.5	ft

Based upon the existing SHWT the pond will be a

Wet Pond or Dry Pond

Step No. 2, Pond 3C ICE Alternatives - Storage Height Estimate (based upon Average Wet Season Water Elevation)

The Average Wet Seasonal Water Elevation and the existing ground elevation is taken from the a combination of LiDAR and a wetland delineation (see Appendix). The Berm Elevation is assumed to be equal to the low elevation along a LiDAR cut Chuluota Road's centerline. Therefore the treatment volume and the peak attenuation volume are constrained to the following storage height (SH) or CH (See Step No. 5).

SH = Store Berm Elevation - Freeboard - Seasonal High Water Table Elevation

Existing Ground Elevation =	67.5	ft NGVD88
Berm Elevation =	69.2	ft NGVD88
Freeboard =	1.00	ft
Seasonal High Water Table EL =	67.0	ft NGVD88
SH =	1.20	ft

Note: Check CH (Step No. 5) before calculating pond configuration

Pond 3C ICE Alternatives would receive water from Basins 1A/B, 2A/B, and 3.

Volume 1A =	9,147.60	cu-ft	=	0.21 ac-ft
Volume 1B =	1,742.40	cu-ft	=	0.04 ac-ft
Volume 2A =	4,986.13	cu-ft	=	0.11 ac-ft
Volume 2B =	52,925.40	cu-ft	=	1.22 ac-ft
Volume 3 =	197,109.00	cu-ft	=	4.53 ac-ft
Total =	265,910.53	cu-ft	=	6.10 ac-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Pond No.: *3C ICE Alternatives*
Subject: *Pond Calculations*

Step No. 3, Pond 3C ICE Alternatives - Pond Configuration

Use the formula for a rectangular box to determine the water surface area of a pond with vertical sides.

Volume = Length * Width * Height

Where: V = Volume from Step No. 3
L = Length of Pond
W = Width of Pond
H = Height (Lesser Height SH or CH from Step No.'s 2 or 6)

Assume that the width (W) is half of the Length (L), therefore L/W = 2

Volume = 265,911 cu-ft = L * W *H where L = 2* W

H = 1.2 ft
W = 333 ft
L = 666 ft

Step No. 4, Pond 3C ICE Alternatives - Accounting for the Pond Side Slopes

Pond Side Slope assumed to be 1:4

L(top) = 2 * (SH * Side Slope) + L
W(top) = 2 * (SH * Side Slope) + W

Where: L(top) = Length of the pond at the top slope
W(top) = Width of the pond at top slope
L = Length of Pond from Step No. 4
W = Width of Pond from Step No. 4

L(top) = 675 ft
W(top) = 342 ft

Area @ Peak Design Stage = L(top) * W(top)
Area @ Peak Design Stage = 5.31 ac Inside of Berm

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Pond No.: *3C ICE Alternatives*
Subject: *Pond Calculations*

Step No. 5, Pond 3C ICE Alternatives - Accounting for Energy Loss

Urban section with closed storm sewer system therefore 10-year attenuation constrained to the following height (CH).

CH = Low point in gutter - Clearance - Estimated Energy Loss - Average Wet Season Water Elevation

Low Point in the gutter =	69.395	ft NGVD88	Assumes the low point in the road is raised to 70 FT NAVD88. Proposed gutter is 0.605 FT below crown.
Distance from Low Point to Pond =	100	ft	
Clearance =	1.00	ft	Assume Minor Losses
Estimated Energy Loss =	0.1	ft	Assume 0.05% Slope
Average Wet Season Water Elevation =	67.0	ft NGVD88	From Step No. 2
CH =	1.295	ft	

Step No. 6, Pond 3C ICE Alternatives - Accounting for Maintenance Berms

Desired Maintenance Berm Width =	20.00	ft	
Freeboard Buffer Width =	4	ft	all sides
Top of Berm Elevation =	69.2	ft	
Existing Ground Elevation =	67.5	ft	
Tie Down Buffer Width =	6.80	ft	all sides
Additional Buffer Width =	5.00	ft	all sides
Length = L(top) + 2 * (Berm Width + Tie Down Buffer Width + Freeboard Buffer Width + Additional Buffer Width) =	746.92	ft	
Width = W(top) + 2 * (Berm Width + Tie Down Buffer Width + Freeboard Buffer Width + Additional Buffer Width) =	414	ft	
Pond Area Requirement =	**7.10**	ac	

Increasing Pond Area by: 15% to account for preceding information being preliminary (range between 10 and 20 percent).

Total Pond Area Requirement = 8.17 ac

Note: This estimate is for pond size only, further estimates for pond access and conveyance are site specific and should be added to the "Pond Area Requirement" estimated above.

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Pond No.: 4C Round-a-bout
Subject: Pond Calculations

Step No. 1, Pond 4C Round-a-bout - Pond Type

Geotechnical analysis for the project took one boring within the limits of Pond 4C Round-a-bout. The results are shown below.

Average Ground Surface Elevation at pond =	71.9	ft NAVD88
Seasonal High Water Table Elevation =	67.0	ft NAVD88
Seasonal High Water Table depth =	4.9	ft

Based upon the existing SHWT the pond will be a

Wet Pond or Dry Pond

Step No. 2, Pond 4C Round-a-bout - Storage Height Estimate (based upon Average Wet Season Water Elevation)

The Average Wet Seasonal Water Elevation and the existing ground elevation is taken from the geotechnical information. The Berm Elevation is assumed to be equal to the low elevation along Lake Pickett Road. Therefore the treatment volume and the peak attenuation volume are constrained to the following storage height (SH) or CH (See Step No. 5).

SH = Store Berm Elevation - Freeboard - Seasonal High Water Table Elevation

Existing Ground Elevation =	71.9	ft NGVD88
Berm Elevation =	71.9	ft NGVD88
Freeboard =	1.00	ft
Seasonal High Water Table EL =	67	ft NGVD88
SH =	3.90	ft

Note: Check CH (Step No. 6) before calculating pond configuration

Pond 4C Round-a-bout would receive water from 4-100, 4-200, 4-300, and 4-400.

Volume 4-100/200 =	20,037.60	cu-ft	=	0.46	ac-ft
Volume 4-300 =	6,534.00	cu-ft	=	0.15	ac-ft
Volume 4-400 =	41,599.80	cu-ft	=	0.96	ac-ft
Total =	68,171.40	cu-ft	=	1.57	ac-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Pond No.: *4C Round-a-bout*
Subject: *Pond Calculations*

Step No. 3, Pond 4C Round-a-bout - Pond Configuration

Use the formula for a rectangular box to determine the water surface area of a pond with vertical sides.

Volume = Length * Width * Height

Where: V = Volume from Step No. 3
L = Length of Pond
W = Width of Pond
H = Height (Lesser Height SH or CH from Step No.'s 2 or 6)

Assume that the width (W) is half of the Length (L), therefore L/W = 2

Volume = 68,171 cu-ft = L * W *H where L = 2* W

H = 3.900 ft
W = 93 ft
L = 187 ft

Step No. 4, Pond 4C Round-a-bout - Accounting for the Pond Side Slopes

Pond Side Slope assumed to be 1:4

L(top) = 2 * (SH * Side Slope) + L
W(top) = 2 * (SH * Side Slope) + W

Where: L(top) = Length of the pond at the top slope
W(top) = Width of the pond at top slope
L = Length of Pond from Step No. 4
W = Width of Pond from Step No. 4

L(top) = 218 ft
W(top) = 125 ft

Area @ Peak Design Stage = L(top) * W(top)
Area @ Peak Design Stage = 0.62 ac Inside of Berm

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Pond No.: *4C Round-a-bout*
Subject: *Pond Calculations*

Step No. 5, Pond 4C Round-a-bout - Accounting for Energy Loss

Urban section with closed storm sewer system therefore 10-year attenuation constrained to the following height (CH).

CH = Low point in gutter - Clearance - Estimated Energy Loss - Average Wet Season Water Elevation

Low Point in the gutter =	72.395	ft NGVD88	Crown at low point is 73 FT NAVD88.
Distance from Low Point to Pond =	100	ft	Proposed gutter at 0.605 FT below crown.
Clearance =	1.00	ft	Assume Minor Losses
Estimated Energy Loss =	0.1	ft	Assume 0.05% Slope
Average Wet Season Water Elevation =	67	ft NGVD88	From Step No. 2
CH =	4.295	ft	

Step No. 6, Pond 4C Round-a-bout - Accounting for Maintenance Berms

Desired Maintenance Berm Width =	20.00	ft	
Freeboard Buffer Width =	4	ft	all sides
Length = L(top) + (2 * Berm Width + 2 * Freeboard Buffer Width) =	266	ft	
Width = W(top) + (2 * Berm Width + 2 * Freeboard Buffer Width) =	173	ft	

Pond Area Requirement = **1.06** ac

Increasing Pond Area by: 15% to account for preceding information being preliminary

Total Pond Area Requirement = **1.22**

Note: This estimate is for pond size only, further estimates for pond access and conveyance are site specific and should be added to the "Pond Area Requirement" estimated above.

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Pond No.: 4C Bowtie
Subject: Pond Calculations

Step No. 1, Pond 4C Bowtie - Pond Type

Geotechnical analysis for the project took one boring within the limits of Pond 4C Bowtie. The results are shown below.

Average Ground Surface Elevation at pond =	71.9	ft NAVD88
Seasonal High Water Table Elevation =	67.0	ft NAVD88
Seasonal High Water Table depth =	4.9	ft

Based upon the existing SHWT the pond will be a

Wet Pond or Dry Pond

Step No. 2, Pond 4C Bowtie - Storage Height Estimate (based upon Average Wet Season Water Elevation)

The Average Wet Seasonal Water Elevation and the existing ground elevation is taken from the geotechnical information. The Berm Elevation is assumed to be equal to the low elevation along Lake Pickett Road. Therefore the treatment volume and the peak attenuation volume are constrained to the following storage height (SH) or CH (See Step No. 5).

SH = Store Berm Elevation - Freeboard - Seasonal High Water Table Elevation

Existing Ground Elevation =	71.9	ft NGVD88
Berm Elevation =	71.9	ft NGVD88
Freeboard =	1.00	ft
Seasonal High Water Table EL =	67	ft NGVD88
SH =	3.90	ft

Note: Check CH (Step No. 6) before calculating pond configuration

Pond 4C Bowtie would receive water from 4-100, 4-200, 4-300, and 4-400.

Volume 4-100/200 =	23,740.20	cu-ft	=	0.55	ac-ft
Volume 4-300 =	4,356.00	cu-ft	=	0.10	ac-ft
Volume 4-400 =	40,510.80	cu-ft	=	0.93	ac-ft
Total =	68,607.00	cu-ft	=	1.58	ac-ft

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Pond No.: *4C Bowtie*
Subject: *Pond Calculations*

Step No. 3, Pond 4C Bowtie - Pond Configuration

Use the formula for a rectangular box to determine the water surface area of a pond with vertical sides.

Volume = Length * Width * Height

Where: V = Volume from Step No. 3
L = Length of Pond
W = Width of Pond
H = Height (Lesser Height SH or CH from Step No.'s 2 or 6)

Assume that the width (W) is half of the Length (L), therefore L/W = 2

Volume = 68,607 cu-ft = L * W *H where L = 2* W

H = 3.900 ft
W = 94 ft
L = 188 ft

Step No. 4, Pond 4C Bowtie - Accounting for the Pond Side Slopes

Pond Side Slope assumed to be 1:4

L(top) = 2 * (SH * Side Slope) + L
W(top) = 2 * (SH * Side Slope) + W

Where: L(top) = Length of the pond at the top slope
W(top) = Width of the pond at top slope
L = Length of Pond from Step No. 4
W = Width of Pond from Step No. 4

L(top) = 219 ft
W(top) = 125 ft

Area @ Peak Design Stage = L(top) * W(top)
Area @ Peak Design Stage = 0.63 ac Inside of Berm

PROJECT: *Chuluota Road Widening Conceptual Drainage Report*
Pond No.: *4C Bowtie*
Subject: *Pond Calculations*

Step No. 5, Pond 4C Bowtie - Accounting for Energy Loss

Urban section with closed storm sewer system therefore 10-year attenuation constrained to the following height (CH).

CH = Low point in gutter - Clearance - Estimated Energy Loss - Average Wet Season Water Elevation

Low Point in the gutter =	72.395	ft NGVD88	Crown at low point is 73 FT NAVD88. Proposed gutter at 0.605 FT below crown.
Distance from Low Point to Pond =	100	ft	
Clearance =	1.00	ft	Assume Minor Losses
Estimated Energy Loss =	0.1	ft	Assume 0.05% Slope
Average Wet Season Water Elevation =	67	ft NGVD88	From Step No. 2
CH =	4.295	ft	

Step No. 6, Pond 4C Bowtie - Accounting for Maintenance Berms

Desired Maintenance Berm Width =	20.00	ft	
Freeboard Buffer Width =	4	ft	all sides
Length = L(top) + (2 * Berm Width + 2 *	267	ft	
Width = W(top) + (2 * Berm Width + 2 *	173	ft	

Pond Area Requirement = **1.06** ac

Increasing Pond Area by: 15% to account for preceding information being preliminary (range between 10 and 20 percent).

Total Pond Area Requirement = **1.22 ac**

Note: This estimate is for pond size only, further estimates for pond access and conveyance are site specific and should be added to the "Pond Area Requirement" estimated above.