POND SITING REPORT

SR 29
From CR 80A (Cowboy Way) to US 27
Financial Project ID: 417878-1-22-01
Hendry and Glades County

05090

Prepared For:
FLORIDA DEPARTMENT OF TRANSPORTATION
District One

Prepared By:
Faller, Davis & Associates, Inc.
5525 W. Cypress Street, Suite 300
Tampa, Florida 33607
Certificate of Authorization No.: 5864
Deborah L. Knighton, P.E. No.: 43920

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EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT), District One, is conducting a Project Development and Environment (PD&E) Study on State Road (SR) 29 in Hendry and Glades counties, Florida. The study limits extend from CR 80A (Cowboy Way) north to US 27, a distance of approximately 15 miles.

The purpose of the project is to provide capacity and operational improvements to the existing 2-lane facility by upgrading to a 4-lane facility, including the addition of a new bridge over the Caloosahatchee River. This study meets all requirements of the Federal Highway Administration (FHWA) National Environmental Policy Act (NEPA) regulations.

The purpose of the Pond Siting Report is to document the pond site alternatives assessed along the study corridor. For the pond siting assessment, the corridor was subdivided into two, with the portion of the corridor south of the Caloosahatchee River further divided into basins identified with alphabetic characters, and the portion north of the Caloosahatchee River further divided into basins identified with numeric characters. South of the river, milling and resurfacing is proposed, with added impervious areas limited to turn lanes and sidewalk. North of the river, reconstruction is proposed thereby necessitating the need for stormwater treatment and attenuation. This report identifies one potential pond site alternative per basin for further consideration during the roadway design phase. For each site under consideration, the report will address the soils and groundwater characteristics, hydraulic feasibility, the presence of hazardous material contamination, threatened or endangered species, cultural resources, and wetland indicators. The ponds were sized based on limited information, without the benefit of geotechnical information and survey therefore, the pond sizes presented within this report are approximate and will require further refinement during the design phase.

At the time of this study, it is uncertain if and when the anticipated Statewide Stormwater Rule is to go into effect. The design criteria and details for the new stormwater rule currently have not been finalized. The offsite ponds ***have not been*** sized to meet the new stormwater rule per SFWMD directive.

Note that all elevations sited in this report are NGVD29. **Table E.1** on the following pages summarizes the offsite ponds assessed for each basin. Pink highlighted items require further assessment.

Table E.1 Summary of Pond Alternatives Assessed

SEGMENT ONE ALTERNATIVES	POND A	POND 0	POND 1	POND 2	POND 3	POND 4	POND 5	POND 6-1	POND 6-2	POND 7
INFLOW LOCATION (Station)	192+50	283+50	298+30	314+50	348+50	384+00	428+50	477+30	475+00	491+00
INFLOW LENGTH (ft) AND SIDE (LT or RT)	50 LT	50 LT	50 RT	50 RT	50 RT	50 RT	50 RT	50 RT	300 RT	50 RT
SMF SITE AREA (ac)	1.6	1.0	1.6	1.9	3.8	3.3	3.8	3.2	3.7	5.4
EASEMENT AREA (ac)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.20	N/A
EST. GROUND ELEVATION (ft) @THE SMF SITE (Avg.)	18.0	13.0	12.0	15.0	21.0	29.8	33.6	35.8	Unknown	<35.2
EST. DEPTH TO ROCK OR RESTRICTIVE LAYER (in)	24-40	>80	>80	>80	>80	>80	>80	>80	>80	>80
LOW EDGE OF PAVEMENT ELEVATION WITHIN BASIN	19.0	15.4	15.4	18.2	23.0	31.6	36.0	36.1	36.1	36.4
ESTIMATED SHGWT @ SITE	16.8 - 17.5	<6.3	10.5 - 11.5	14.5 - 15.0	19.5 - 20.5	28.3 - 29.3	32.6 - 33.6	34.3 - 35.3	Unknown	33.7 - 34.7
ESTIMATED CONTROL ELEVATION	16.8	9.0	11.3	14.5	19.5	28.3	32.6	33.4	33.4	33.9
HYDRAULIC FEASIBILITY	Fair	Good	Good	Good	Good	Good	Good	Good	Good	Good
TREATMENT SYSTEM	Wet	Dry	Wetland	Wet	Wet	Wet	Wet	Wet	Wetland	Wet
SOILS NAME	Boca	Udifluvents	Wabasso	Riviera	Oldsmar/ Floridana	Oldsmar	Immokalee/ Malabar	Pople/ Gator Muck	Malabar/ Water	Immokalee
HYDROLOGIC SOIL GROUP	A/D	A	C/D	C/D	C/D	C/D	B/D & A/D	B/D & C/D	A/D	B/D
LAND USE	Residential	Open Land	Mixed Wetland Hardwoods	Unimproved Pasture	Improved Pasture	Improved Pasture	Improved Pasture	Mixed Hardwoods/ Wetland Scrub	Mixed Hardwoods/ Freshwater Marsh	Improved Pasture/ Sod Farm/ Ditch
RECORDED ARCHAEOLOGICAL SITES	No	No	No	No	No	No	No	No	No	No
ARCHAEOLOGICAL POTENTIAL	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
RECORDED HISTORICAL STRUCTURES/RESOURCES	No	No	No	No	No	No	No	No	No	No
TENTATIVE CONTAMINATION RANKING	Medium	Medium	Low	No	No	No	No	No	No	No
PROTECTED, THREATENED & ENDANGERED SPECIES	No	Habitat	Habitat	Habitat	Habitat	Habitat	Habitat	Habitat	Habitat	Habitat
WETLAND INVOLVEMENT POTENTIAL	No	No	Significant	No	No	No	No	Medium	High	Low
PROXIMITY TO OUTFALL (ft)	50	50	50	50	280	80	200	50	500	600
NUMBER OF PARCELS	3	2	1	1	1	1	1	1	1	1
PARTIAL (PT) OR WHOLE TAKE (WT)	WT	PT	PT	PT	PT	PT	PT	PT	PT	PT

Requires Additional Investigation

Table E.1 (Continued) Summary of Pond Alternatives Assessed

SEGMENT TWO ALTERNATIVES	POND 8A	POND 8B	POND 9	POND 10	POND 11A	POND 11B	POND 12-13A	POND 13B	POND 14A	POND 14B-15-1	POND 14b-15-2
INFLOW LOCATION (Station)	576+00	587+50	628+50	668+50	690+00	702+50	795+50	835+50	905+00	919+00	919+00
INFLOW LENGTH (ft) AND SIDE (LT or RT)	50 LT	50 RT	50 RT	50 RT	50 RT	50 RT	50 RT	50 RT	50 RT	50 LT	50 LT
SMF SITE AREA (ac)	4.1	2.5	3.5	3.2	2.6	4.7	4.2	3.5	3.8	6.2	6.2
EASEMENT AREA (ac)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EST. GROUND ELEVATION (ft) @THE SMF SITE (Avg.)	31.8	31.8	32.2	33.2	<33	<33	35.2	<35.8	38.8	38.8	38.8
EST. DEPTH TO ROCK OR RESTRICTIVE LAYER (in)	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
LOW EDGE OF PAVEMENT ELEVATION WITHIN BASIN	35.0	35.0	34.8	35.7	37.0 (Raised One Foot)	37.4 (Raised One Foot)	40.1	40.7	41.3	41.25	41.25
ESTIMATED SHGWT @ SITE	31.9	31.9	30.8	33.2	34.0	34.0	35.2	37.5	37.9	37.9	37.9
ESTIMATED CONTROL ELEVATION	31.9	31.9	30.8	33.2	34.0	34.0	35.2	37.5	37.9	37.9	37.9
HYDRAULIC FEASIBILITY	Good	Good	Good	Good	Good/ Raise Road	Good/ Raise Road	Good	Good	Good	Good	Good
TREATMENT SYSTEM	Wet	Wet	Wet	Wet	Wet	Wet	Wet	Wet	Wet	Wet	Wet
SOILS NAME	Oldsmar	Oldsmar	Malabar	Malabar	Pineda	Malabar	Myakka	Malabar/ Basinger	Myakka	Basinger	Basinger/ Water
HYDROLOGIC SOIL GROUP	C/D	C/D	A/D	A/D	C/D	A/D	B/D	A/D	B/D	A/D	A/D
LAND USE	Improved Pasture/ Freashwater Marsh	Improved Pasture	Improved Pasture/ Freshwater Marsh/ Wet Prairie	Wet Prarie	Mixed Wetland Hardwoods	Mixed Wetland Hardwoods/ Freshwater Marsh	Shrub and Brushland	Wet Prairie	Drainage Ditch/ Wet Prairie	Drainage Ditch/ Wet Prairie	Reservoir / Wet Prairie
RECORDED ARCHAEOLOGICAL SITES	No	No	No	No	No	No	No	No	No	No	No
ARCHAEOLOGICAL POTENTIAL	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
RECORDED HISTORICAL STRUCTURES/RESOURCES	No	No	No	No	No	No	No	No	No	No	No
TENTATIVE CONTAMINATION RANKING	No	No	No	No	No	No	No	No	No	No	No
PROTECTED, THREATENED & ENDANGERED SPECIES	Habitat	Habitat	Habitat	Habitat	Habitat	Habitat	Habitat	Habitat	Habitat	Habitat	Habitat
WETLAND INVOLVEMENT POTENTIAL	Low	No	High	Significant	Significant	Significant	No	Significant	Significant	Significant	Significant
PROXIMITY TO OUTFALL (ft)	250	120	50	50	200	200	400	470	350	150	300
NUMBER OF PARCELS	1	1	1	1	1	1	1	1	1	1	1
PARTIAL (PT) OR WHOLE TAKE (WT)	PT	PT	PT	PT	PT	PT	PT	PT	PT	PT	PT

Requires Additional Investigation

Table E.1 (Continued) Summary of Pond Alternatives Assessed

SEGMENT THREE ALTERNATIVES	POND 16A	POND 16-17
INFLOW LOCATION (Station)	No Stationing	978+00
INFLOW LENGTH (ft) AND SIDE (LT or RT)	50 LT	50 RT
SMF SITE AREA (ac)	3.8	68.8
EASEMENT AREA (ac)	N/A	N/A
EST. GROUND ELEVATION (ft) @THE SMF SITE (Avg.)	<40.0	>40.0
EST. DEPTH TO ROCK OR RESTRICTIVE LAYER (in)	>80	>80
LOW EDGE OF PAVEMENT ELEVATION WITHIN BASIN	41.4	42 +/-
EST. SHGWT @ SITE	39.0	40.0
EST. SHW OF OUTFALL	Unknown	Unknown
HYDRAULIC FEASIBILITY	Good	Good
TREATMENT SYSTEM	Wet	Wetland
SOILS NAME	Immokalee/ Basinger	Water
HYDROLOGIC SOIL GROUP	B/D	N/A
LAND USE	Wet Prairie	Freshwater Marsh (Borrow Pit)
RECORDED ARCHAEOLOGICAL SITES	No	No
ARCHAEOLOGICAL POTENTIAL	Low	Low
RECORDED HISTORICAL STRUCTURES/RESOURCES	No	8GL456
TENTATIVE CONTAMINATION RANKING	No	Low
PROTECTED, THREATENED & ENDANGERED SPECIES	Habitat	Habitat
WETLAND INVOLVEMENT POTENTIAL	Significant	Significant
PROXIMITY TO OUTFALL (ft)	50	50
NUMBER OF PARCELS	1	1
PARTIAL (PT) OR WHOLE TAKE (WT)	PT	PT

Requires Additional Investigation

SECTION 1

1.0 GENERAL PROJECT INFORMATION

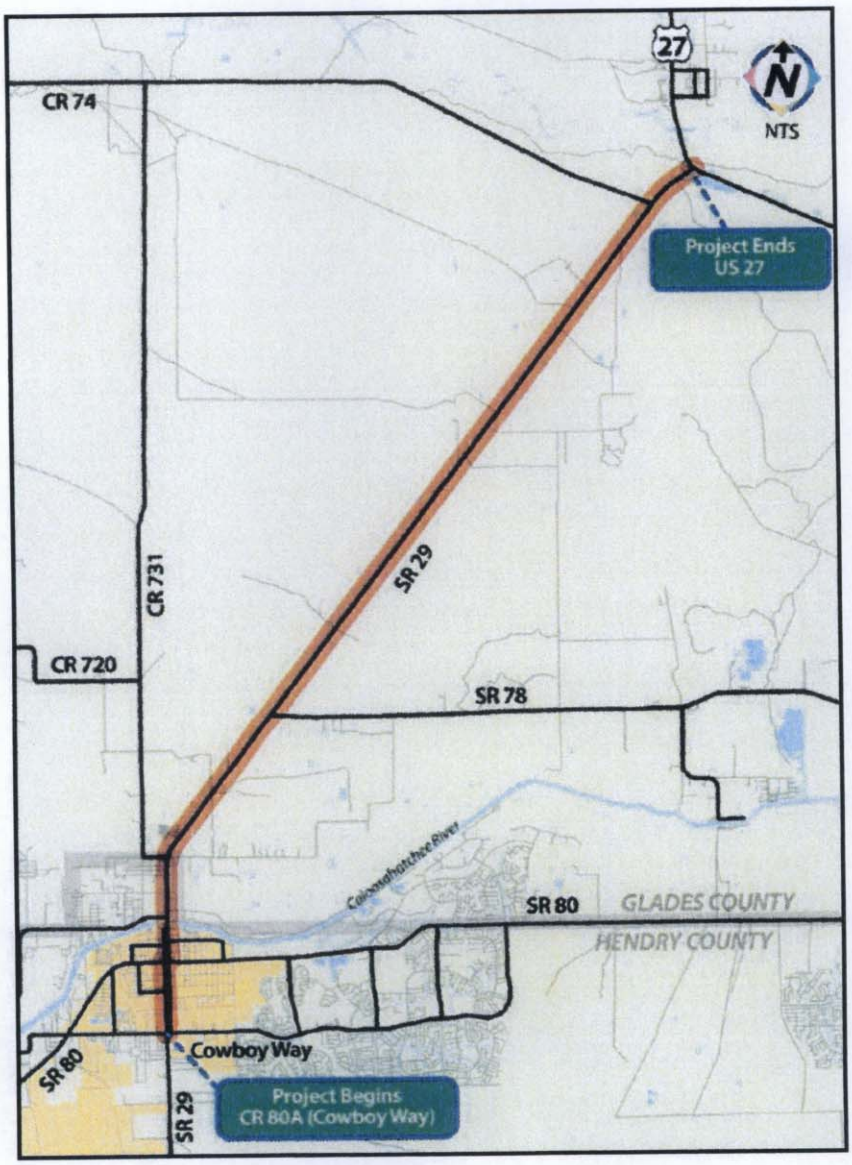
1.1 INTRODUCTION

The Florida Department of Transportation (FDOT), District One, is conducting a Project Development and Environment (PD&E) Study on State Road (SR) 29 in Hendry and Glades counties, Florida. The study limits extend from CR 80A (Cowboy Way) north to US 27, a distance of approximately 15 miles. Refer to **Figure 1.1.1** on the following page for the **Project Location Map**. The purpose of the project is to provide capacity and operational improvements to the existing 2-lane facility by upgrading to a 4-lane facility, including the addition of a new bridge over the Caloosahatchee River. This study meets all requirements of the Federal Highway Administration (FHWA) National Environmental Policy Act (NEPA) regulations.

The purpose of the Pond Siting Report is to document the pond site alternatives assessed along the study corridor. For the pond siting assessment, the corridor was subdivided into two, with the portion of the corridor south of the Caloosahatchee River further divided into basins identified with alphabetic characters, and the portion north of the Caloosahatchee River further divided into basins identified with numeric characters. South of the river, milling and resurfacing is proposed, with added impervious areas limited to turn lanes and sidewalk. North of the river, reconstruction is proposed thereby necessitating the need for stormwater treatment and attenuation. This report identifies one potential pond site alternative per basin for further consideration during the roadway design phase. For each site under consideration, the report will address the soils and groundwater characteristics, hydraulic feasibility, the presence of hazardous material contamination, threatened or endangered species, cultural resources, and wetland indicators. The ponds were sized based on limited information, without the benefit of geotechnical information and survey therefore, the pond sizes presented within this report are approximate and will require further refinement during the design phase.

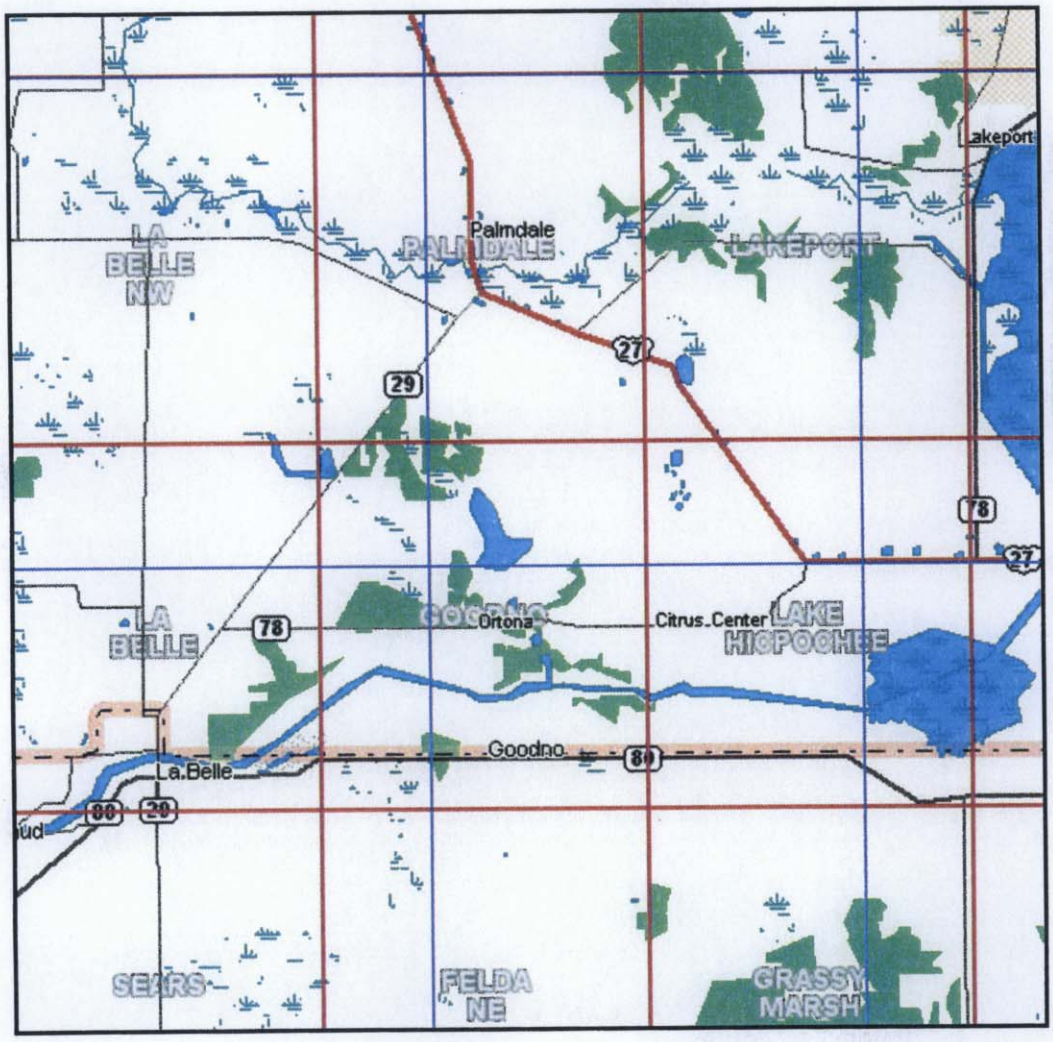
The locations of the pond site alternatives assessed are shown on the Pond Site Alternatives Maps located in **Appendix 2.2.**

Figure 1.1.1 Project Location Map



The SR 29 corridor within the study limits is located on the Sears, LaBelle, Goodno, and Palmdale USGS Quadrangle Maps. Refer to **Figure 1.1.2** on the following page for the location of the **USGS Quadrangle Maps.** Copies of the USGS Quadrangle Maps with the cross drain and bridge basins delineated are also located in **Appendix 2.3.**

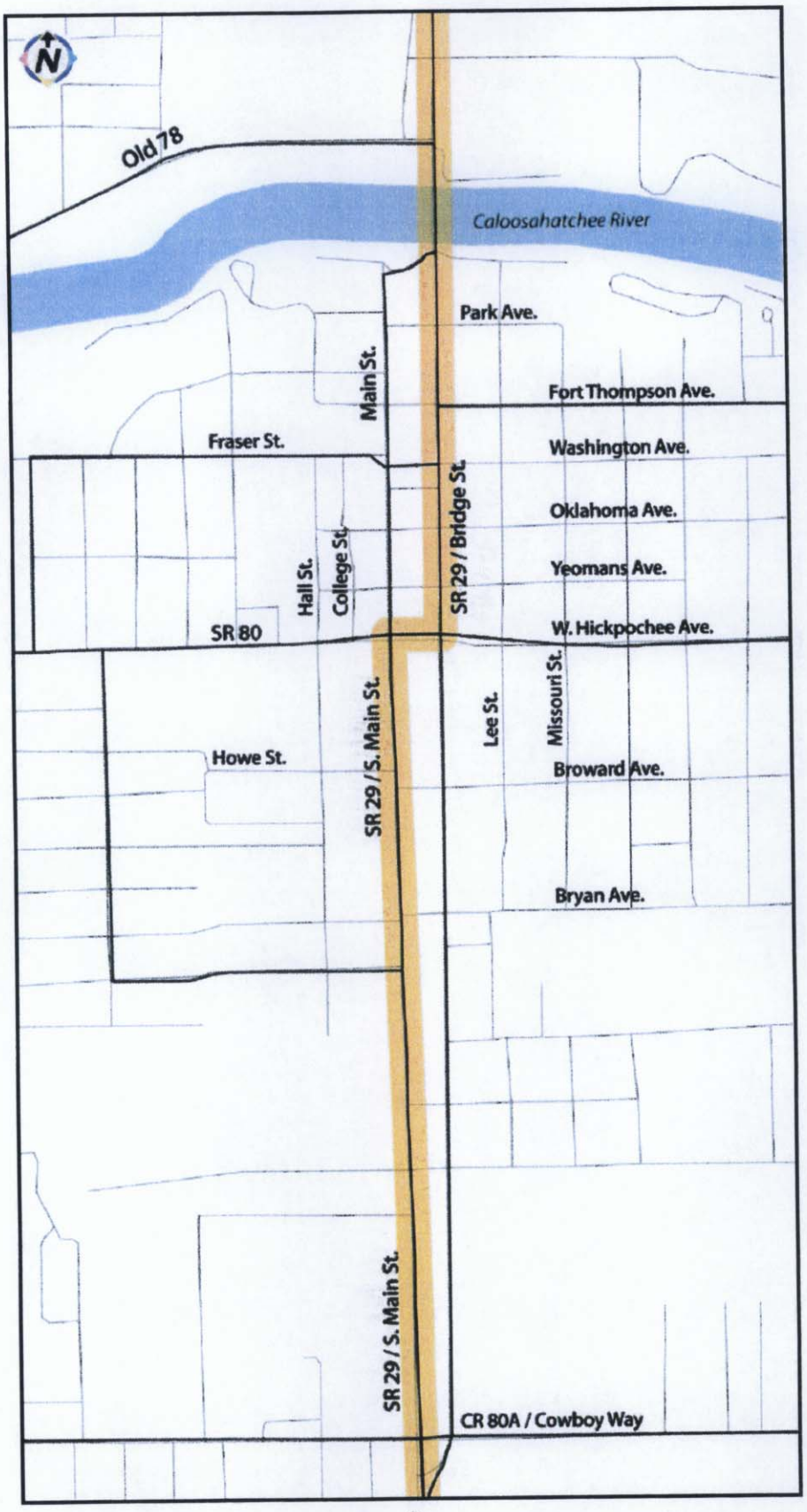
Figure 1.1.2 USGS Quadrangle Maps



1.2 SITE LOCATION AND DESCRIPTION

SR 29 is an SIS facility from SR 82 in Collier County (south of this project's study limits) to US 27 in Glades County. Within the study limits, from CR 80A (Cowboy Way) to US 27, SR 29 currently consists of two- and three-lane urban and rural facilities. SR 29 (Main Street) from CR 80A to SR 80 is a three-lane urban facility with one travel lane in each direction and a two-way center left-turn lane. Within the same area, SR 29A (Bridge Street) is also a three-lane urban facility. At SR 80, the designation of SR 29 shifts from Main Street to Bridge Street. Refer to **Figure 1.2.1** on theCR following page for the **Existing SR 29 Designation Map**.

Figure 1.2.1 Existing SR 29 Designation Map



From SR 80 to the Caloosahatchee River Bridge, SR 29 (Bridge Street) continues as a three-lane urban facility and is within the Downtown LaBelle Historic District. Main Street in this area is a two-lane urban roadway.

The Caloosahatchee River Bridge crossing is a two-lane urban roadway. From north of the bridge to US 27, SR 29 is a two-lane undivided rural facility. Additionally, there is an existing CSX railroad crossing approximately 140 feet south of the intersection of SR 29 and US 27. There are also six (6) additional bridge structures within this segment.

For the purpose of developing and evaluating project alternatives, the SR 29 study area was divided into three corridors as follows:

West Corridor

Central Corridor

East Corridor

As a result of the corridor evaluation, the West Corridor was eliminated from further consideration due to lack of public and government support, direct impacts to the predominately commercial area of LaBelle, and several major environmental justice related issues. The Central Corridor and the East Corridor were carried forward for further study. The detailed analyses of the corridors is documented in the FHWA-approved November 2008 Corridor Evaluation Technical Memorandum.

Along the Central and East Corridors, the project was divided into three segments as follows:

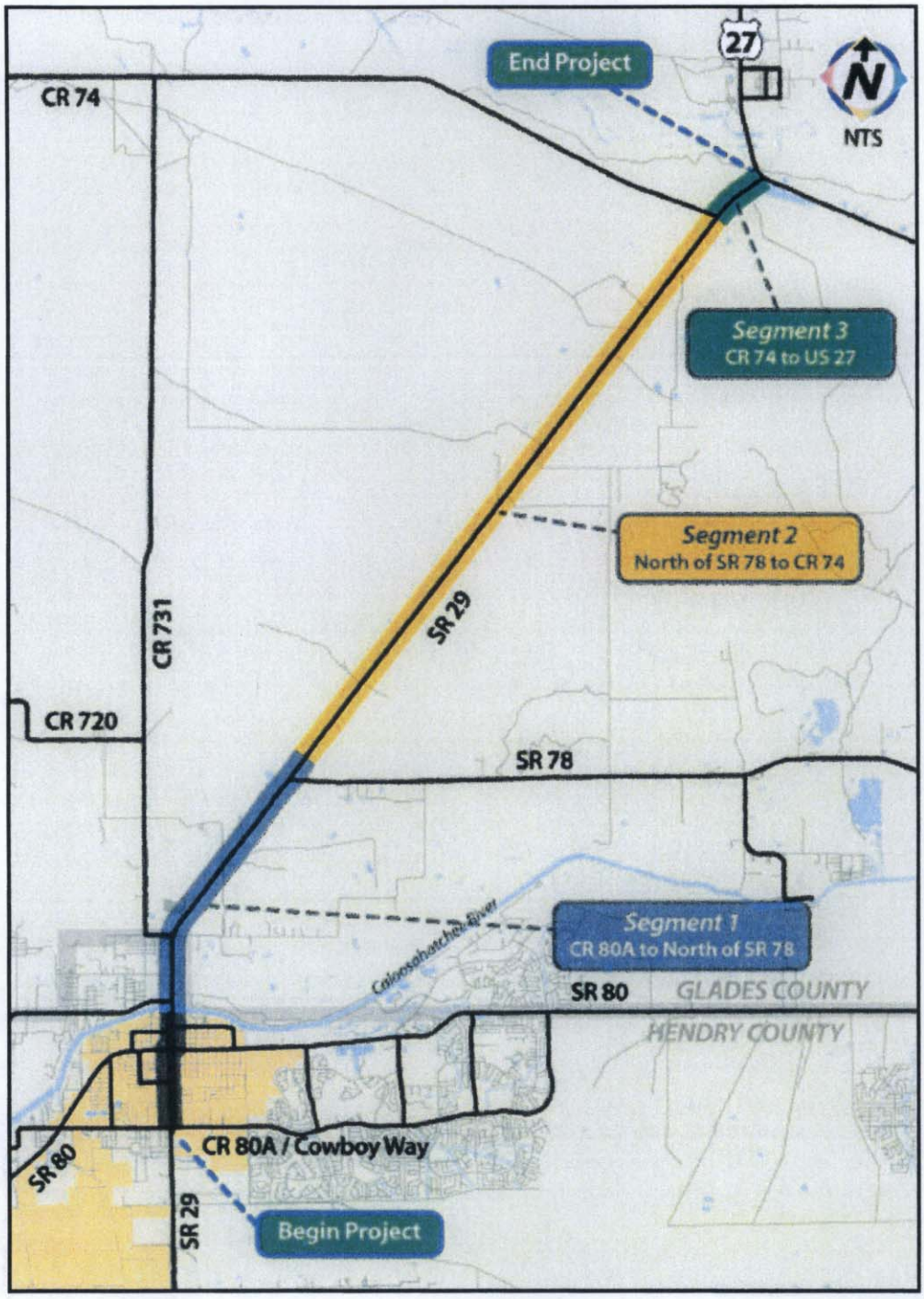
Segment 1 – From CR 80A (Cowboy Way) to north of SR 78

Segment 2 – From north of SR 78 to CR 74

Segment 3 – From CR 74 to US 27

Refer to **Figure 1.2.2** on the following page for the **Project Segments Map.**

Figure 1.2.2 Project Segments Map



As a result of the Alternatives Public Workshop and based on public and local government comment, as well as engineering and environmental evaluation, preferred alternatives have been selected in each segment to be carried forward for detailed analyses. The alternatives selection process is described in

detail in the Alternatives Analysis Memorandum, approved by FHWA on October 11, 2010. The following are brief descriptions of the preferred build alternatives by project segment.

Segment 1 (CR 80A to North of SR 78)

The preferred alternative in Segment 1 (**Option 2**) is a one-way pair alternative that would utilize Bridge Street for two northbound lanes and Main Street for two southbound lanes from C.R. 80A to north of the Caloosahatchee River. With this alternative, the existing two-lane bascule bridge would be replaced and a second two-lane bascule bridge would be constructed at Main Street. Two intersections are being considered at CR 80A for Option 2. The first intersection, **Option 2A**, is a signalized intersection with Main Street and Bridge Street similar to the existing condition. The second intersection configuration, **Option 2B**, being considered is a roundabout. Both intersection options will be considered.

Segment 2 (North of SR 78 to CR 74)

In Segment 2, the **East Option** was selected for further study. The East Option would be a four-lane divided rural facility with a multi-use pathway on the west side of the roadway. Right-of-way would be required on the east side of existing SR 29 for this option.

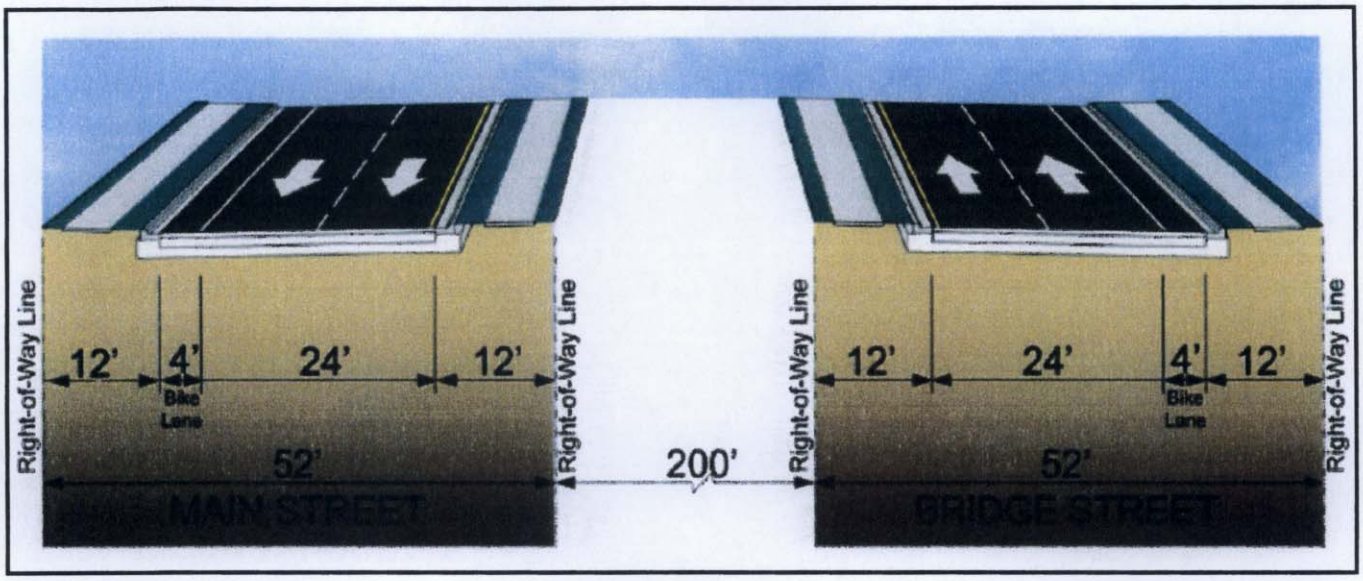
Segment 3 (CR 74 to US 27)

The preferred alternative selected in Segment 3 was **Option 5**, which is a four-lane divided rural facility with a multi-use pathway on the west side of the roadway. This option would provide an interchange at CR 74 and would relocate the SR 29/U.S. 27 intersection to the east of its current location. For this alternative, the existing SR 29 railroad crossing and intersection with US 27 would be eliminated.

1.3 TYPICAL SECTIONS

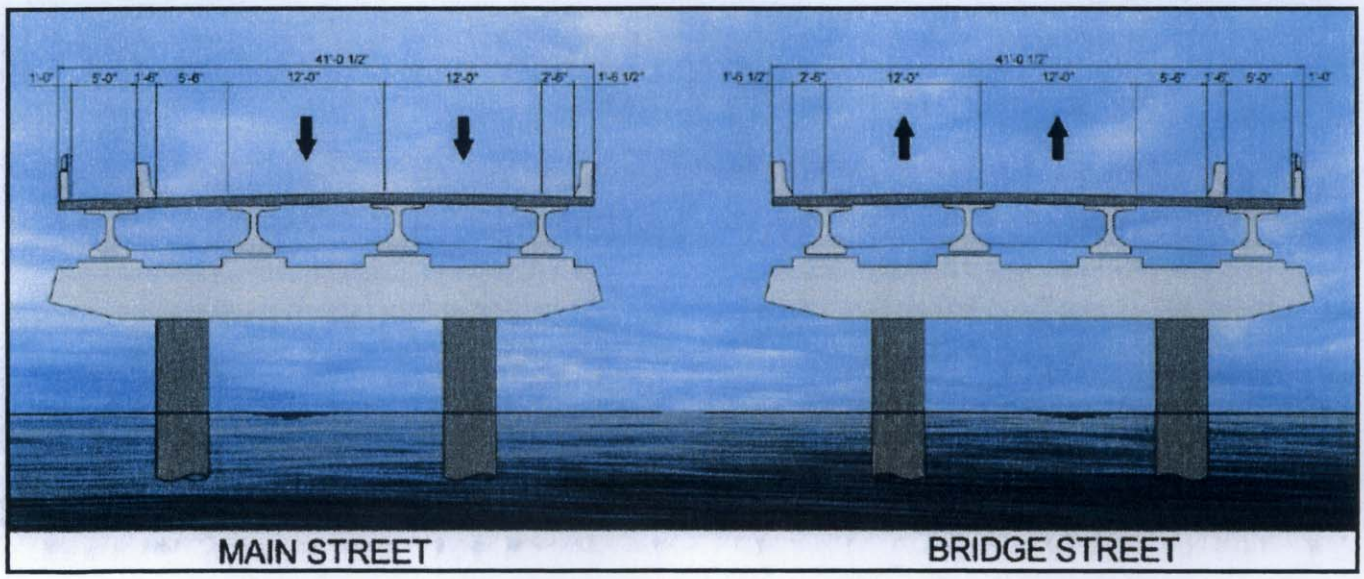
To reduce the impacts to the downtown LaBelle Historic District, the existing two-way facilities on Bridge Street and Main Street are proposed to be converted to one-way facilities. The typical section consists of constructing a one-way pair facility with two lanes, a bike lane, and sidewalks. Curb and gutter is proposed, and conveyance of roadway runoff will be via a storm sewer system of inlets and pipes. Refer to **Figure 1.3.1** on the following page for the **Two-Lane One-Way Pair Urban Typical Section** for SR 29 from CR 80A to Nobles Road.

Figure 1.3.1 Two-Lane One-Way Pair Urban Typical Section



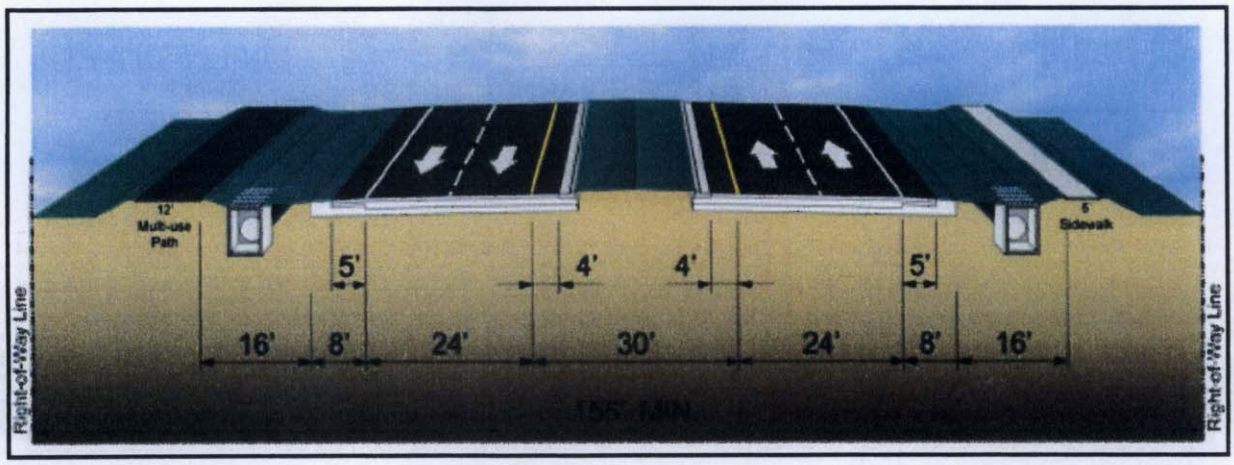
The existing bridge over the Caloosahatchee River is proposed to be replaced, and a new parallel bridge constructed to the west of the existing bridge to accommodate the one-way pair operations. The bridges will accommodate two lanes, inside and outside shoulders, and a sidewalk. Refer to **Figure 1.3.2** below for the **One-Way Pair Bridge Typical Section** for the bridges over the Caloosahatchee River.

Figure 1.3.2 One-Way Pair Bridge Typical Section



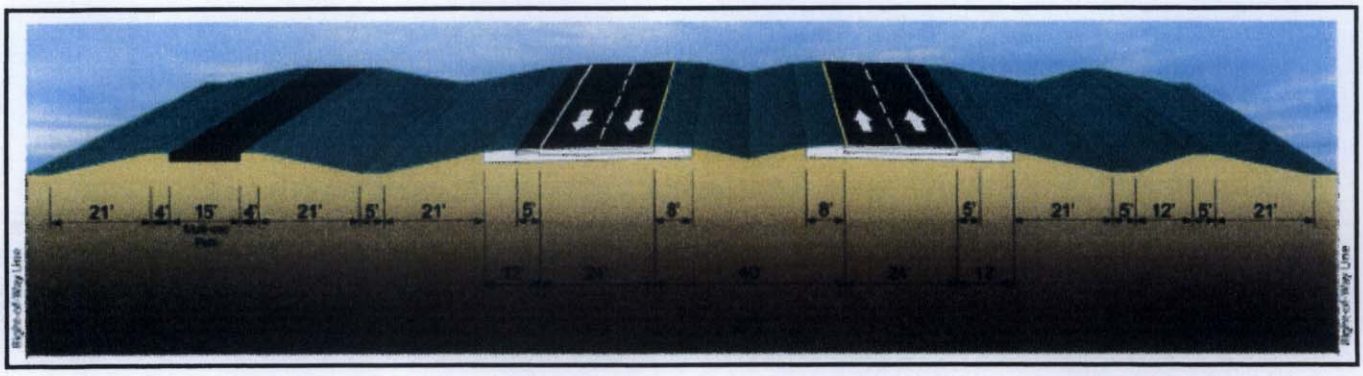
SR 29 from downtown LaBelle to CR 731 transitions from an urban environment to a rural environment entering Glades County. The typical section from Nobles Road to SR 78 is proposed as a four-lane divided suburban typical section. The typical section includes two lanes and inside and outside shoulders in each direction, separated by a raised median. A sidewalk on the east side and a multi-use path on the west side separated from the roadway by drainage swales are proposed. Refer to **Figure 1.3.3** below for the **Suburban Typical Section** from Nobles Road to SR 78.

Figure 1.3.3 Suburban Typical Section



SR 29 in Glades County is a rural environment with one primary land owner. The typical section proposed from SR 78 to US 27 consists of a four-lane divided roadway with two lanes and inside and outside shoulders in each direction separated by a depressed median. A multi-use path is proposed on the west side, separated from the roadway by a drainage swale. The multi-use path and a berm on the east side will prevent offsite runoff from co-mingling with onsite runoff. Refer to **Figure 1.3.4** below for the **Rural Typical Section** from SR 78 to US 27.

Figure 1.3.4 Rural Typical Section



1.4 SOIL CHARACTERISTICS

SR 29 within the project limits is located within Hendry and Glades County. The Natural Resources Conservation Service (NRCS) mapping for Hendry and Glades County identify several soil units within the project area. Refer to **Appendix 3.0** for the NRCS information.

South of the Caloosahatchee River, the soils within the SR 29 right of way are mainly mapped as Boca (1), Pompano (18), Wabasso (6) and Chobee (57) sands. These soils are assigned to hydrologic group A/D and C/D, with A or C being the typical hydrologic group in this area of the project as the area is developed and appears to be well drained. Hydrologic group D soils are likely to be present at the cross drain location just north of Favor Street.

North of the Caloosahatchee River up to the county line, there are Udifluvents (39) along the river, and Wabasso (6), Chobee (57), Riviera (9) and Oldsmar (4) sands. These soils are assigned to hydrologic group A/D and C/D. The area appears to be well drained however hydrologic group D soils are likely to be present within the wetland area near Nobles Road on the east side of SR 29.

For the rural portion of the project in Glades County from the county line to US 27, the soils within the SR 29 right of way are mainly mapped as Oldsmar (23), Immokalee (26), and Myakka (29) which are hydrologic group C/D and B/D soils. There are EauGallie (20), Floridana depressional (16), Malabar (6), Pople (7), Bassinger (14), and Pineda (15) sands and Okeelanta muck (17) mapped in narrow bands crossing through the SR 29 right of way which are most likely hydrologic group D soils associated with low lying areas and waterways. The majority of the area adjacent to SR 29 where offsite ponds will be sited appears to be low lying, and is most likely to be hydrologic group D soils. The seasonal high ground water table appears to be at or above the existing ground in most locations within the rural Glades County portion of the project. At the terminus of SR 29 with US 27, a small area of Pomello (28) sand is present, which is well drained hydrologic group A soils.

1.5 FLOODPLAIN INFORMATION

According to the Flood Insurance Rate Maps (FIRM) for Hendry County (Community Panel Numbers 120107 0035 B and 120109 0001 C) and Glades County (Community Panel Numbers 120095 0200, 0260, 0270, and 0280 B), SR 29 has encroachments into the 100-year floodplain, mainly associated with waterways crossing the roadway at cross drain and bridge locations. Refer to **Appendix 2.4** for the FEMA FIRMettes of the project area. The limits of the 100-year floodplain per GIS data are also shown as orange hatching on the Pond Site Alternatives maps included in **Appendix 2.2**. **Table 1.5.1** below summarizes the base floodplain encroachments estimated from both the FIRM maps and GIS data.

Table 1.5.1 Base Floodplain Encroachment Locations

From Station	To Station	Flood Zone	Base Flood Elevation (ft-NGVD)	Remarks
188+00	192+00	A	19.0	LaBelle A
215+00	222+00	AH	17.0	Stream D
224+00	233+00	AH	16.0	Stream C
243+00	245+00	AH	16.0	Stream B
253+00	254+00	A	Not determined	Unnamed
258+00	268+00	B	Not determined	Stream E
300+00		Not Mapped	9.0 +	From Caloosahatchee River
378+00	382+00	A	Not determined	Unnamed
428+00	433+00	A	Not determined	North Okaloacoochee
470+00	484+00	A	Not determined	Unnamed
582+00	584+00	A	Not determined	Lone Pine Creek
601+00	610+00	A	Not determined	Unnamed
615+00	623+00	A	Not determined	Unnamed
685+00	687+00	A	Not determined	Cypress Branch, AKA Chapporal Slough
694+00	698+00	A	Not determined	Cypress Branch, AKA Chapporal Slough
722+00	727+00	A	Not determined	Unnamed
821+00	829+00	A	Not determined	York Branch
909+00	938+00	A	Not determined	Turkey Branch
977+00	990+00	A	Not determined	Unnamed (Borrow Pit)
SR 74 Extension	1,050 LF	A	Not determined	Isolated
SR 74 Extension	1,140 LF	A	Not determined	Isolated
SR 74 Extension	540 LF	A	Not determined	Unnamed (Borrow Pit)

Refer to **Section 4.2.7** for a discussion regarding the recommended remediation for the floodplain impacts associated with this project.

SECTION 2

2.0 COORDINATION AND RESOURCE INFORMATION

2.1 INVESTIGATIONS

Initial investigations and data collection were conducted to establish the existing conditions, available information, and historical conditions.

2.1.1 FIELD REVIEWS

Field reviews were conducted during September 2007, February 2009, and June 2010 to identify potential pond site locations, photo document the existing conditions, and measure the stain lines down from the top of the headwalls or bridge decks to estimate seasonal high water levels.

The terrain is flat yet urbanized in the Hendry County portion of the project. Roadway runoff is conveyed either by inlets and storm sewer systems or shallow swales to streams. Water was observed within the streams only, roadside swales where present were observed to be dry.

The terrain in Glades County was noted to be flat pasture and farm lands or undeveloped areas dominated by wetlands. Evidence of high water staining less than two feet below the bottom of all the bridge decks was observed. The concrete headwalls and bridge piles also show signs of a water environment that is highly corrosive to concrete, as the concrete is pitted and the aggregate is exposed below the high water stain lines for most of the older existing structures in Glades County.

Field review notes and photos are included in **Appendix 1.3**.

2.1.2 FDOT COORDINATION

On August 25, 2008 the FDOT Maintenance Office in LaBelle was contacted regarding reports of roadway overtopping as a result of tropical storm Fay. It was confirmed that SR 29 was closed on August 20, 2008 and reopened the next day. The limits of closure were from just north of the bridge at Cypress Branch from approximately mile post 6.877 to mile post 9.361. Water was sheeting over the roadway within the closed section, and water was also staging onto the travel lanes in numerous locations. Flooding problems were attributed to the lack of ditches to convey the water. Refer to **Appendix 1.1** for FDOT Correspondence.

The historic drainage maps were obtained from the FDOT District One office, and are included in **Appendix 2.1**.

2.1.3 SFWMD COORDINATION

On September 22, 2010 a pre-application meeting was held at the Fort Myers Service Office. The project area studied for the PD&E will most likely result in more than one design and construction project with the county line as a division therefore, it was established that the project(s) in Hendry County will be permitted through the Fort Myers Service Office, and that the project(s) in Glades County will be permitted through the Okeechobee Service Office. Since there is an existing permit already associated with SR 29, they requested that the project be permitted as a permit modification.

For the portion of the project located south of the Caloosahatchee River, an exemption could be acceptable for the addition of turn lanes if they meet all of the criteria. For the portion of the project that involves widening, stormwater ponds for treatment and attenuation will be required. A 50% increase in treatment volume is required because the Caloosahatchee River is an impaired water body. Portions of the project within the existing right of way can meet the SFWMD 72-hour 25-year post peak discharge less than the pre peak discharge attenuation requirement. However, portions of the project requiring new right of way, including offsite pond sites, will need to meet the CSM discharge criteria established for the Caloosahatchee River Basin. We were advised to coordinate further with the Okeechobee Service Office in this regard.

The downtown LaBelle area of the project and the bridge over the Caloosahatchee River were also discussed. Since the downtown area will only involve milling and resurfacing with the addition of turn lanes less than one quarter mile in length, the project activity in this area of the corridor should be exempt. For the south side of the new bridge over the Caloosahatchee River, a structural BMP or "StormCeptor" on the south side is acceptable.

It was also established that the Caloosahatchee River is a manmade canal at the proposed bridge crossing location, and that it was not anticipated to be a sovereign water body. A formal sovereign submerged lands determination will be requested once the bridge plans are finalized.

On October 6, 2010 a pre-application meeting was held at the Okeechobee Service Office. It was advised to design the ponds utilizing the current criteria due to the uncertainty of when the new Statewide Stormwater Rule will go into effect. The project area contributes to the Caloosahatchee River and Fisheating Creek basins, both of which are impaired water bodies. Pollutant loading removal calculations demonstrating no net increase will be required. Further clarification of the CSM discharge criteria for the Caloosahatchee River basin was provided. Any new right of way, including pond sites, will be required to limit the discharge rate to 30.1 CSM (cfs per square mile). A weighted allowable discharge rate will need to be calculated for each outfall location. The northern basin to Fisheating Creek can meet pre vs. post discharge criteria.

It was brought to our attention that the gas station just north of the Caloosahatchee River at North River Road and SR 29, on the west side, is in the process of remediating a contamination issue.

The project corridor within Glades County is within a Wood Stork core foraging area, and Cara Cara are also present. It was expressed that wetland impacts could be reduced with a re-alignment at US 27, and selection of the western alignment alternative.

It was requested that we demonstrate no adverse impacts for floodplains as a result of the proposed project. The bridge hydraulics design will need to demonstrate no adverse impacts,

and no scuppers will be allowed on the proposed bridges. Refer to **Appendix 1.2** for SFWMD Correspondence.

2.2 CURVE NUMBERS

The Curve Number (CN) for all manmade impervious areas (asphalt, concrete, and buildings) is 98 regardless of the soil type. For water, the CN is always 100. For the unpaved areas within the right of way, **Table 2.2.1** below was developed specifically for this project to establish the CN value used for the ground cover and soil types encountered.

Table 2.2.1 CN Values for Each Hydrologic Group Encountered

HYDROLOGIC GROUP	LAND USE				
	OPEN SPACE GOOD COND.	PASTURE GOOD COND.	WOODS GOOD COVER	RESIDENTIAL 1 AC	DIRT
A	39	30	25	51	72
B	61	58	55	68	82
C	74	71	70	79	87
D	80	78	77	84	89

2.3 RAINFALL DATA

Per SFWMD criteria the design storm event is the SFWMD 25-year/3-day storm for the stormwater management design within an open basin. In addition, the FDOT storm events are required to be analyzed to determine the critical duration for each return frequency. The following table summarizes the rainfall amounts for each storm event. The rainfalls noted for the 2-day and 4-day events in Appendix B-Precipitation Data of the Drainage Manual were interpolated to determine the rainfalls for the 3-day event. The IDF curves for Zone 8 also included in Appendix B of the Drainage Manual were utilized to calculate the FDOT rainfalls for the 1-hour through 8-hour duration storm events. Refer to **Table 2.3.1** on the following page for rainfall amounts in inches for each storm event.

Table 2.3.1 Rainfall Amount Summary in Inches

STORM EVENT	RETURN PERIOD					
	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
SFWMD 3-DAY	4.2	5.8	7.0	8.7	10.0	11.7
FDOT 1-HOUR	2.5	3.0	3.3	3.8	4.3	4.6
FDOT 2-HOUR	2.8	3.5	4.0	4.6	5.2	5.6
FDOT 4-HOUR	3.3	4.0	4.6	5.4	6.1	6.7
FDOT 8-HOUR	3.8	4.9	5.6	6.4	7.4	7.8
FDOT 24-HOUR	4.5	6.0	7.0	8.0	9.0	10.0
FDOT 3-DAY	5.5	7.5	8.5	10.0	11.0	13.0

2.4 RESOURCES FOR ANALYSIS

The most recent applicable publications available were utilized for reference. The following is a list of resources utilized for the pond siting report analysis for this project:

1) Florida Department of Transportation
    a. Staff directives
    b. FDOT Project Development and Environmental Manual
    c. FDOT Drainage Manual
    d. FDOT Drainage Handbook Hydrology
    e. FDOT Design Standards (English Units)
    f. 1947 Construction Plans
    g. Historic Drainage Maps
    h. Straight Line Diagrams
    i. Previous Projects Survey Files
2) Other
    a. FEMA FIRM Maps for Hendry and Glades County
    b. USGS Maps
    c. NRCS Soil Survey
    d. Environmental Assessments by URS

2.5 PERMITS REQUIRED

1) South Florida Water Management District Environmental Resource Permit (SFWMD ERP)
2) US Army Corps of Engineers (USACE)
3) National Pollutant Discharge Elimination System (NPDES)

SECTION 3

3.0 EXISTING DRAINAGE CHARACTERISTICS

3.1 WATERSHED DESCRIPTIONS

The project area from SR 80A to CR 74 just south of US 27 is within the Caloosahatchee River Basin. The Caloosahatchee River drains southwest to the Gulf of Mexico in Lee County.

The project area from CR 74 to US 27 drains to Fisheating Creek, which is located within the Lake Okeechobee Basin. Per coordination with SFWMD, both the Caloosahatchee River and Fisheating Creek are listed as impaired water bodies and no additional loading of pollutants, nitrogen and phosphorous, will be allowed.

3.2 BASIN DESCRIPTIONS

South of the Caloosahatchee River, only the limits of Basin A were determined. The remaining area south of the Caloosahatchee River was not subdivided into basins for analysis as the proposed improvements are limited to milling and resurfacing and the addition of turn lanes. At the time of the study, adequate survey data was not available to determine the basin divide locations within the right of way for each of the lateral crossings. From CR 80A to SR 80, roadside ditches convey runoff to lateral crossings LaBelle A, and Streams B, C, and D. Each of these lateral crossings conveys east to west, and eventually discharge into the Caloosahatchee River. From SR 80 north to the bridge over the Caloosahatchee River, both Main Street and Bridge Street are urban sections with curb inlets and storm sewer. The storm sewer system discharges to Stream E, which conveys east to the Caloosahatchee River.

North of the Caloosahatchee River, the project area was subdivided into 20 basins for further analysis: Basins 0 thru 19. Roadside ditches convey runoff to cross drains or bridges. The ditch high points serve as the basin divisions within the roadway right of way. The ditch high points were determined from available survey. The basin divides beyond the right of way limits were determined from available

survey data, aerial mapping, USGS maps, and historic FDOT Drainage Maps. The basin divides deviate from those shown on the historic drainage maps due to manmade alterations such as roads and ditches observed on the aerial maps. The divides and resulting basin areas were based on an engineering assessment of the best available information at the time of the study, and should be revisited if contour mapping with more frequent intervals than five feet becomes available. **Table 3.2.1** below summarizes the basin data for SR 29 from Favor Street (south of CR 80A) to US 27. The basin limits for each of the cross drains and bridges evaluated are also shown on the USGS maps included in **Appendix 2.3**.

Table 3.2.1 Basin Data Summary

From Station	To Station	Basin ID	Area (Ac.)	Existing Crossing
179+90	200+00	A	122.5	3-29"x45" CD at LaBelle A
Not determined	Not determined	D	Not determined	2-30" CD at Stream D
Not determined	Not determined	C	Not determined	2-30" CD at Stream C
Not determined	Not determined	B	Not determined	4-30" CD at Stream B
Not determined	Not determined	E	Not determined	Storm Sewer to Stream E
284+00	293+30	0	32.2	Direct to Caloosahatchee River
293+30	374+50	1	694.1	8'x7' CBC
311+10	333+20	2	6.5	24" CD to Basin 1
333+20	374+50	3	277.1	3-42" CD to Basin 1
374+50	443+00	4	220.9	2-42" CD
443+00	457+20	5	2,709.0	2-17.5' Span Bridge at North Okaloacoochee
457+20	479+80	6	111.0	30" CD
479+80	527+00	7	1,465.0	14' Span Bridge
527+00	604+60	8	3,144.0	3-15' Span Bridge at Lone Pine Creek
604+60	656+60	9	302.1	3-30" CD
656+60	675+00	10	258.5	3-36" CD
675+00	764+70	11	17,767.0	10-15' Span Bridge at Cypress Branch
764+70	819+00	12	193.7	4-15" CD
819+00	870+70	13	3,364.0	3-20' Span Bridge at York Branch
870+70	915+00	14	1,820.0	2-15' Span Bridge at Turkey Branch
915+00	950+00	15	200.8	36" CD
950+00	965+40	16	Not determined	West side, drains away
965+40	977+10	17	23.4	24" CD
950+00	977+10	18	290.9	East side, drains away
977+10	990+00	19	Not determined	Borrow Pit

3.3 CROSS DRAIN DATA

Table 3.3.1 below summarizes the existing conditions data for the cross drains within the project.

Table 3.3.1 Existing Cross Drain Data

No.	Cross Drain	Location (Constr. CL)	Location (Survey BL)	Length (ft)	U/S FL Elevation	D/S FL Elevation	Flow Direction
1	3-29"x45"	189+60	na	60	15.70	15.60	E-W
2	2-30"	882+00 (M.S.)	na	82	nd	nd	E-W
3	2-30"	892+00 (M.S.)	na	73	nd	nd	E-W
4	4-30"	906+70 (M.S.)	na	68	nd	nd	E-W
5	8'x7'	299+80	30+82	89	7.80	7.69	E-W
6	24"	312+30	42+95	95	17.20	16.51	W-E
7	3-42"	342+60	73+22	99	17.72	17.72	W-E
8	2-42"	380+45	111+41	90	26.75	25.95	W-E
9	30"	473+00	203+96	101	31.79	33.34	W-E
10	3-30"	625+00	356+00	97	29.90	29.50	W-E
11	3-36"	664+00	395+00	93	30.40	29.90	W-E
12	4-24"	801+00	531+94	89	34.20	34.00	W-E
13	36"	941+00	672+00	97	35.45	35.22	W-E
14	24"	974+10	705+00	98	37.85	37.23	E-W

Cross drain locations with the (M.S.) designation indicate that the cross drains are referenced to the Main Street centerline of stationing. The information provided in the above summary table was determined by reviewing the straight line diagrams and the existing survey information. Field measurements were utilized to resolve any discrepancies. Flow line elevations typically were not identified on the available topographic files; therefore they were estimated from the available survey data utilizing CADD tools.

3.4 BRIDGE DATA

Table 3.4.1 on the following page summarizes the existing conditions data for the bridges within the project.

Table 3.4.1 Existing Bridge Data

Bridge No.	Name of Crossing	Begin Mile Post	End Mile Post	SLD Length (ft)	Bridge Type	Number of Spans	Bridge Opening Length** (ft)	Flow Direction
070033	Caloosahatchee River	17.486	17.581	502	Bascule	9	N/A	E-W
050941	North Okaloacoochee River	1.846	1.858	63	Flat Slab	2	35	W-E
N/A*	Unnamed	2.820		N/A	Flat Slab	1	14	W-E
050035	Lone Pine Creek	4.709	4.723	74	Flat Slab	3	45	W-E
050033	Cypress Branch	6.848	6.877	153	Flat Slab	10	151	W-E
050032	York Branch	9.347	9.361	74	Flat Slab	3	60	W-E
050031	Turkey Branch	10.925	10.936	58	Flat Slab	2	30	W-E

*Noted as a 13'x7' CBC on the SLD
**Approximated, measured with MicroStation (aerial files and existing survey files checked)

The bridge over the Caloosahatchee River is located in Hendry County. It has a sufficiency rating of 46, and will be replaced. The remaining six bridges located along SR 29 within the study limits are all located in Glades County. They all have sufficiency ratings above 90, and are not considered structurally deficient. However, they all show evidence of not meeting the FDOT criteria for 2.0 feet of freeboard above the design high water, as all six bridges have dark stain lines less than 2.0 feet below the low members (bottom of slabs) of each bridge. At some locations, the concrete is pitted within 2.0 feet and stain lines within inches of the low member, evidence of long term standing water and high seasonal high water elevations. Most of the existing bridges also have scuppers, and as a result SFWMD has asked that the existing bridges be replaced.

3.5 FLOODING ISSUES

The roadway within the Cypress Branch area, Basin 11, has a documented history of roadway overtopping. SR 29 was closed on August 20, 2008 as a result of rainfall runoff associated with Tropical Storm Fay. The analysis of the existing cross drains and bridges located within the study corridor in Glades County predicts that roadway overtopping will occur along most of the corridor for the greater storm events. Refer to the Location Hydraulics Report for the existing conditions and proposed alternatives analysis for the cross drains and bridges located along the study corridor.

SECTION 4

4.0 PROPOSED DRAINAGE DESIGN

4.1 STORMWATER MANAGEMENT DESIGN APPROACH

The proposed roadway project area is divided into pond basins that may have a different configuration than the existing condition basins to better facilitate the conveyance of roadway runoff for storm water treatment and attenuation to the pond sites. All contributing offsite areas wherever possible will be intercepted and ditched or piped directly to the basin outfalls. The remaining contributing offsite and project runoff will be routed to a pond for treatment and attenuation.

This Pond Siting Report assesses offsite ponds for stormwater treatment and attenuation. Field visits and an evaluation of aerial contour maps and USGS maps were utilized to select pond site alternatives for each basin. Avoidance of wetlands was a consideration for this project but was not always practical as wetlands adjacent to the roadway span most of several basins within Glades County.

South of the Caloosahatchee River, one pond site was assessed south of CR 80A to address the proposed widening for the transition from a single alignment along SR 29 to the south of the project to one way pairs along Bridge Street and Main Street to the north. The proposed turn lanes south of CR 80A impact the roadside ditches which will likely necessitate the need for treatment of the added impervious area. It is anticipated that runoff from an area of roadway equivalent to the added impervious areas will be captured and conveyed via storm sewer inlets and pipes to the pond to provide compensatory treatment and attenuation. The pond will discharge via a storm sewer system to the outfall location.

North of the Caloosahatchee River, 23 pond sites were assessed to accommodate 20 basins. Two alternatives were assessed for three of the basins. For each offsite pond alternative, runoff is proposed to convey in roadside swales to a piped system that conveys to the pond. To provide sufficient pollutant loading removal, a system of shallow roadside swales set approximately 1.5 feet above the seasonal high ground water table with ditch bottom inlets set up to four inches above the bottom to provide some dry retention is recommended to be incorporated into the design wherever practical. The dry retention

swales will help reduce the sizes of the offsite ponds. The swales can be as shallow as one to 1.5 feet deep from the shoulder break point if it can be demonstrated that the drawdown time is of a short duration as not to affect the roadway base. A safety factor of 2 is recommended, with drawdown occurring in less than 24 hours.

The offsite ponds will discharge via a storm sewer system to the outfall location. Ditch bottom inlets are recommended to serve as the outfall control structures, modified to include a "V" notch weir for treatment volume drawdown, and a rectangular weir for attenuation. It is recommended that the control structure grate be set just above the design high water for the critical duration 100-year return frequency storm event to serve as an emergency overflow should the weirs become blocked.

Refer to **Appendix 2.2** for the pond site alternatives maps. Each of the pond alternatives was assessed for site size required, hydraulic feasibility, environmental considerations, contamination issues, and cultural resources. Construction costs and land acquisition costs were not addressed as the PD&E phase can precede the design phase by many years and the unit cost estimates are likely to change. The construction and acquisition costs will be addressed during design.

4.2 DESIGN CRITERIA

The pond and stormsewer design for this project will meet the criteria set forth in the following manuals:

a. FDOT Drainage Manual
b. FDOT Drainage Handbook Hydrology
c. FDOT Stormwater Management Facility Handbook
d. FDOT Storm Drain Handbook
e. SFWMD ERP Information Manual

4.2.1 CONVEYANCE

The proposed roadway will utilize a system of shallow swales, ditch bottom inlets and pipes to convey runoff. Runoff will convey via pipe to the offsite ponds. The design event for the conveyance system of swales, pipes, and inlets is the 10-year frequency storm event per Section 2.2 of the FDOT Drainage Manual.

4.2.2 NORMAL WATER LEVEL (NWL) ESTABLISHMENT

The normal water level is the design starting water elevation used when determining stage/storage design computations in a retention or detention area. The normal water level is typically a function of the seasonal high groundwater table elevation (SHGWT) of the site. Soil investigations by the geotechnical engineer, field observations and water elevation measurements by the drainage engineer, and vegetative indicators as observed by a biologist are typically all considered when establishing the SHGWT of the site. The seasonal high established for the outfall is also considered. The NWL must be at or above the seasonal high of the receiving water body for the pond to function properly.

Geotechnical and survey services were not available for this study. Therefore, the SHGWT was estimated by reviewing the historic drainage maps, previous project's survey data and the USGS maps. Typically, the SHGWT was assumed to be at the surface in the vicinity of the cross drain outfalls and downstream of the bridge crossings. As the SHGWT is a significant factor in sizing pond site alternatives, the pond sizes will require refinement during design when geotechnical and survey services are available.

For wet detention systems it is common practice to set the normal water level or control elevation at the SHGWT of the site. For wet detention, the control elevation can be set lower than the SHGWT if it can be proven that no harmful drawdown affects occur to adjacent wetlands, and that it has been set above the SHW of the receiving water body. Pond liners can be utilized to prevent the infiltration of base flow from the surrounding ground water table and eliminate impacts to adjacent wetlands. Wet detention is proposed for all offsite ponds within the study corridor.

For dry retention systems, the bottom of the pond is required to be one foot above the seasonal high ground water table. It is our recommendation to utilize a minimum of 1.5 feet to ensure adequate infiltration will occur and recovery times will sufficient.

4.2.3 WATER QUALITY (TREATMENT)

The offsite ponds for this project have been sized to treat the proposed four-lane roadway. Chapter 5, Section 5.2.a.1 of the ERP Manual requires treatment of one inch of runoff from the developed project or 2.5 inches times the percentage of imperviousness, whichever is greater. However, SFWMD has agreed to allow treatment based on 2.5 inches times the percentage of imperviousness since the one inch over the developed project resulted in excessively large pond sites. The developed project area calculation includes the pond site, median, and swale areas which are large open spaces that do not contribute added pollutant loading, as the FDOT does not apply fertilizers or pesticides to the grass areas within their right of way.

The project area contributes to the Caloosahatchee River and Fisheating Creek basins, both of which are impaired water bodies. As a result, the required treatment volume as calculated per the 2.5" over the percent imperviousness was increased by an additional 50% to determine the total treatment volume required. Dry ponds are required to provide 75% of the required treatment volume calculated for wet detention ponds.

Drawdown of half of the treatment volume will occur in 24 hours via a "V" notch weir sized per Figure G-2 of the SFWMD ERP Manual.

4.2.4 WATER QUANTITY (ATTENUATION)

The stormwater ponds for this project will discharge to open basins. Typically the criterion is to attenuate the difference in the runoff rate for pre vs. post for the SFWMD 25-year, 72-hour storm. The criterion is per Chapter 6, Section 6.2 and 6.3 of the ERP Manual. However, for the portion of the project within the Caloosahatchee River basin, any proposed right of way area will be required to meet the 30.1 CSM (cfs per square mile) limiting discharge criteria per SFWMD directive. To determine the actual allowable discharge rate for each basin, the allowable discharge per pre vs. post criteria will be calculated for the existing right of way area, and per the CSM discharge criteria for the proposed right of way area (including proposed roadway and

pond site right of way), and summed to determine the total allowable peak discharge rate at each outfall location within the Caloosahatchee River basin.

4.2.5 TAILWATER AND OUTFALL CONDITIONS

The seasonal high water for each outfall was estimated by assessing USGS contour maps, field observations, and water and stain line elevation measurements. Most of the pond alternatives are located adjacent to or in reasonable proximity to the outfall, either a wetland or lateral ditch. Those that are not conveniently located adjacent to a receiving water body will need to be piped to the outfall location. It is recommended that the tailwater elevations be established during design by evaluating the results of the geotechnical and biological assessments.

4.2.6 CRITICAL DURATION

Rule Chapter 14-86 of the Florida Administrative Code requires using a multiple storm approach when assessing the peak discharge rate (pre and post) from a project. Per Chapter 5.1 of the FDOT Stormwater Management Facility Handbook, a storm for storm approach is preferred. This approach necessitates the need to also model the more frequent FDOT design storms (2-year through 50-year) in addition to the 100-year storm event. However, it is also acceptable, upon approval by the District Drainage Engineer, to meet the attenuation requirements for just the critical duration storm events only. A storm for storm approach results in larger pond sizes than a critical duration only approach. For this project, meeting the 30.1 CSM limiting discharge criteria for the portions of the project located within proposed right of way will likely govern the discharge criteria and pond sizes required for attenuation.

4.2.7 FLOODPLAIN ENCROACHMENT VOLUME

The 100-year floodplain encroachment volume is defined as the proposed fill between the estimated seasonal high water elevation (if above ground) or the existing ground, and the proposed 100-year peak stage per Chapter 4, Section 4.4 of the ERP Manual.

As a result of the proposed SR 29 roadway improvements, portions of the existing floodplain will be impacted by the roadway widening and proposed pond sites. The impacts should be mitigated within the proposed ditches and ponds where possible. However, due to the extensive wetland impacts anticipated for this project, excavation of upland areas adjacent to the impacted floodplain is likely to be required for floodplain compensation. As no professionally estimated seasonal high water elevations were available for this study, the floodplain impacts could not be quantified. The floodplain impacts will need to be quantified during design, and the appropriate compensation areas identified.

The impacts to floodplains that are a result of bridge and cross drain capacities to convey water under SR 29 are proposed to be mitigated by the appropriate bridge and cross drain improvements.

4.3 POND SITE SIZING

Based upon an assessment of the existing conditions through field reviews, review of aerial and USGS maps and SCS soils data, preliminary offsite pond site alternatives were located for further investigation. Each site alternative was initially assessed for hydraulic feasibility based upon a SHGWT of the site estimated from preliminary SHGWT estimates, conveyance distance required, and the critical elevations upstream of the site. The critical elevations checked are at the low edge of pavement where one foot of clearance above the hydraulic grade line is desirable, and at the edge of pavement furthest from the pond.

Each offsite pond was sized to treat 2.5 inches of runoff from the proposed four-lanes, shoulders, and sidewalks. An additional 12 feet of paved area was included in the impervious calculation to account for turn lanes, median openings, and driveways to be conservative. The required treatment volume was increased by an additional 50% due to discharge to impaired water bodies.

Due to the CSM criteria imposed by SFWMD for the project area within proposed right of way Pond 9, to represent a typical pond site, was modeled in ICPR to test how much larger the pond would need to be to meet the CSM criteria. The result was to add an additional 25% pond site area increase (contingency) to accommodate the CSM criteria.

4.4 HYDRAULIC FEASIBILITY OF POND SITES

The hydraulic feasibility calculations for the offsite pond alternatives were based on rough estimates of the seasonal high water elevation at the outfall locations, as site seasonal high ground water elevations were not available. The pond sizing and hydraulic feasibility calculations will need to be updated after hand auger borings are obtained and seasonal high groundwater estimates are provided by the Geotechnical Engineer. The hydraulic feasibility calculations also calculate attenuation depth utilizing the NRCS equations. Refer to **Appendix 4.0** for the offsite pond hydraulic feasibility calculations.

4.5 BIOLOGICAL ASSESSMENT

Each site alternative was assessed by a Scientist to determine the presence of potential jurisdictional wetlands, and threatened and endangered species. The biological assessment for each of the pond site alternatives is included in **Appendix 6.0**. The results of the biological investigations will be discussed for each site alternative later in this report.

4.6 CONTAMINATION ASSESSMENT

A Level I hazardous materials investigation was conducted for each offsite pond alternative. The report is included as **Appendix 7.0.** The results of the investigation will be discussed later in this report.

4.7 CULTURAL RESOURCES ASSESSMENT

Each offsite pond alternative was assessed to determine the potential for significant cultural resources, including archaeological sites and historic structures. The report is included as **Appendix 8.0.** The results of these investigations will be discussed later in this report.

4.8 CONSTRUCTION AND ACQUISITION COSTS

The pond construction costs and land acquisition costs were not considered for this study. They will be assessed for each of the pond siting alternatives analyzed during the design phase.

4.9 EVALUATIONS AND RECOMMENDATIONS

The purpose of this study is to identify the general location of suitable pond site alternatives, estimate the site area required, and evaluate the environmental characteristics in the site vicinity.

The offsite pond alternatives were located as close to outfalls as practical, while avoiding wetlands wherever possible. Avoidance of wetlands is difficult or not possible in some basins due to the significant amount of wetlands within the hydraulically feasible locations within the basin. Where wetlands could not be avoided, it is recommended that isolated wetland treatment be considered. Berms could be constructed around the perimeter and the existing wetland be left in place in the interior of the pond, with the exception of inflow sumps to be constructed to allow the inflow pipe to enter the pond and the sump to collect incoming sediments.

Preliminary pond sizes were provided initially for the environmental assessments then further refined as the study progressed. Refinements were due to revisions in the typical section, seasonal high water estimates, the accommodation of a 50% increase in treatment to meet impaired water body criteria, and an additional 25% contingency to accommodate the CSM critera. As a result, the areas assessed as noted in **Appendix 6.0** are different that the final estimated site sizes.

The following subsections discuss in detail each alternative assessed. Refer to **Appendix 2.2** for the pond site alternatives maps that show the locations of each pond alternative assessed. A table summarizing the characteristics of each pond site alternative is provided for each project segment. The summary table provided for each segment is highlighted showing any features which may require additional investigation if pursued for design.

4.9.1 SEGMENT ONE

Segment One extends from approximately Station 188+50, just north of Favor Street and South of CR 80A, to approximately Station 500+00, north of SR 78. Located within the Caloosahatchee River Basin, discharge will be to lateral ditches and wetland systems that eventually discharge into the Caloosahatchee River. South of the river, one alternative, Pond A, was assessed to accommodate the improvements required to tie into the proposed SR 29

improvements adjacent to the south, and to facilitate the traffic movement from SR 29 onto the one way pairs proposed for Main Street and Bridge Street northward though downtown LaBelle.

No pond sites were proposed to accommodate the improvements from CR 80A to the bridges over the Caloosahatchee River as no new impervious area except turn lanes are proposed through downtown LaBelle, and an alternative for the new bridge was discussed and concurred with SFWMD.

The portion of the new bridge from the highpoint south towards LaBelle has been agreed with SFWMD to be treated with sediment and trash removal devices. There are several devices available by vendors or one can be designed by modifying a large manhole structure to accommodate a sump, baffles, and skimmers to retain the trash and sediments entering the system. Routine maintenance will be required to remove the trash and sediments and to maintain the effectiveness of the system. Refer to **Appendix 5.0** for examples of suitable devices for the removal of trash and sediments.

North of the river, nine pond sites were assessed within Segment One, Ponds 0, 1, 2, 3, 4, 5, 6-1, 6-2, and 7. These offsite ponds are proposed to accommodate the proposed widening of SR 29.

Each pond alternative is summarized in **Table E.1** included in the Executive Summary. Highlighted items require further investigation if the site alternative is selected. A detailed description for each pond alternative within Segment One follows.

4.9.1.1 POND A

Pond A is an approximately 1.6 acre site area located on the west side of SR 29. Pond A is also referred to as Pond South in the environmental assessments. The pond site is located north of and adjacent to the lateral ditch that serves as the outfall for the existing triple 29"x45" cross drain at Station 189+60. No easements for inflow or outflow pipes would be required for Pond A.

The contributing roadway basin to Pond A extends from the triple cross drain at Station 189+60 to CR 80A at approximately Station 200+00.

According to the NRCS web soil survey, the soils are mapped as Boca sand, with a hydrologic group A/D. The depth to lithic bedrock is approximately 24 to 40 inches, and the estimated depth to the water table is six to 18 inches. Boca sands are poorly drained soils located in flatwoods on marine terraces.

The site elevation is approximately elevation 18.0. A stain line was observed approximately half way up the barrel of the triple 29"x45" cross drain. Utilizing the available survey information, the stain line location is approximated to be at elevation 16.8. This elevation is approximately 1.2 feet lower than the site elevation, and was utilized as the control elevation estimate for the hydraulic feasibility calculations. Based on the results of the hydraulic feasibility calculations, a 2.1 acre site is needed. As the available site area is 1.6 acres, this site alternative was given a **hydraulic feasibility** rating of **fair**. A vacant area of approximately 0.5 acres just south of CR 80A will be created as a result of splitting SR 29 into the one way pairs on Main Street and Bridge Street. Utilization of this vacant area to provide additional area for stormwater storage is recommended.

The Pond A site is within a residential area, and a residential mobile home is currently located on the site. There are **no wetlands** associated with this site.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

No protected species or suitable habitats were observed within the site.

A contamination assessment of the site ranked it as **medium** potential for **contamination**, based its location approximately 500 feet south of Handy Food Store #58. Handy Food Store has a history of discharges which have since been remediated. If

selected for design, a Level II contamination assessment should be conducted for the Pond A site.

4.9.1.2 POND 0

Pond 0 is an approximately 1.0 acre site area located on the west side of SR 29. The pond site is located north of and adjacent to the Caloosahatchee River. No easements for inflow or outflow pipes would be required for Pond 0.

The contributing roadway basin to Pond 0 extends from the high point of the bridge over the Caloosahatchee River, estimated to be at Station 282+00, to Buser Avenue at Station 293+30.

According to the NRCS web soil survey, the soils are mapped as Udifluvents, with no assigned hydrologic group. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is also greater than 80 inches. Due to the depth to the groundwater table, the soils were assumed to be hydrologic group A. Udifluvents are located in flood plains on marine terraces.

The site elevation is approximately elevation 13.0. The FEMA flood plain maps indicate the 100-year flood stage to be at elevation 9.0 in the adjacent river. This elevation is approximately 4.0 feet lower than the site elevation, and was utilized as the control elevation estimate for the hydraulic feasibility calculations. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**.

The site is within open land, along the river bank of the Caloosahatchee River. There are **no wetlands** or surface waters located within this site.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the location of Pond 0 to the Caloosahatchee River, several listed bird species have the potential to occur within or adjacent to the site, including wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis. Suitable habitat is available within the open spaces of the site for the southeastern American kestrel, gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake, and Florida mouse. No wildlife was observed within or adjacent to the Pond 0 site during the field evaluations.

A contamination assessment of the site ranked it as **medium** potential for **contamination** based its location adjacent to the Handy Food Store #82. Handy Food Store has a history of discharge. The discharge status is "on-going". There is a 24" to 30" air stripping tower located behind the gas station at the time of this study. If selected for design, a Level II contamination assessment should be conducted for the Pond 0 site.

4.9.1.3 POND 1

Pond 1 is an approximately 1.6 acre site area located on the east side of SR 29. The pond site is located south of and adjacent to the lateral ditch draining to the existing 8'x7' cross drain at Station 299+80. No easements for inflow or outflow pipes would be required for Pond 1.

The contributing roadway basin to Pond 1 extends from Buser Avenue at Station 293+30 to the ditch high point at approximately Station 311+10, and spans the limits of the existing contributing roadway basin to the 8'x7' cross drain. The roadway runoff conveyance system will be required to pipe from the north under the cross drain lateral ditch to enter Pond 1.

According to the NRCS web soil survey, the soils are mapped as Wabasso sand, with a hydrologic group C/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is six to 18 inches. Wabasso sands are poorly drained soils located in flatwoods on marine terraces.

The site elevation is approximately elevation 12.0. A stain line was observed approximately half way up the barrel of the 8'x7' cross drain. Utilizing the available survey information, the stain line location is approximated to be at elevation 11.3. This elevation is approximately 0.7 feet lower than the site elevation, and was utilized as the control elevation estimate for the hydraulic feasibility calculations. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**.

As the Pond 1 site is entirely comprised of a forested wetland system, it will have **significant wetland involvement** potential. The site consists of mixed wetland hardwoods dominated by swamp laurel, red bay, cabbage palm, and red maple.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat and close proximity to the Caloosahatchee River, several listed species have the potential to occur within Pond 1 including the mangrove fox squirrel, wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis. No wildlife was observed within or adjacent to the Pond 1 site during the field evaluations.

A contamination assessment of the site ranked it as **low** potential for **contamination**.

4.9.1.4 POND 2

Pond 2 is an approximately 1.9 acre site area located on the east side of SR 29. The pond site is located north of and adjacent to the lateral ditch that serves as the outfall for the 24" cross drain at Station 312+30. No easements for inflow or outflow pipes would be required for Pond 2.

The contributing roadway basin to Pond 2 extends from the ditch high point at approximately Station 311+10 to the ditch high point at approximately Station 333+20, and spans the limits of the existing contributing roadway basin to the existing 24" cross drain. The roadway runoff conveyance system will be required to pipe from the south under the cross drain outfall lateral ditch to enter Pond 2.

According to the NRCS web soil survey, the soils are mapped as Riviera fine sand, with a hydrologic group C/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is zero to six inches. Riviera fine sands are poorly drained soils located in drainageways on marine terraces.

The site elevation is approximately elevation 15.0. A stain line was observed approximately two-thirds the way up the barrel of the 24" cross drain. Utilizing the available survey information, the stain line location is approximated to be at elevation 14.5. This elevation is approximately 0.5 feet lower than the site elevation, and was utilized as the control elevation estimate for the hydraulic feasibility calculations. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**.

The site consists of unimproved pasture that extends beyond the pond site on all sides. There are **no wetlands** or surface waters located within this site.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat, the southeastern American kestrel, Florida sandhill crane, Florida burrowing owl, gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake, and Florida mouse have the potential to occur within Pond 2. No wildlife was observed within or adjacent to the Pond 2 site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.1.5 POND 3

Pond 3 is an approximately 3.8 acre site area located on the east side of SR 29. The pond site is located 280 feet north of the lateral ditch that serves as the outfall for the triple 42" cross drain at Station 342+60. No easements for inflow or outflow pipes would be required for Pond 3.

The contributing roadway basin to Pond 3 extends from the ditch high point at approximately Station 333+20 to the ditch high point at approximately Station 374+50, and spans the limits of the existing contributing roadway basin to the existing triple 42" cross drain. The roadway runoff conveyance system will be required to pipe from the south under the cross drain outfall lateral ditch to enter Pond 3.

According to the NRCS web soil survey, the soils are mapped primarily as Oldsmar sand, with a hydrologic group C/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is six to 18 inches. Oldsmar sands are poorly drained soils located in flatwoods on marine terraces. The southwest corner of the site extends into soils mapped as Floridana fine sand, depressional, with a hydrologic group C/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is zero inches with frequent ponding. Floridana fine sands are located in depressions on marine terraces.

The site elevation is approximately elevation 21.0. A stain line was observed approximately half way up the barrel of the triple 42" cross drain. Utilizing the available survey information, the stain line location is approximated to be at elevation 19.5. This elevation is approximately 1.5 feet lower than the site elevation, and was utilized as the control elevation estimate for the hydraulic feasibility calculations. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**.

The site consists of improved pasture that extends beyond the pond site on southeast side. There are **no wetlands** or surface waters located within this site, however wetlands are located adjacent to the site.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat, the southeastern American kestrel, Florida sandhill crane, Florida burrowing owl, gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake, and Florida mouse have the potential to occur within Pond 3. No wildlife was observed within or adjacent to the Pond 3 site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.1.6 POND 4

Pond 4 is an approximately 3.3 acre site area located on the east side of SR 29. The pond site is located north of and adjacent to the lateral ditch that serves as the outfall for the existing double 42" cross drain at Station 380+45. No easements for inflow or outflow pipes would be required for Pond 4.

The contributing roadway basin to Pond 4 extends from the ditch high point at approximately Station 374+50 to the ditch high point at approximately Station 413+00, and spans the limits of the existing contributing roadway basin to the double 42" cross drain. The roadway runoff conveyance system will be required to pipe from the south under the cross drain outfall lateral ditch to enter Pond 4.

According to the NRCS web soil survey, the soils are mapped as Oldsmar sand, with a hydrologic group C/D. The depth to the restrictive layer is greater than 80 inches, and the

estimated depth to the water table is six to 18 inches. Oldsmar sands are poorly drained soils located in flatwoods on marine terraces.

The site elevation is approximately elevation 29.8. A stain line was observed approximately two-thirds the way up the barrel of the double 42" cross drain. Utilizing the available survey information, the stain line location is approximated at elevation 28.3. This elevation is approximately 1.5 feet lower than the site elevation, and was utilized as the control elevation estimate for the hydraulic feasibility calculations. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**.

The site consists of improved pasture that extends beyond the pond site on all sides. There are **no wetlands** or surface waters located within this site.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat, the southeastern American kestrel, Florida sandhill crane, Florida burrowing owl, gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake, and Florida mouse have the potential to occur within Pond 4. No wildlife was observed within or adjacent to the Pond 4 site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.1.7 POND 5

Pond 5 is an approximately 3.8 acre site area located on the east side of SR 29. The pond site is located south of and adjacent to the North Okaloacoochee River. The existing crossing at SR 29 is a two span flat slab bridge, Bridge No. 050941, at Station 431+10. No easements for inflow or outflow pipes would be required for Pond 5.

The contributing roadway basin to Pond 5 extends from the ditch high point at approximately Station 413+00 to the ditch high point at approximately Station 457+20, and spans the limits of the existing contributing roadway basin to the North Okaloacoochee River. The roadway runoff conveyance system will be required to pipe from the north under the waterway to enter Pond 5.

According to the NRCS web soil survey, the soils are mapped primarily as Immokalee sand, with a hydrologic group B/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is six to 18 inches. Immokalee sands are poorly drained soils located in flatwoods on marine terraces. The northwest corner of the site extends into soils mapped as Malabar fine sand, with a hydrologic group A/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is zero to 12 inches. Malabar fine sands are poorly drained soils located in drainageways on marine terraces.

The site elevation is approximately elevation 33.6. The downstream impoundment elevation is at approximately elevation 32.6. This elevation is approximately 1.0 foot lower than the site elevation, and was utilized as the control elevation estimate for the hydraulic feasibility calculations. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**.

The site consists of improved pasture that extends beyond the pond site on all sides. There are **no wetlands** or surface waters located within this site.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat, the southeastern American kestrel, Florida sandhill crane, Florida burrowing owl, gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake,

and Florida mouse have the potential to occur within Pond 5. No wildlife was observed within or adjacent to the Pond 5 site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.1.8 POND 6-1

Pond 6-1 is an approximately 3.2 acre site area located on the east side of SR 29. The pond site is located north of and adjacent to the lateral ditch that serves as the outfall for the existing 30" cross drain at Station 473+00. No easements for inflow or outflow pipes would be required for Pond 6-1.

The contributing roadway basin to Pond 6-1 extends from the ditch high point at approximately Station 457+20 to the bridge high point at Station 482+00. The roadway basin contributing to the pond extends 220 feet into Basin 7 to avoid having to pipe that portion of Basin 7 under the waterway to Pond 7.

According to the NRCS web soil survey, the soils are mapped primarily as Pople fine sand, with a hydrologic group B/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is six to 18 inches. Pople fine sands are poorly drained soils located in flats on marine terraces. The western edge of the site encroaches into soils mapped as Gator muck, depressional, with a hydrologic group C/D.

The site elevation is approximately elevation 35.8. The seasonal high water appears to be at the crown of the 30" cross drain. Utilizing the available survey information, the crown is approximated to be at elevation 33.4. This elevation is approximately 2.4 feet lower than the site elevation, and was utilized as the control elevation estimate for the hydraulic feasibility calculations. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**. It should be noted however that the estimated seasonal high elevation at the outfall is nearly one foot below the low range estimated for the site seasonal high ground water table. The cross drain has flared end sections for end treatments therefore there is no headwall to obtain good stain

line measurements. It is possible that the assumption of the crown elevation may be low at this location, which would result in a larger site required for the pond.

The site consists primarily of upland mixed hardwoods. Approximately five percent of the western portion of the pond site is comprised of wetland scrub habitat. The site is also adjacent to freshwater marsh habitat. It is recommended that the site be reconfigured to minimize wetland impacts, and is ranked **medium** for **wetland involvement** potential.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat, the mangrove fox squirrel, wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis have the potential to occur within Pond 6-1. No wildlife was observed within or adjacent to the Pond 6-1 site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.1.9 POND 6-2

Pond 6-2 is a second alternative that was assessed for Basin 6 with a slightly different configuration than Pond 6-1 to incorporate an isolated wetland. Pond 6-2 is an approximately 3.7 acre site area encompassing the isolated wetland, and is located approximately 300 feet east of SR 29. The pond site is located north of the lateral ditch that serves as the outfall for the existing 30" cross drain at Station 473+00. A 0.2 acre easement for inflow or outflow pipes would be required for Pond 6-2.

The contributing roadway basin to Pond 6-2 extends from the ditch high point at approximately Station 457+20 to the bridge high point at Station 482+00. The roadway basin contributing to the pond extends 220 feet into Basin 7 to avoid having to pipe that portion of Basin 7 under the waterway to Pond 7.

According to the NRCS web soil survey, the soils are mapped primarily as Malabar fine sand, with a hydrologic group A/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is zero to 12 inches. Malabar fine sands are poorly drained soils located in drainageways on marine terraces. The center of the site is open water.

The site elevation is unknown as it is outside of the range of available survey data, but is less than elevation 35 per the USGS topo quad maps. The seasonal high water of the site will need to be estimated by a biologist during design. This site was identified as an opportunity to provide isolated wetland treatment. A berm would be required around the perimeter, and an inflow sump is required for the inflow pipe. The interior portion of the wetland could be incorporated into the design to remain undisturbed. Isolated wetland alternatives typically result in better hydraulic feasibility as the treatment occurs below the seasonal high water elevation for isolated wetland treatment. Based on this logic, this site alternative was given a **hydraulic feasibility** rating of **good**.

The site consists primarily of freshwater marsh habitat in the center, fringed by upland mixed hardwoods. It is recommended that the site be configured to incorporate the isolated wetland with as much of it to remain undisturbed as possible, and is ranked **high** for **wetland involvement** potential.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat, the mangrove fox squirrel, wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis have the potential to occur within Pond 6-1. No wildlife was observed within or adjacent to the Pond 6-1 site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.1.10 POND 7

Pond 7 is an approximately 5.4 acre site area located on the east side of SR 29. The pond site is located approximately 600 feet north of an un-named waterway. The existing crossing at SR 29 appears to be a one span flat slab bridge at Station 482+00. With a span width less than 20 feet, the bridge does not have an assigned bridge number, and is noted as a box culvert on the straight line diagram. No easements for inflow or outflow pipes would be required for Pond 7.

The contributing roadway basin to Pond 7 extends from the bridge high point at Station 482+00 to the ditch high point at Station 527+00. The roadway basin contributing to the pond is 220 feet less than what contributes to Basin 7 in the existing condition to avoid having to pipe the portion of Basin 7 south of the bridge under the waterway to Pond 7. The 220 feet of roadway not included in Pond 7 will be routed to Pond 6 for attenuation and treatment.

According to the NRCS web soil survey, the soils are mapped primarily as Immokalee sand, with a hydrologic group B/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is six to 18 inches. Immokalee sands are poorly drained soils located in flatwoods on marine terraces.

The site elevation is less than elevation 35.2. The downstream impoundment elevation is at approximately elevation 34.0. The distance from the top of the bridge to the stain line was measured. Utilizing the available survey information, the stain line is approximated to be at elevation 33.9. This elevation is approximately 1.3 foot lower than the site elevation, and was utilized as the control elevation estimate for the hydraulic feasibility calculations. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**.

The site consists mostly of improved pasture and a sod farm on the eastern portion. A drainage ditch runs through the east side of the pond. Due to the presence of the drainage ditch, the site is ranked **low** for **wetland involvement** potential.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat, the southeastern American kestrel, Florida sandhill crane, Florida burrowing owl, gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake, and Florida mouse have the potential to occur within Pond 7. Within the drainage ditch, several listed bird species may potentially occur including wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis. No wildlife was observed within or adjacent to the Pond 7 site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.2 SEGMENT TWO

Segment Two extends from approximately Station 500+00, north of SR 78 to Station 950+00 at CR 74. Located within the Caloosahatchee River Basin, discharge will be to lateral ditches and wetland systems that eventually discharge into the Caloosahatchee River.

Eleven pond sites were assessed within Segment Two, Ponds 8A, 8B, 9, 10, 11A, 11B, 12-13A, 13B, 14A, 14B-15-1 and 14B-15-2. These offsite ponds are proposed to accommodate the proposed widening of SR 29.

Each pond alternative is summarized in **Table E.1** included in the Executive Summary. Highlighted items require further investigation if the site alternative is selected. A detailed description for each pond alternative within Segment Two follows.

4.9.2.1 POND 8A

Pond 8A is an approximately 4.1 acre site area located on the west side of SR 29. The pond site is located approximately 250 feet south of Lone Pine Creek. The existing crossing at SR 29 is a three span flat slab bridge, Bridge No. 050035, at Station 582+60. No easements for inflow or outflow pipes would be required for Pond 8A.

The contributing roadway basin to Pond 8A extends from the ditch high point at Station 527+00 to the center of the bridge at Station 582+60. The roadway basin contributing to Pond 8A spans only the portion of Basin 8 located south of the bridge to avoid piping under the creek.

According to the NRCS web soil survey, the soils are mapped as Oldsmar sand, with a hydrologic group C/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is six to 18 inches. Oldsmar sands are poorly drained soils located in flatwoods on marine terraces.

The site elevation is approximately elevation 31.8. The downstream impoundment elevation is at approximately elevation 31.8. The distance from the top of the bridge to the stain line was measured. Utilizing the available survey information, the stain line is approximated at elevation 32.8. On June 2, 2010 the water surface was measured at elevation 31.9, and is assumed to be a good approximation of the seasonal high water elevation. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**.

The site consists primarily of improved pasture with a freshwater marsh extending into the southeastern portion of the pond site. It is recommended that the site be reconfigured to avoid wetlands, and is ranked **low** for **wetland involvement** potential.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat, several listed bird species have the potential to occur within the freshwater marsh portion of Pond 8A including the wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis. Within the improved pasture protion of the pond site, the southeastern American kestrel, Florida sandhill crane, Florida burrowing owl, gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake, and Florida mouse have the potential to occur within Pond 8A. No wildlife was observed within or adjacent to the Pond 8A site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.2.2 POND 8B

Pond 8B is an approximately 2.5 acre site area located on the east side of SR 29. The pond site is located approximately 120 feet north of Lone Pine Creek. The existing crossing at SR 29 is a three span flat slab bridge, Bridge No. 050035, at Station 582+60. No easements for inflow or outflow pipes would be required for Pond 8B.

The contributing roadway basin to Pond 8B extends from the center of the bridge at Station 582+60 to the ditch high point at Station 604+60. The roadway basin contributing to Pond 8B spans only the portion of Basin 8 located north of the bridge to avoid piping under the creek.

According to the NRCS web soil survey, the soils are mapped as Oldsmar sand, with a hydrologic group C/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is six to 18 inches. Oldsmar sands are poorly drained soils located in flatwoods on marine terraces.

The site elevation is approximately elevation 31.8. The downstream impoundment elevation is at approximately elevation 31.8. The distance from the top of the bridge to the stain line was measured. Utilizing the available survey information, the stain line is

approximated to be at elevation 32.8. On June 2, 2010 the water surface was measured at elevation 31.9, and is assumed to be a good approximation of the seasonal high water elevation. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**.

The site consists of improved pasture. A forested wetland is adjacent to the south side of the pond site. There are **no wetlands** or surface waters located within this site.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat, the southeastern American kestrel, Florida sandhill crane, Florida burrowing owl, gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake, and Florida mouse have the potential to occur within Pond 8B. No wildlife was observed within or adjacent to the Pond 8B site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.2.3 POND 9

Pond 9 is an approximately 3.5 acre site area located on the east side of SR 29. The pond site is located north of and adjacent to the lateral ditch that serves as the outfall for the existing triple 30" cross drain at Station 625+00. No easements for inflow or outflow pipes would be required for Pond 9.

The contributing roadway basin to Pond 9 extends from the ditch high point at approximately Station 604+60 to the ditch high point at approximately Station 656+60, and spans the limits of the existing contributing roadway basin to the triple 30" cross drain. The roadway runoff conveyance system will be required to pipe from the south under the cross drain outfall lateral ditch to enter Pond 9.

According to the NRCS web soil survey, the soils are mapped as Malabar fine sand, with a hydrologic group A/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is zero to 12 inches. Malabar fine sands are poorly drained soils located in drainageways on marine terraces.

The site elevation is approximately elevation 32.2. A staked wetland line was shown in the available survey data at approximately elevation 30.8, and was utilized as the control elevation estimate for the hydraulic feasibility calculations. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**.

The site consists of improved pasture in the southeast portion, freshwater marsh in the northwest portion, and wet prairie in the remaining portion of the site. This site is ranked **high** for **wetland involvement** potential.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat, the southeastern American kestrel, Florida sandhill crane, Florida burrowing owl, gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake, and Florida mouse have the potential to occur within the improve pasture portion and or the wet prairie portion of the pond site. Within the freshwater marsh portion of Pond 9, the wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis have the potential to occur. No wildlife was observed within or adjacent to the Pond 9 site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.2.4 POND 10

Pond 10 is an approximately 3.2 acre site area located on the east side of SR 29. The pond site is located north of and adjacent to the lateral ditch that serves as the outfall for the existing triple 36" cross drain at Station 664+00. No easements for inflow or outflow pipes would be required for Pond 10.

The contributing roadway basin to Pond 10 extends from the ditch high point at approximately Station 656+60 to the ditch high point at approximately Station 675+00, and spans the limits of the existing contributing roadway basin to the triple 36" cross drain. The roadway runoff conveyance system will be required to pipe from the south under the cross drain outfall lateral ditch to enter Pond 10.

According to the NRCS web soil survey, the soils are mapped as Malabar fine sand, with a hydrologic group A/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is zero to 12 inches. Malabar fine sands are poorly drained soils located in drainageways on marine terraces.

The site elevation is approximately elevation 33.2. The seasonal high water appears to be above the crown of the triple 36" cross drain. Utilizing the available survey information, the crown is approximated to be at elevation 32.2. This elevation is approximately 1.0 feet lower than the site elevation. Since the site is a wet prairie, the site elevation estimate was utilized as the control elevation estimate for the hydraulic feasibility calculations. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**.

The site consists of wet prairie that extends in all directions from the site. This site is ranked **significant** for **wetland involvement** potential.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for **listed species**. Due to the availability of suitable habitat, the Florida sandhill crane and eastern indigo snake have the potential to occur within the pond site. No wildlife was observed within or adjacent to the Pond 10 site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.2.5 POND 11A

Pond 11A is an approximately 2.6 acre site area located on the east side of SR 29. The pond site is located approximately 200 feet south of Cypress Branch. The existing crossing at SR 29 is a ten span flat slab bridge, Bridge No. 050033, at Station 696+00. No easements for inflow or outflow pipes would be required for Pond 11A.

The pond size is based on the assumption that the critical low edge elevations of the roadway within the basin will be raised at least one foot. Without raising the roadway, the estimated size for Pond 11A is 11.3 acres. Basin 11 has a history of roadway overtopping, and the analysis performed for the bridge replacement recommends that the bridge be raised. Refer to the Location Hydraulics Report for additional information.

The contributing roadway basin to Pond 11A extends from the ditch high point at Station 675+00 to the center of the bridge at Station 696+00. The roadway basin contributing to Pond 11A spans only the portion of Basin 11 located south of the bridge to avoid piping under the waterway.

According to the NRCS web soil survey, the soils are mapped as Pineda fine sand, with a hydrologic group C/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is zero to 12 inches. Pineda fine sands are poorly drained soils located in swamps within floodplains on marine terraces.

The site elevation is less than elevation 33.0. On June 2, 2010 the water surface at the bridge was measured at elevation 34.0, and is assumed to be a good approximation of the seasonal high water elevation. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good** if the road is raised a minimum of one foot, otherwise the hydraulic feasibility would be fair.

The site consists of mixed wetland hardwoods that extend beyond the site on all sides. This site is ranked **significant** for **wetland involvement** potential.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat, several listed species have the potential to occur within the site including the mangrove fox squirrel, wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis. No wildlife was observed within or adjacent to the Pond 11A site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.2.6 POND 11B

Pond 11B is an approximately 4.7 acre site area located on the east side of SR 29. The pond site is located approximately 200 feet north of Cypress Branch. The existing crossing at SR 29 is a ten span flat slab bridge, Bridge No. 050033, at Station 696+00. No easements for inflow or outflow pipes would be required for Pond 11B.

The pond size is based on the assumption that the critical low edge elevations of the roadway within the basin will be raised at least one foot. Without raising the roadway, the estimated size for Pond 11B is 7.9 acres. Basin 11 has a history of roadway

overtopping, and the analysis performed for the bridge replacement recommends that the bridge be raised. Refer to the Location Hydraulics Report for additional information.

The contributing roadway basin to Pond 11B extends from the center of the bridge at Station 696+00 to the ditch high point at Station 764+60. The roadway basin contributing to Pond 11B spans only the portion of Basin 11 located north of the bridge to avoid piping under the waterway.

According to the NRCS web soil survey, the soils are mapped as Malabar fine sand, high, with a hydrologic group A/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is six to 18 inches. Malabar fine sands are poorly drained soils located in drainageways on marine terraces.

The site elevation is assumed to be less than elevation 33.0. On June 2, 2010 the water surface at the bridge was measured at elevation 34.0, and is assumed to be a good approximation of the seasonal high water elevation. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good** if the road is raised a minimum of one foot, otherwise the hydraulic feasibility would be fair.

The site consists primarily of mixed wetland hardwoods, with a freshwater marsh within the west corner of the site. This site is ranked **significant** for **wetland involvement** potential.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat, several listed species have the potential to occur within the site including the mangrove fox squirrel, wood stork, limpkin, little blue heron, snowy egret, tricolored

heron, and white ibis. No wildlife was observed within or adjacent to the Pond 11B site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.2.7 POND 12-13A

Pond 12-13A is an approximately 4.2 acre site area located on the east side of SR 29. The pond site is located approximately 400 feet south of the lateral ditch that serves as the outfall for the existing quadruple 15" cross drain at Station 801+00. No easements for inflow or outflow pipes would be required for Pond 12-13A.

The contributing roadway basin to Pond 12-13A extends from the ditch high point at approximately Station 764+60 to the bridge high point at Station 827+80. The roadway basin contributing to the pond extends 880 feet into Basin 13 to avoid having to pipe that portion of Basin 13 under the waterway to Pond 13B.

According to the NRCS web soil survey, the soils are mapped as Myakka sand, with a hydrologic group B/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is six to 18 inches. Myakka sands are poorly drained soils located in flatwoods on marine terraces.

The site elevation is approximately elevation 35.2. The seasonal high water appears to be at the top of the headwall on the upstream side of the quadruple 15" cross drain. The cross drain was determined to be undersized. The estimated site elevation was utilized as the control elevation estimate for the hydraulic feasibility calculations. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**.

The site consists primarily of shrub and brushland habitat. There are **no wetlands** or surface waters located within this site.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for **listed species**. Due to the availability of suitable habitat, the eastern indigo snake has the potential to occur within the pond site. No wildlife was observed within or adjacent to the Pond 12-13A site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.2.8 POND 13B

Pond 13B is an approximately 3.5 acre site area located on the east side of SR 29. The pond site is located approximately 470 feet north of York Branch. The existing crossing at SR 29 is a three span flat slab bridge, Bridge No. 050032, at Station 827+80. No easements for inflow or outflow pipes would be required for Pond 13B.

The contributing roadway basin to Pond 13B extends from the center of the bridge at Station 827+80 to the ditch high point at Station 870+70. The roadway basin contributing to Pond 13B spans only the portion of Basin 13 located north of the bridge to avoid piping under the waterway.

According to the NRCS web soil survey, the soils are mapped primarily as Basinger fine sand, with a hydrologic group A/D. Malabar fine sand, with a hydrologic group A/D, is also present along the southwest edge of the site. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is zero to 12 inches. Basinger and Malabar fine sands are poorly drained soils located in drainageways on marine terraces.

The site elevation is assumed to be less than elevation 35.8. On June 2, 2010 the water surface at the bridge was measured at elevation 37.5, and is assumed to be a good

approximation of the seasonal high water elevation. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**.

The site consists of wet prairie. This site is ranked **significant** for **wetland involvement** potential.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for **listed species**. Due to the availability of suitable habitat, the Florida sandhill crane and eastern indigo snake have the potential to occur within the pond site. No wildlife was observed within or adjacent to the Pond 13B site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.2.9 POND 14A

Pond 14A is an approximately 3.8 acre site area located on the east side of SR 29. The pond site is located approximately 350 feet south of Turkey Branch. The existing crossing at SR 29 is a two span flat slab bridge, Bridge No. 050031, at Station 911+00. No easements for inflow or outflow pipes would be required for Pond 14A.

The contributing roadway basin to Pond 14A extends from the ditch high point at Station 870+70 to the center of the bridge at Station 911+00. The roadway basin contributing to Pond 14A spans only the portion of Basin 14 located south of the bridge to avoid piping under the waterway.

According to the NRCS web soil survey, the soils are mapped as Myakka sand, with a hydrologic group B/D. The depth to the restrictive layer is greater than 80 inches, and the

estimated depth to the water table is six to 18 inches. Myakka sands are poorly drained soils located in flatwoods on marine terraces.

The site elevation is approximately elevation 38.8. On June 2, 2010 the water surface at the bridge was measured at elevation 37.9, and is assumed to be a good approximation of the seasonal high water elevation. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**.

The site consists primarily of wet prairie. A drainage ditch extends north and south through the site. This site is ranked **significant** for **wetland involvement** potential.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat, the Florida sandhill crane and eastern indigo snake have the potential to occur within the wet prairie portion of the site. Within the drainage ditch, the wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis have the potential to occur. No wildlife was observed within or adjacent to the Pond 14A site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.2.10 POND 14B-15-1

Pond 14B-15-1 is an approximately 6.2 acre site area located on the west side of SR 29. The pond site is located north of and adjacent to Turkey Branch. The existing crossing at SR 29 is a two span flat slab bridge, Bridge No. 050031, at Station 911+00. No easements for inflow or outflow pipes would be required for Pond 14B-15-1.

The contributing roadway basin to Pond 14B-15-1 extends from the center of the bridge at Station 911+00 to CR 74 at Station 950+20. The roadway basin contributing to Pond 14B-15-1 spans only the portion of Basin 14 located north of the bridge to avoid piping under the waterway, and all of Basin 15. The portion of Basin 15 north of the existing 36" cross drain at station 941+00 will need to be piped under the lateral ditch to the pond. This cross drain serves as a relief structure for the bridge crossing at Turkey Branch therefore it contributes to the same wetland system.

According to the NRCS web soil survey, the soils are mapped as Basinger fine sand, with a hydrologic group A/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is zero to 12 inches. Basinger fine sands are poorly drained soils located in drainageways on marine terraces.

The site elevation is approximately elevation 38.8. On June 2, 2010 the water surface at the bridge was measured at elevation 37.9, and is assumed to be a good approximation of the seasonal high water elevation. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**.

The site consists primarily of wet prairie that extends beyond the site from all sides. A drainage ditch runs through the southeast portion of the site. This site is ranked **significant** for **wetland involvement** potential.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat, the Florida sandhill crane and eastern indigo snake have the potential to occur within the wet prairie portion of the site. Within the drainage ditch, the wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis have the potential to occur. No wildlife was observed within or adjacent to the Pond 14B-15-1 site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.2.11 POND 14B-15-2

Pond 14B-15-2 is a second alternative that was assessed with a slightly different configuration than Pond 14B-15-1 to incorporate an existing reservoir. Pond 14B-15-2 is an approximately 6.2 acre site area located on the west side of SR 29. The pond site is located approximately 300 feet north of Turkey Branch. The existing crossing at SR 29 is a two span flat slab bridge, Bridge No. 050031, at Station 911+00. No easements for inflow or outflow pipes would be required for Pond 14B-15-2.

The contributing roadway basin to Pond 14B-15-2 extends from the center of the bridge at Station 911+00 to CR 74 at Station 950+20. The roadway basin contributing to Pond 14B-15-1 spans only the portion of Basin 14 located north of the bridge to avoid piping under the waterway, and all of Basin 15. The portion of Basin 15 north of the existing 36" cross drain at station 941+00 will need to be piped under the lateral ditch to the pond. This cross drain serves as a relief structure for the bridge crossing at Turkey Branch therefore it contributes to the same wetland system.

According to the NRCS web soil survey, the soils are mapped as Basinger fine sand, with a hydrologic group A/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is zero to 12 inches. Basinger fine sands are poorly drained soils located in drainageways on marine terraces. Open water is mapped within the northwest portion of the site.

The site elevation is approximately elevation 38.8. On June 2, 2010 the water surface at the bridge was measured at elevation 37.9, and is assumed to be a good approximation of the seasonal high water elevation. Based on the results of the hydraulic feasibility calculations, this site alternative was given a **hydraulic feasibility** rating of **good**.

The site consists primarily of wet prairie with a reservoir within the northwest half of the site. A drainage ditch runs through the southeast portion of the site. This site is ranked **significant** for **wetland involvement** potential.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat, the Florida sandhill crane and eastern indigo snake have the potential to occur within the wet prairie portion of the site. Within the reservoir, the American alligator has the potential to occur. No wildlife was observed within or adjacent to the Pond 14B-15-2 site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.3 SEGMENT THREE

Segment Three extends from Station 950+00 at CR 74 to Station 992+00 at US 27, and includes an interchange at CR 74, improvements along CR 74, and new alignment for SR 29 to US 27. The west side of SR 29, and a 23.4 acre basin contributing to the existing 24" cross drain at Station 974+10 within Segment Three is located within the Fisheating Creek Basin, where discharge will be to lateral ditches and wetland systems that eventually discharge into Fisheating Creek. The area east of the 24" cross drain basin, including the area where the new alignment of SR 29 to US 27 is proposed, contributes to the Caloosahatchee River Basin.

Two pond sites were assessed within Segment Three, Ponds 16A and Pond 16-17. These offsite ponds are proposed to accommodate the proposed widening of SR 29 and CR 74, and the new alignment associated with the interchange and the relocation of the intersection of SR 29 with US 27.

Each pond alternative is summarized in **Table E.1** included in the Executive Summary. Highlighted items require further investigation if the site alternative is selected. A detailed description for each pond alternative within Segment Three follows.

4.9.3.1 POND 16A

Pond 16A is an approximately 3.8 acre site area located on the north side of CR 74, west of SR 29. The pond site is located east of and adjacent to an outfall ditch. No easements for inflow or outflow pipes would be required for Pond 16A.

Pond 16A is sized to accommodate the CR 74 improvements west of SR 29. The pond size is a very rough estimate due to the lack of survey information needed to estimate the site elevation and seasonal high ground water table elevation. As it is located within the Fisheating Creek Basin, it does need to provide an additional 50% treatment volume to meet the impaired water body criteria, but it does not need an additional 25% area increase contingency to meet CSM limiting discharge criteria.

According to the NRCS web soil survey, the soils are primarily mapped as Immokalee sand, with a hydrologic group B/D. Along the western edge, the site is mapped as Basinger fine sand, with a hydrologic group A/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is six to 18 inches within the Immokalee soils and zero to 12 inches within the Basinger soils. Immokalee sands are poorly drained soils located in flatwoods on marine terraces. Basinger fine sands are poorly drained soils located in drainageways on marine terraces.

The site elevation is unknown, but is less than elevation 40 according to the USGS topo quad maps. It is assumed this site alternative has a **hydraulic feasibility** rating of **good** due to its proximity to the drainage ditch.

The site consists primarily of wet prairie that extends beyond the site from all sides. This site is ranked **significant** for **wetland involvement** potential.

There are **no historical structures** associated with this site.

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for **listed species**. Due to the availability of suitable habitat, the Florida sandhill crane and eastern indigo snake have the potential to occur within the site. No wildlife was observed within or adjacent to the Pond 16A site during the field evaluations.

A contamination assessment of the site ranked it as **no** potential for **contamination**.

4.9.3.2 POND 16-17

Pond 16-17 is an approximately 68.8 acre site area located on the east side of SR 29 and south side of US 27. The pond site encompasses an existing borrow pit. No easements for inflow or outflow pipes would be required for Pond 16-17. Two outfalls could be incorporated, one to the US 27 ditch and the other to the east, to balance the attenuation to both the Fisheating Creek and Caloosahatchee River Basins, as both basins are involved for the proposed roadway improvements contributing runoff to Pond 16-17.

Pond 16-17 will be utilized to accommodate the CR 74 improvements east of SR 29, and the realignment of SR 29 with US 27. The pond size is large as it entirely encompasses an existing borrow pit.

According to the NRCS web soil survey, the site is mapped as open water. Adjacent soils are primarily mapped as Pomello fine sand, with a hydrologic group A. Immokalee sand is also mapped adjacent along the south eastern edge, with a hydrologic group B/D. The depth to the restrictive layer is greater than 80 inches, and the estimated depth to the water table is 24 to 42 inches within the Pomello soils and six to 18 inches within the Immokalee soils. Pomello fine sands are moderately well drained soils located in rises on marine terraces. Immokalee sands are poorly drained soils located in flatwoods on marine terraces.

The site elevation is unknown, but is higher than elevation 40 according to the USGS topo quad maps. It is assumed this site alternative has a **hydraulic feasibility** rating of **good** due to its large size.

The site since being excavated has become a freshwater marsh habitat. This site is ranked **significant** for **wetland involvement** potential.

There are **no historical structures** associated with this site, however it is located adjacent to one historic linear resource, the Atlantic Coast Line (South Central Florida Express) Railroad (8GL456).

The site was rated to have **low archaeological potential**.

The site is suitable **habitat** for a variety of **listed species**. Due to the availability of suitable habitat, several listed bird species have the potential to occur within the freshwater marsh including the wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis. No wildlife was observed within or adjacent to the Pond 16-17 site during the field evaluations.

A contamination assessment of the site ranked it as **low** potential for **contamination** due its location adjacent to a railroad corridor.

4.10 CONCLUSION

This Pond Siting Report identifies potential offsite pond alternatives to be considered during the design of SR 29. The study corridor begins south of CR 80A in Hendry County and ends at US 27 in Glades County. The entire corridor is located within impaired water bodies, and the majority of the corridor is required to meet CSM limiting discharge criteria for all proposed right of way areas including pond sites. It is our recommendation to incorporate dry shallow swales into the typical section to provide some dry retention treatment, and to utilize offsite ponds for

the remainder of the treatment and attenuation required. The acquisition of additional right of way is anticipated for both the roadway and offsite ponds.

APPENDICES

1.0 CORRESPONDENCE AND DOCUMENTATION

- 1.1 FDOT
- 1.2 SFWMD
- 1.3 Field Review Notes and Photos

2.0 MISCELLANEOUS MAPS

- 2.1 Historic FDOT Drainage Maps
- 2.2 Pond Site Alternatives Maps
- 2.3 USGS Maps
- 2.4 FIRMettes
- 2.5 Impaired Water Body Maps

3.0 SOILS AND HIGH WATER INFORMATION

4.0 HYDRAULIC FEASIBILITY AND POND SIZING CALCULATIONS

5.0 TRASH AND SEDIMENT REMOVAL DEVICES

6.0 ENVIRONMENTAL ASSESSMENT

7.0 HAZARDOUS MATERIAL AND CONTAMINATION ASSESSMENT

8.0 CULTURAL RESOURCES ASSESSMENT

Appendix 1.0

Correspondence and Documentation

1.1 FDOT

Faller, Davis & Associates, Inc.
CONSULTING ENGINEERS

PHONE CONVERSATION

PROJECT: SR 29 PD&E Study
Hendry County

DATE: August 25, 2008

SUBJECT: Roadway Overtopping

CONVERSATION BETWEEN: Deborah Knighton – Faller, Davis & Associates Inc.
Gloria Seay – FDOT Maintenance Office

DETAILS OF CONVERSATION:

As part of the due diligence for the above referenced project, FDOT Maintenance was contacted regarding reports of roadway overtopping as a result of tropical storm Fay.

Gloria indicated that SR 29 was closed on Wednesday August 20th 2008, and reopened the next day. The limits of closure were from just north of the bridge at Cypress Branch from approximately mile post 6.877 to mile post 9.361. She indicated that water was sheeting over the roadway at the low areas within the closed section of roadway, and that the water was staging onto the travel lanes in numerous locations.

She indicated that Lykes, the adjacent property owner, has not wanted to construct ditches which contributed to the flooding problems.

1.2 SFWMD

Faller, Davis & Associates, Inc.
CONSULTING ENGINEERS

PHONE CONVERSATION

PROJECT: SR 29 PD&E
From Cowboy Way to US 27
Hendry and Glades County

DATE: March 25, 2011

SUBJECT: SFWMD Treatment Requirements for Highways

BETWEEN: Deborah L. Knighton, P.E. – FDA
Kelly Cranford, P.E. – SFWMD Lead Engineer

DETAILS OF CONVERSATION:

Typically the treatment requirement is 1" over the project area or 2.5" over the percent impervious area, whichever is greater. For the above referenced project, due to the wide right of way required for the median, swales, and berms, the 1" over the project area was found to be the governing criteria. The above project is required to provide 150% of the required treatment because it is located within impaired basins. In addition, most of the project is within the Caloosahatchee River Basin which is required to meet their CSM criteria for all new right of way area including ponds, which is an issue that compounds as pond sites get larger.

I called Kelly because the issue I was having was that the ponds were becoming excessively large utilizing the 1" over the project area times 150%. I explained the project issues with low roadway elevations in relation to the surrounding terrain which has a high water table, and that it was also factoring into the need for larger pond sites due to hydraulic feasibility calculations. The pond sites are included in the 1" over the project area calculation whereas they are not included in the calculation for the 2.5" over the percent impervious area calculation. I asked her if SFWMD would consider a hardship exception and allow the Department to treat just the impervious area. I pointed out to her that the FDOT does not fertilize their pervious areas, and she agreed that could be considered a BMP. She indicated that since the road is in the best interest for public safety (it is an emergency evacuation route) that the request is reasonable. She indicated that they typically require the calculation to include the sidewalks and trails when being proposed for construction with a roadway project.

Fuller, Davis & Associates, Inc.
CONSULTING ENGINEERS

MEETING NOTES

PROJECT: SR 29 PD&E
From Cowboy Way to US 27
Hendry and Glades County

DATE: October 6, 2010

SUBJECT: SFWMD Pre-Application Meeting

ATTENDEES: Jim Wilt, P.E. - PBSJ
Deborah L. Knighton, P.E. – FDA
Hugo Carter, P.E. – SFWMD Engineer Supervisor
Kelly Cranford, P.E. – SFWMD Lead Engineer
Eve Raymond – SFWMD Environmental Analyst 3
Mindy Parrot – SFWMD Senior Supervising Environmental Analyst

BACKGROUND INFORMATION:

The above referenced PD&E study involves the improvement of SR 29 in three segments: Segment One from Cowboy Way to north of SR 78, Segment Two from north of SR 78 to CR 74, and Segment Three from CR 74 to US 27. The Hendry/Glades county line is located within Segment One at CR 731, just north of the Caloosahatchee Canal crossing.

TOPICS OF DISCUSSION:

1. Permitting jurisdictions
    - Hendry County
    - Glades County

They indicated that the entire project, including the small portion located in Hendry County, could be permitted through the Okeechobee Service Office. We pointed out that the PD&E project limits would likely be subdivided into two or three design projects, and that the FDOT typically uses a county line as a project division. As the Hendry County portion has been previously coordinated with the Ft. Myers office, we indicated that we would most likely permit the Hendry County portion through the Ft. Myers office.

2. Treatment Criteria

Design ponds utilizing current criteria due to uncertainty of when the new Statewide Stormwater Rule will go into effect. The project area except the last basin to the north is within the Caloosahatchee River basin. The northernmost basin discharges to Fisheating Creek. Both the Caloosahatchee River and Fisheating Creek are impaired water bodies. Impaired water body calculations will be required for the entire project.

3. Attenuation Criteria

The existing roadway right of way can meet SFWMD 72-hour 25-year pre vs. post criteria. However, any new right of way, including pond sites, will have to meet the 30.1 CSM discharge criteria established for the Caloosahatchee River basin. A weighted allowable discharge rate will need to be calculated for each outfall location. The northern basin to Fisheating Creek can meet pre vs. post discharge criteria.

4. Floodplain

Demonstrate no adverse impacts for floodplains.

5. Bridges

Demonstrate no adverse impacts. No scuppers will be allowed. They expect the bridges to be rebuilt.

6. Contamination

It was noted that the gas station just north of the Caloosahatchee River at North River Road and SR 29 is in the process of remediating a contamination issue. It was noted that they have a 24"-30" air stripping tower behind the building.

7. Environmental

Some issues and concerns were expressed by the SFWMD Environmental staff present at the meeting. Their concerns were noted but comment was deferred to a later time when FDOT could check into the issues and URS could respond to their concerns. They noted that the project area was within a Wood Stork core foraging area, and that Cara Cara habitat is also present. They had concerns with respect to the alignment of Segments Two and Three shown on the exhibits. They expressed that wetland impacts could be reduced with a western alignment, and that the realignment at US 27 could have avoided or minimized wetland impacts.

The FDOT will confirm whether the PD&E Study has gone through the ETDM Process, and if it has, who provided comments on behalf of the SFWMD.

Faller, Davis & Associates, Inc.
CONSULTING ENGINEERS

MEETING NOTES

PROJECT: SR 29 PD&E
From Cowboy Way to US 27
Hendry and Glades County

DATE: September 22, 2010

SUBJECT: SFWMD Pre-Application Meeting

ATTENDEES: Brent Setchell, P.E. – FDOT D1
Carl Spirio, P.E. – FDOT D1
Jim Wilt, P.E. - PBSJ
Deborah L. Knighton, P.E. - FDA
Bill Foley - SFWMD

BACKGROUND INFORMATION:

The above referenced PD&E study involves the improvement of SR 29 in three segments: Segment One from Cowboy Way to north of SR 78, Segment Two from north of SR 78 to CR 74, and Segment Three from CR 74 to US 27. The Hendry/Glades county line is located within Segment One at CR 731, just north of the Caloosahatchee Canal crossing.

TOPICS OF DISCUSSION:

1. Permitting jurisdictions
    - Hendry County
    - Glades County

The direction provided was that the Glades County portion of the project would be permitted out of the SFWMD Okeechobee Service Office, and perhaps even the entire project as only a small portion was located in Hendry County. We pointed out that the PD&E project limits would likely be subdivided into two or three design projects, and that the FDOT typically uses a county line as a project division.

2. SR 29 Permitting in Hendry County

It was agreed that a design project limited to Hendry County could be permitted in the Fort Myers Service Office. The permit would most likely entail a permit modification, as SFWMD assigns one permit number per road in each county. They would prefer a

permit modification over an exemption. We explained that the portion of the project through Labelle would only entail milling and resurfacing of the existing pavement, and turn lane additions at SR 80 and at Cowboy Way. It was indicated that an exemption could be a way to go for the turn lane additions if they meet all of the criteria.

3. Treatment Criteria

For the portion of the project that involves widening and stormwater ponds, a 50% increase in treatment is required since the Caloosahatchee is an impaired water body.

4. Attenuation Criteria

The existing roadway right of way can meet SFWMD 72-hour 25-year pre vs. post criteria. However, any new right of way will have to meet the CSM discharge criteria established for the Caloosahatchee River basin. We were directed to contact Kelly Cranford at the Okeechobee Service Office for further guidance.

5. Hardships
    - Downtown Labelle
    - South side of new bridge over Caloosahatchee Canal
    - North side of bridges over Caloosahatchee Canal

Since downtown Labelle will be milling and resurfacing and sidewalks only, it should be exempt. Turn lanes are less than one quarter of a mile, and should also be exempt if existing ditches are not being impacted.

For the south side of the new bridge over the Caloosahatchee Canal, a structural BMP or "StormCeptor" on the south side was acceptable.

For the north side of the bridges, treatment volume capacity will be allowed under the bridge. The FDOT has a precedent at the Indiantown bridge crossing in St. Lucie.

6. Floodplain

Floodplain compensation was not discussed. It is assumed that the standard protocol would apply.

7. Sovereignty of Caloosahatchee at the new bridge crossing

The new bridge will be located just west of the existing bridge, and will be aligned with Main Street in downtown Labelle. The Caloosahatchee is a manmade canal at this location, and is not anticipated to be a sovereign water body. A formal sovereign submerged lands determination will be requested once the bridge plans are finalized.

1.3 Field Review Notes and Photos

Faller, Davis & Associates, Inc. 5525 W. CYPRESS ST. - SUITE 300 TAMPA, FLORIDA 33607-1707 CERTIFICATE OF AUTHORIZATION NO.: 5864 DEBORAH L. KNIGHTON, P.E. NO.: 43920	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD NO. / COUNTY / FINANCIAL PROJECT ID SR 29 / HENDRY / 417878-1-22-01	DRAINAGE AREA CROSSDRAIN AT STA. 189460	SHEET NO.

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Pond A

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	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
	SR 29	HENDRY	417878-1-22-01		

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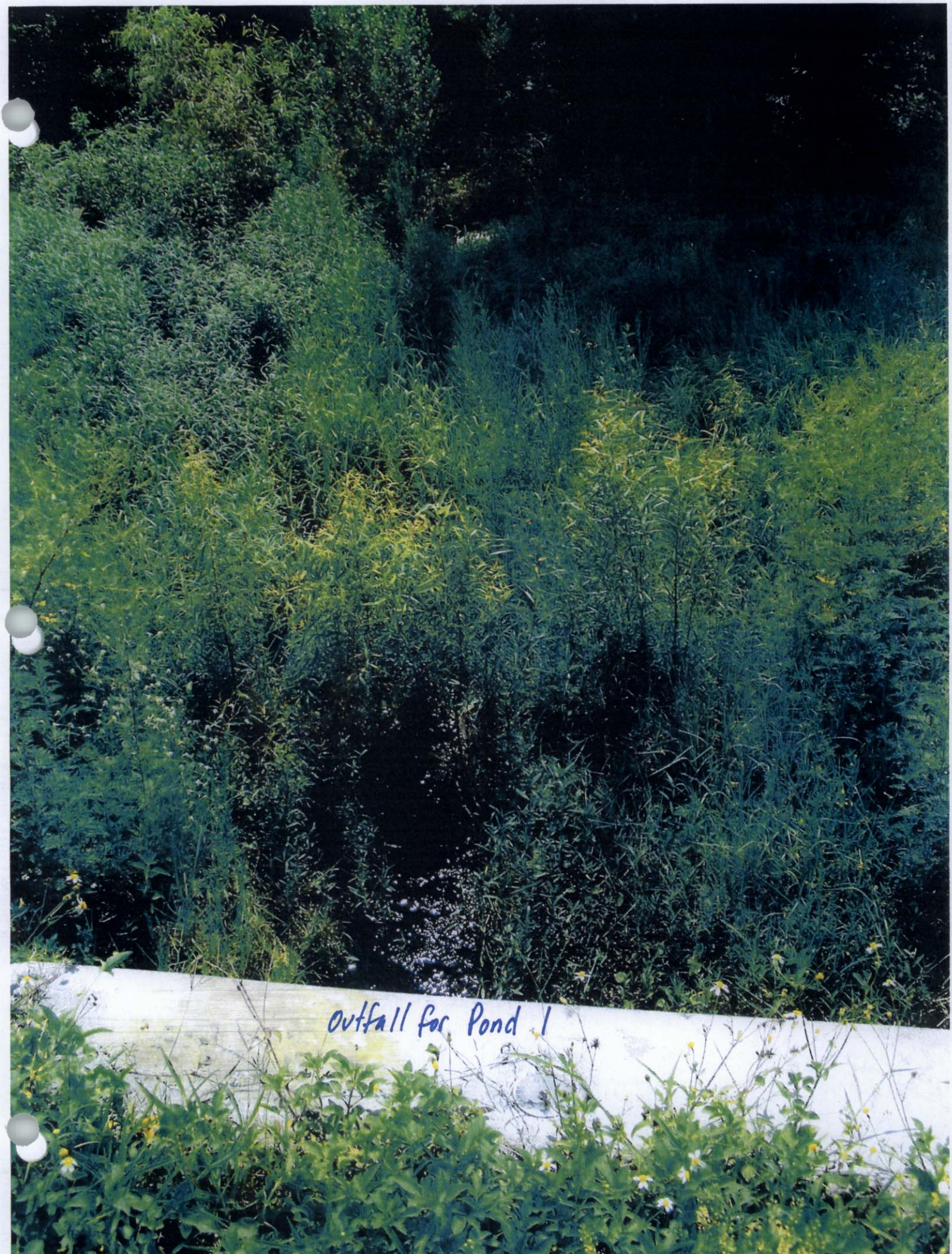
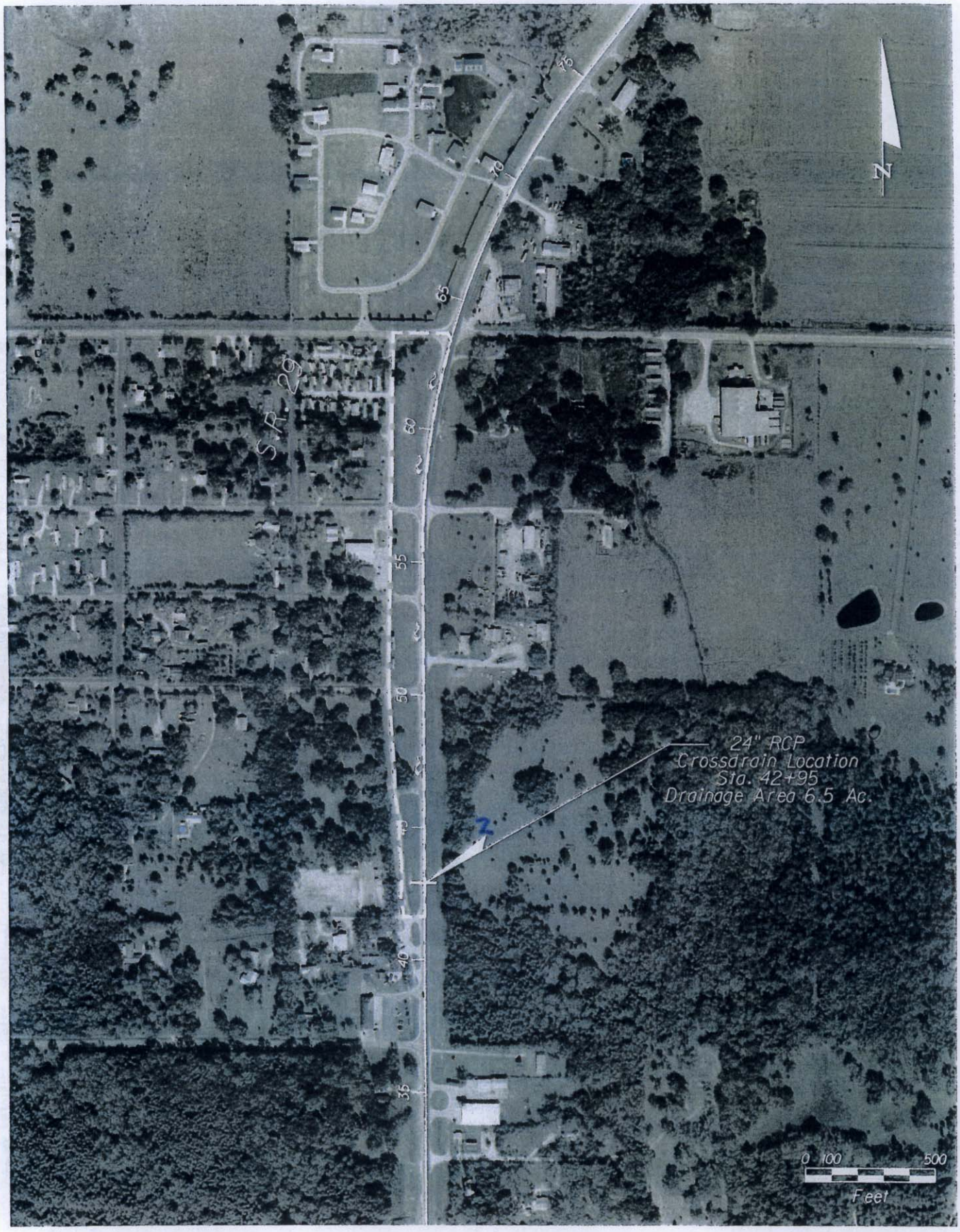
Page 11



outfall for Pond 1



Faller, Davis & Associates, Inc. 5525 W. CYPRESS ST. - SUITE 300 TAMPA, FLORIDA 33607-1707 CERTIFICATE OF AUTHORIZATION NO.: 5864 DEBORAH L. KNIGHTON, P.E. NO.: 43920	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			DRAINAGE AREA CROSSDRAIN AT STA. 42+95	SHEET NO.
	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
	SR 29	HENDRY	417878-1-22-01		

Outfall for Pond 2

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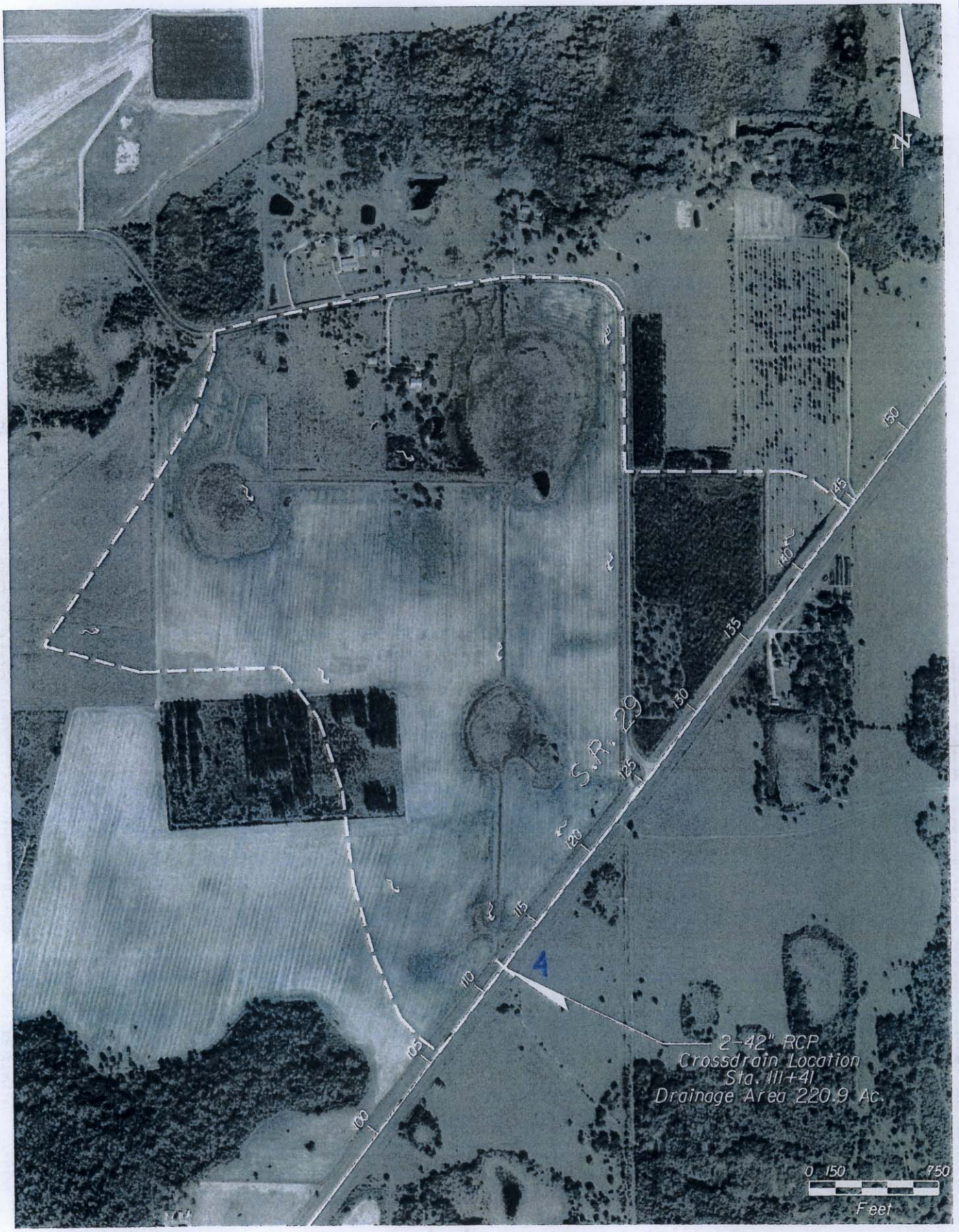
	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
	SR 29	GLADES	417878-1-22-01		

Outfall for Pond 3



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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

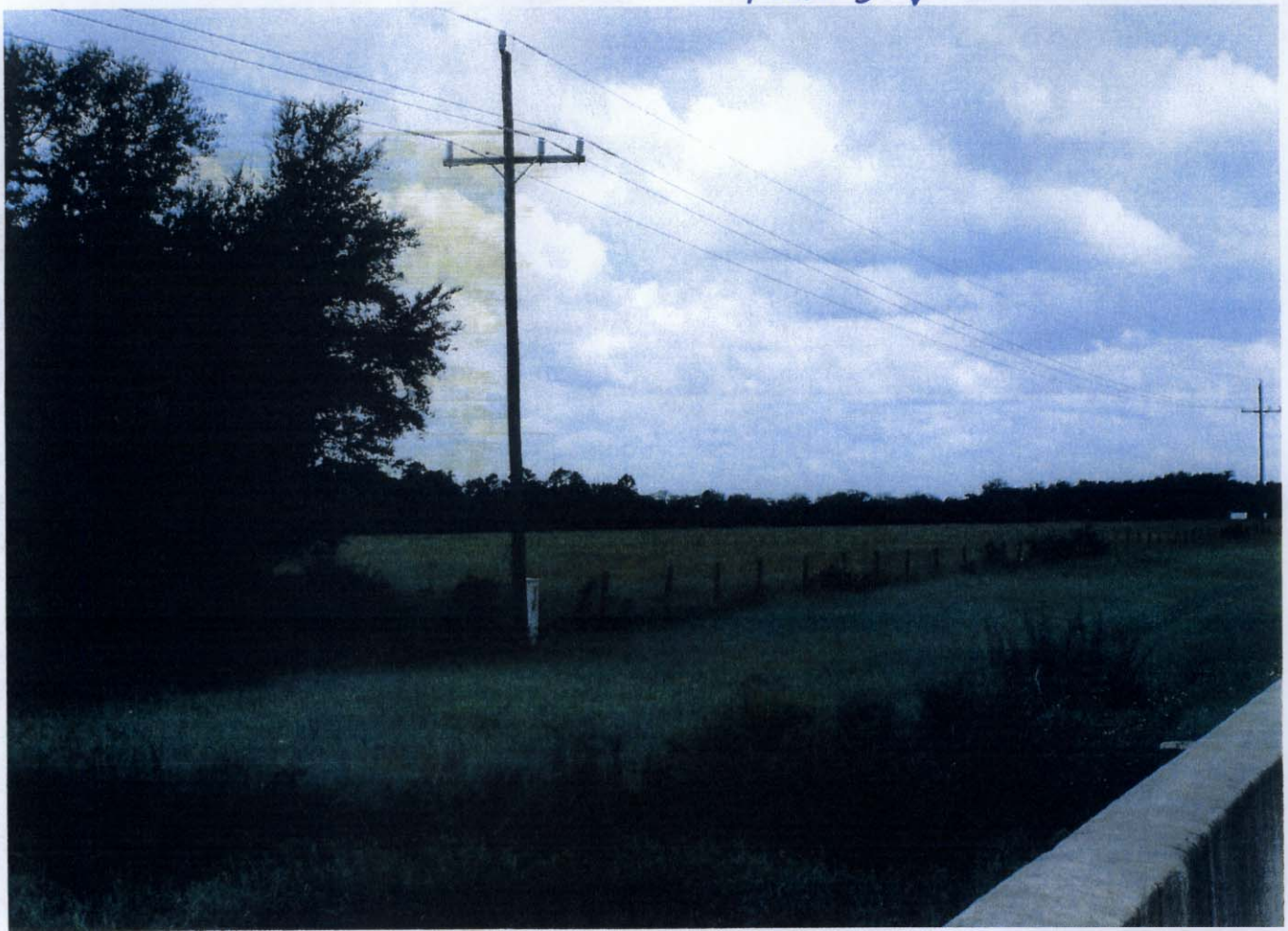
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
CROSSDRAIN AT STA. 111+41

SHEET NO.

Pond 4 ↑

Pond 5 ↓



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NORTH
OKALOACOOCHEE
050941

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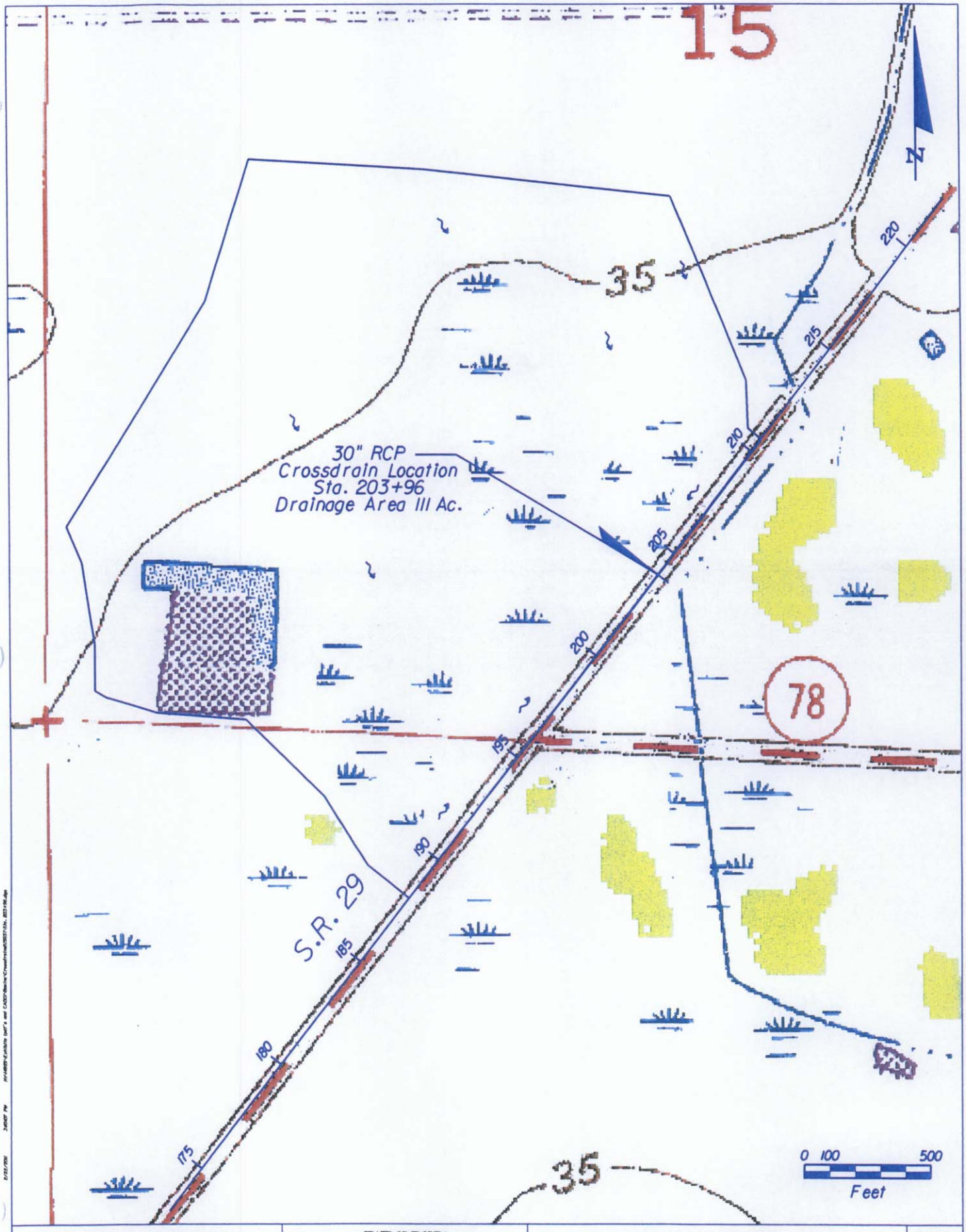
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
CROSSDRAIN AT STA. 203+96

SHEET NO.



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Pond 6 ↓ (outfall)

Pond 7 ↑

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STATE OF FLORIDA
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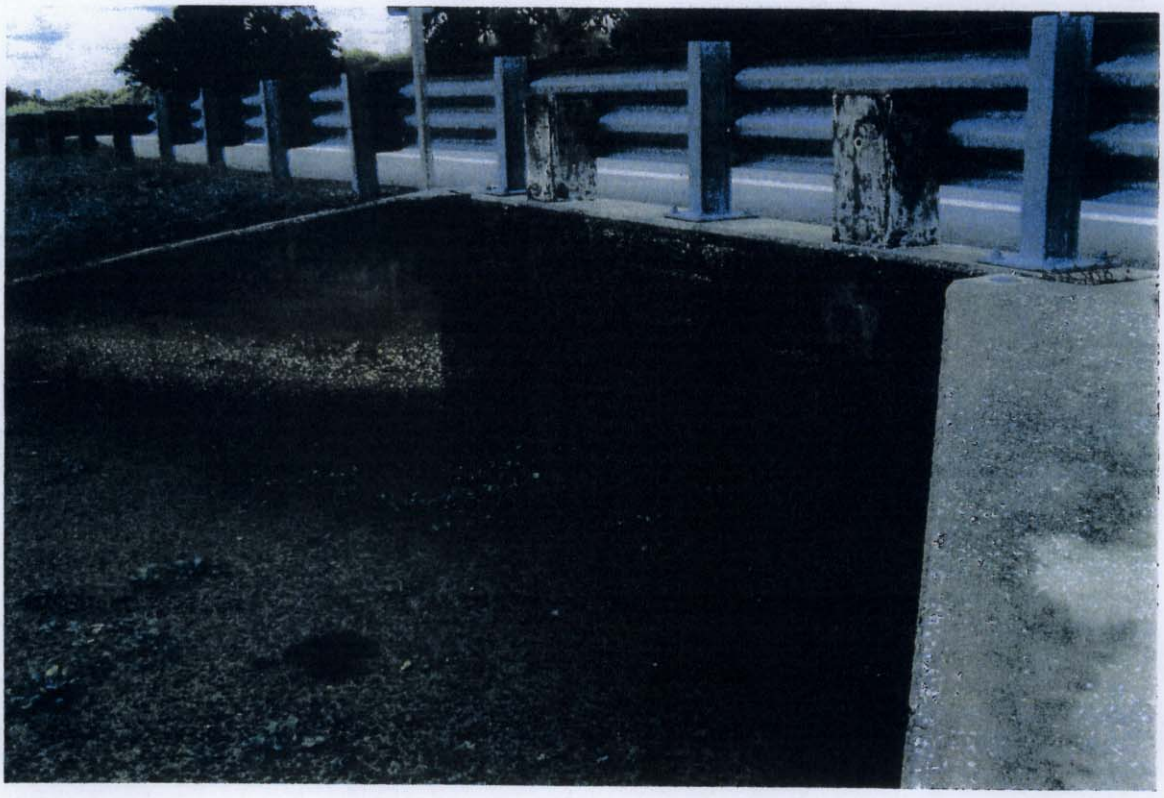
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
BRIDGE AT STA. 213+00

SHEET NO.



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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

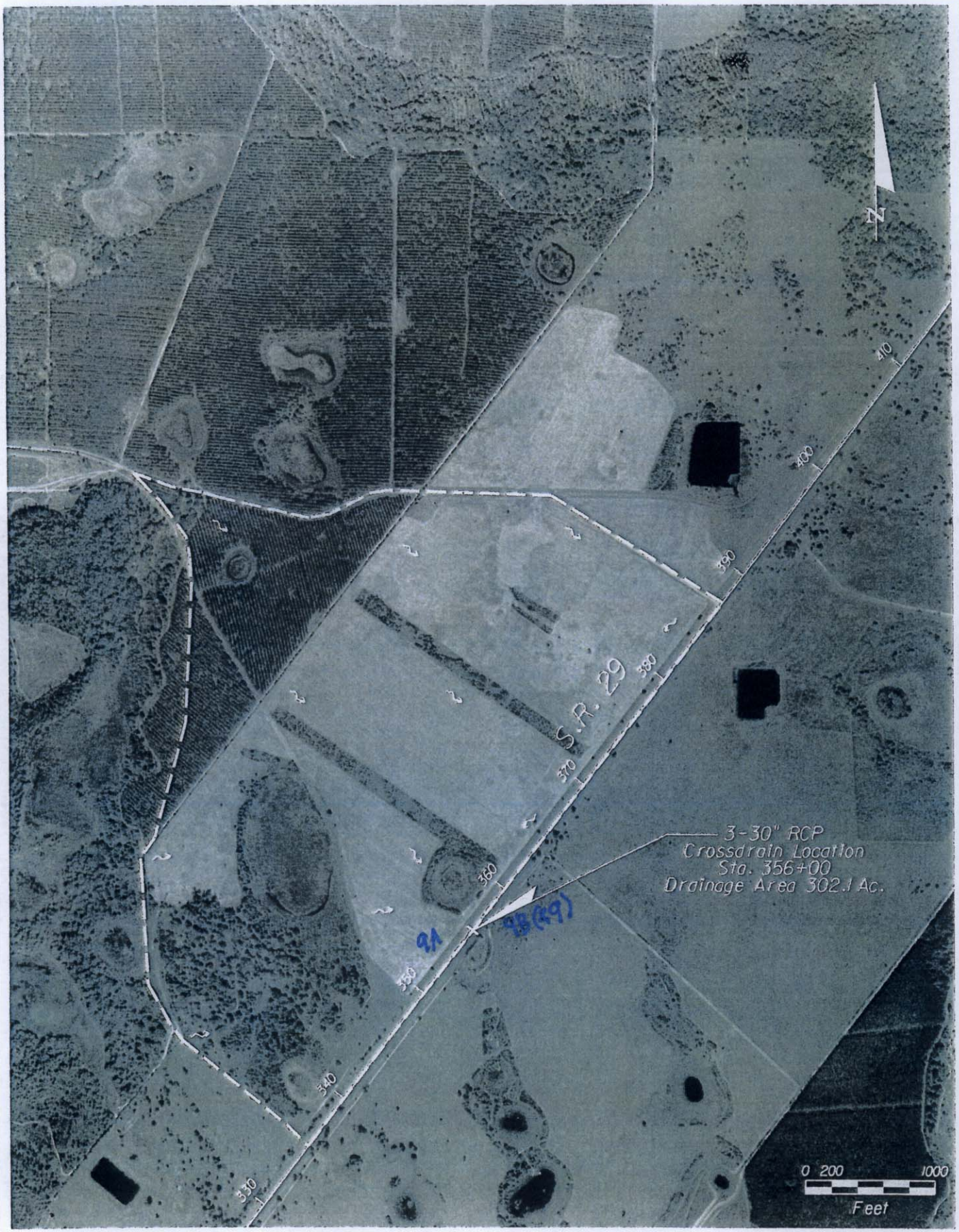
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
BRIDGE AT STA. 313+50

SHEET NO.

LONE PINE CREEK
050035

Pond 8A (behind trees) ↓ Pond 8B ↑



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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
CROSSDRAIN AT STA. 356+00

SHEET NO.

Pond 9A ↑

Pond 9B and 9 (east side) ↓

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
CROSSDRAIN AT STA. 395+00

SHEET NO.

Pond 10 ↓ Pond 10 outfall ↑

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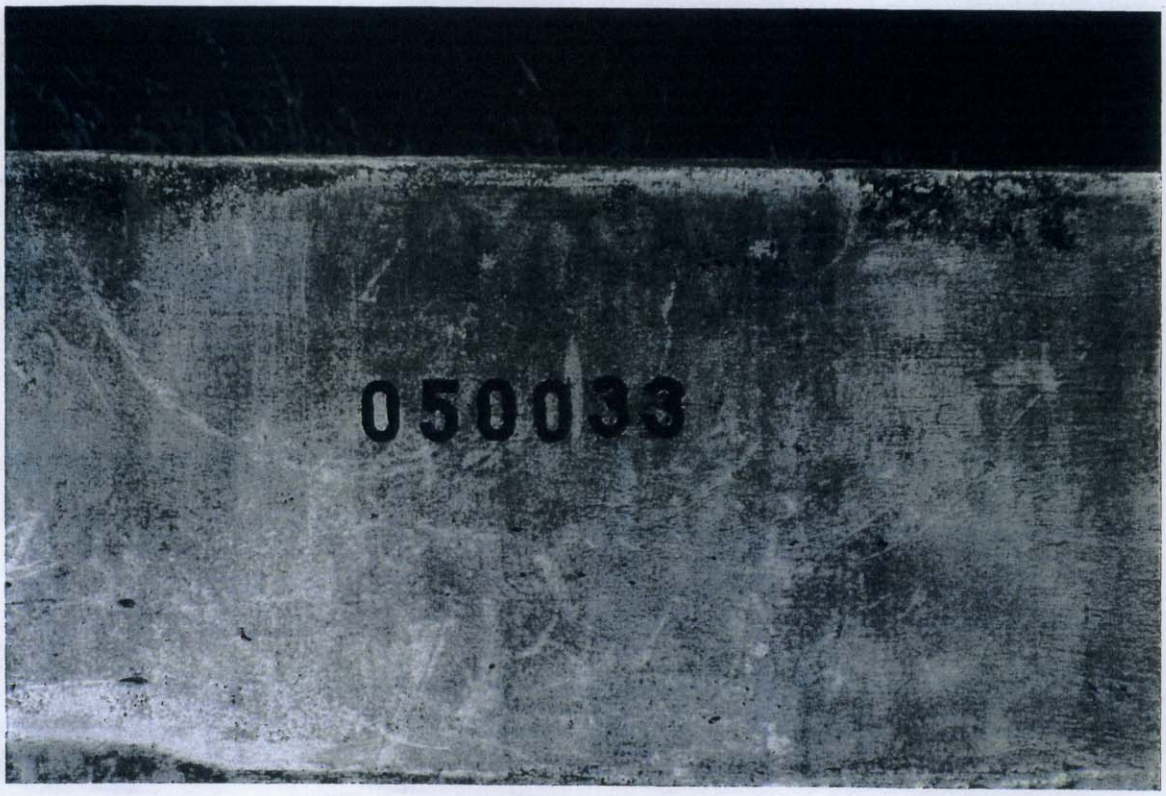
	SR 29	GLADES	417878-1-22-01		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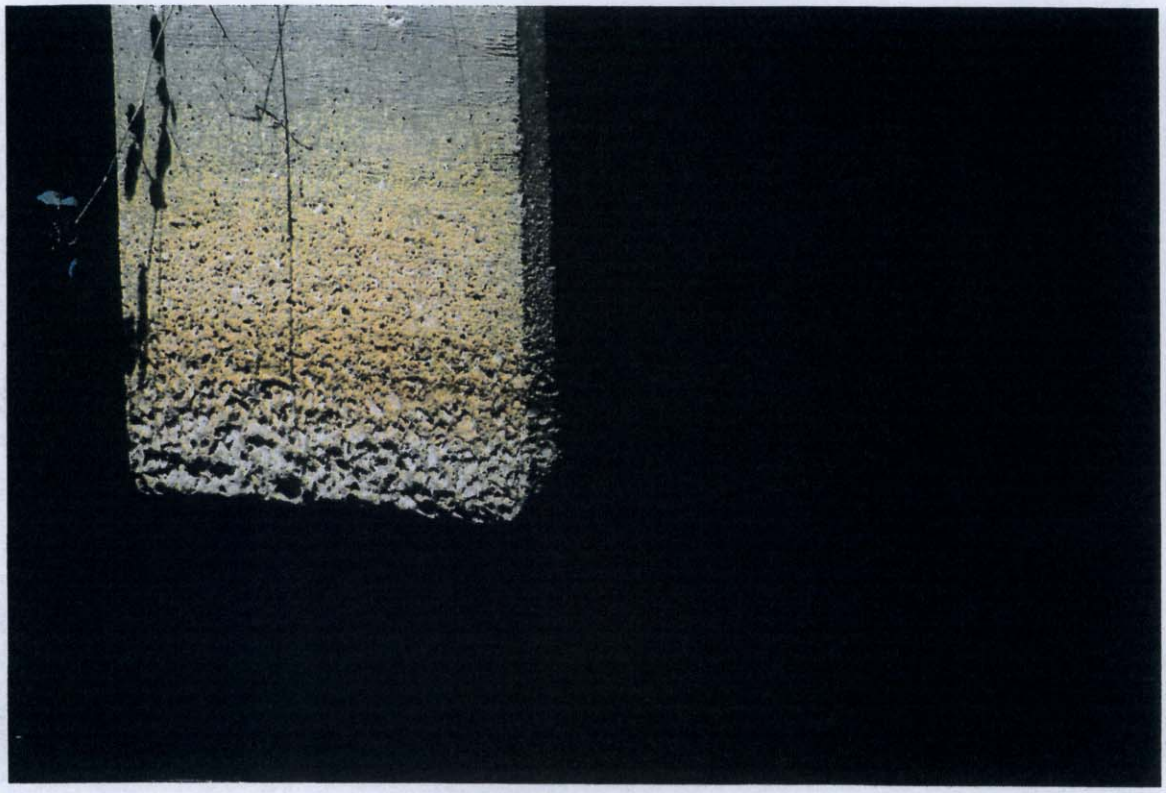

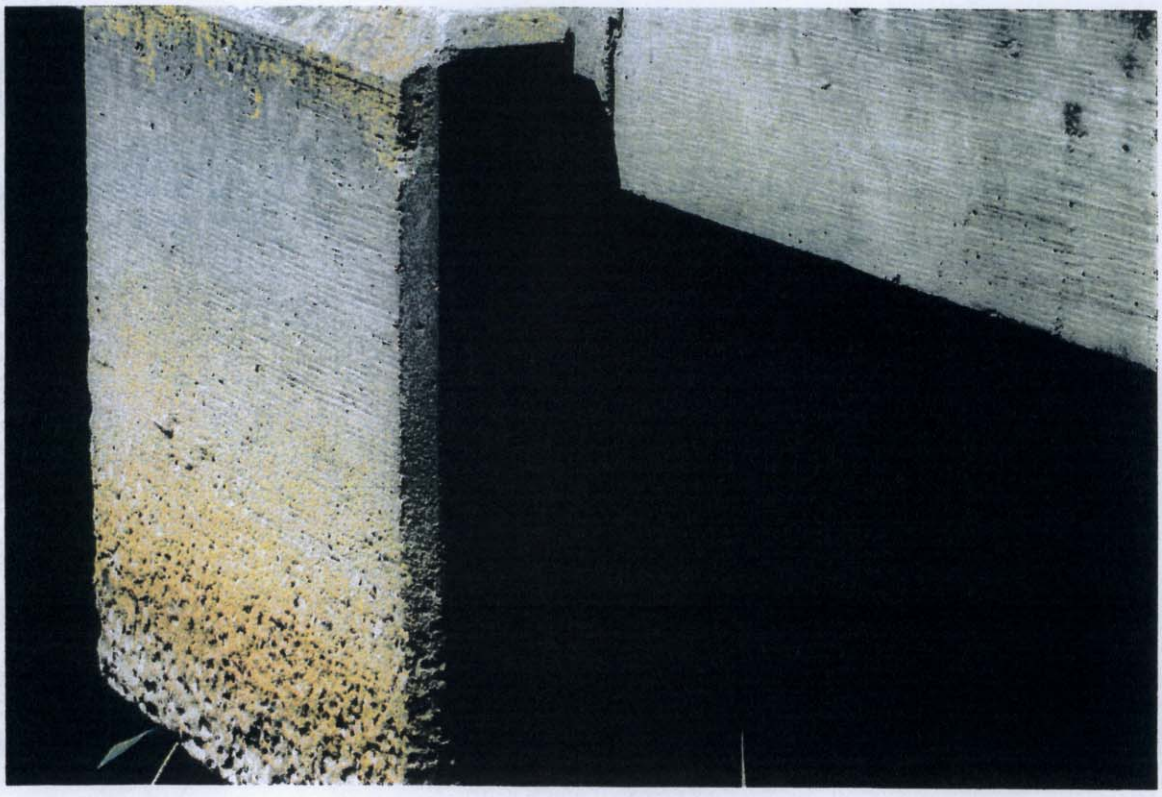

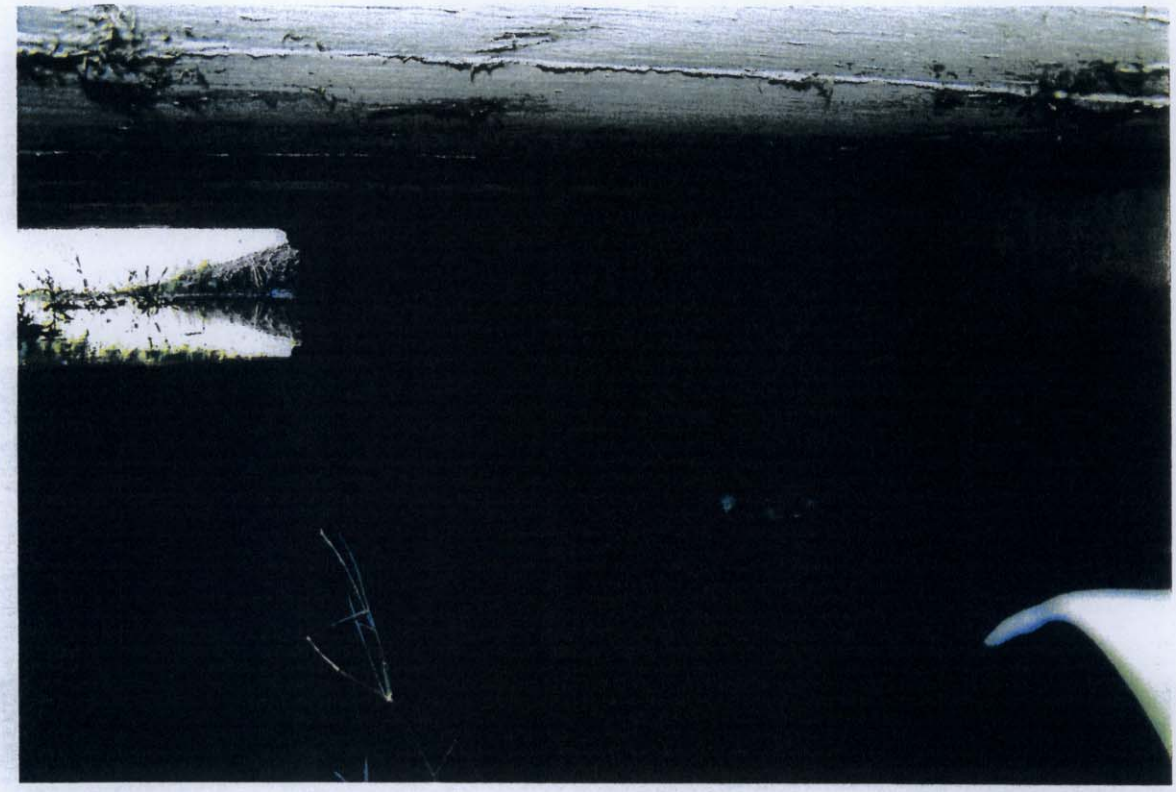

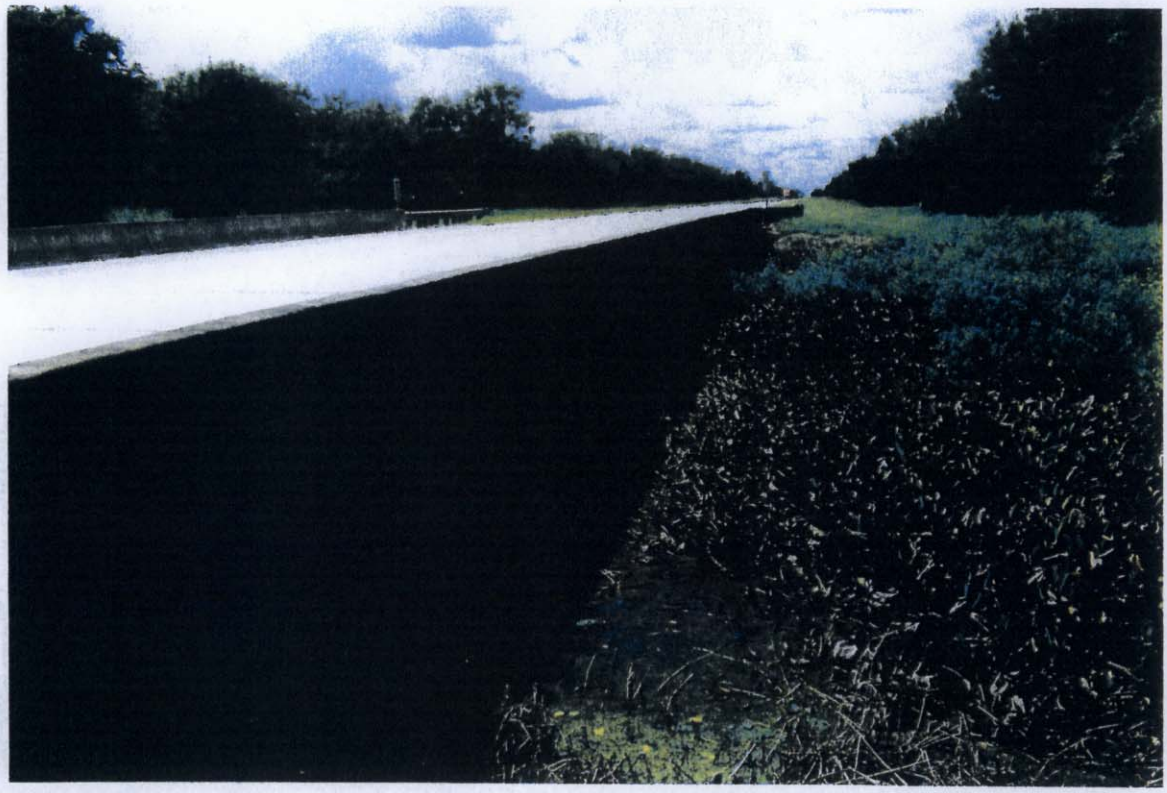

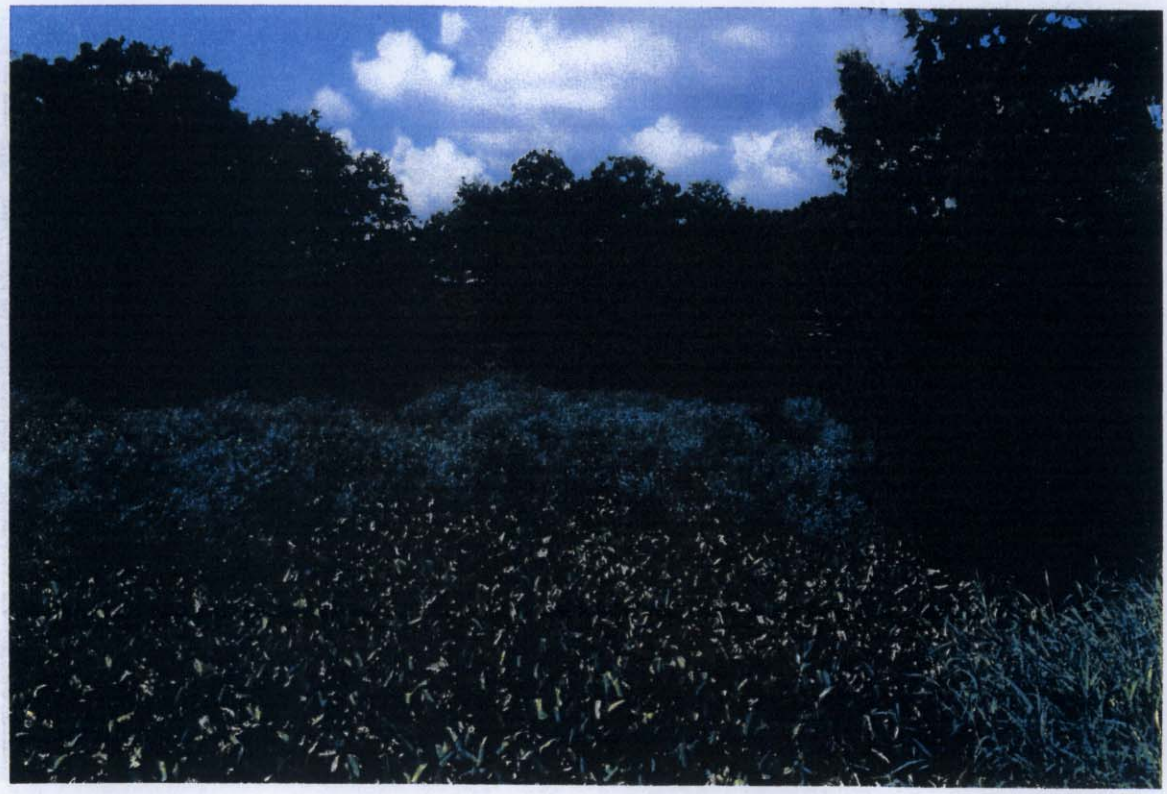

Pond 11A behind water and Basin 11 outfall ↑ Pond 11B ↓

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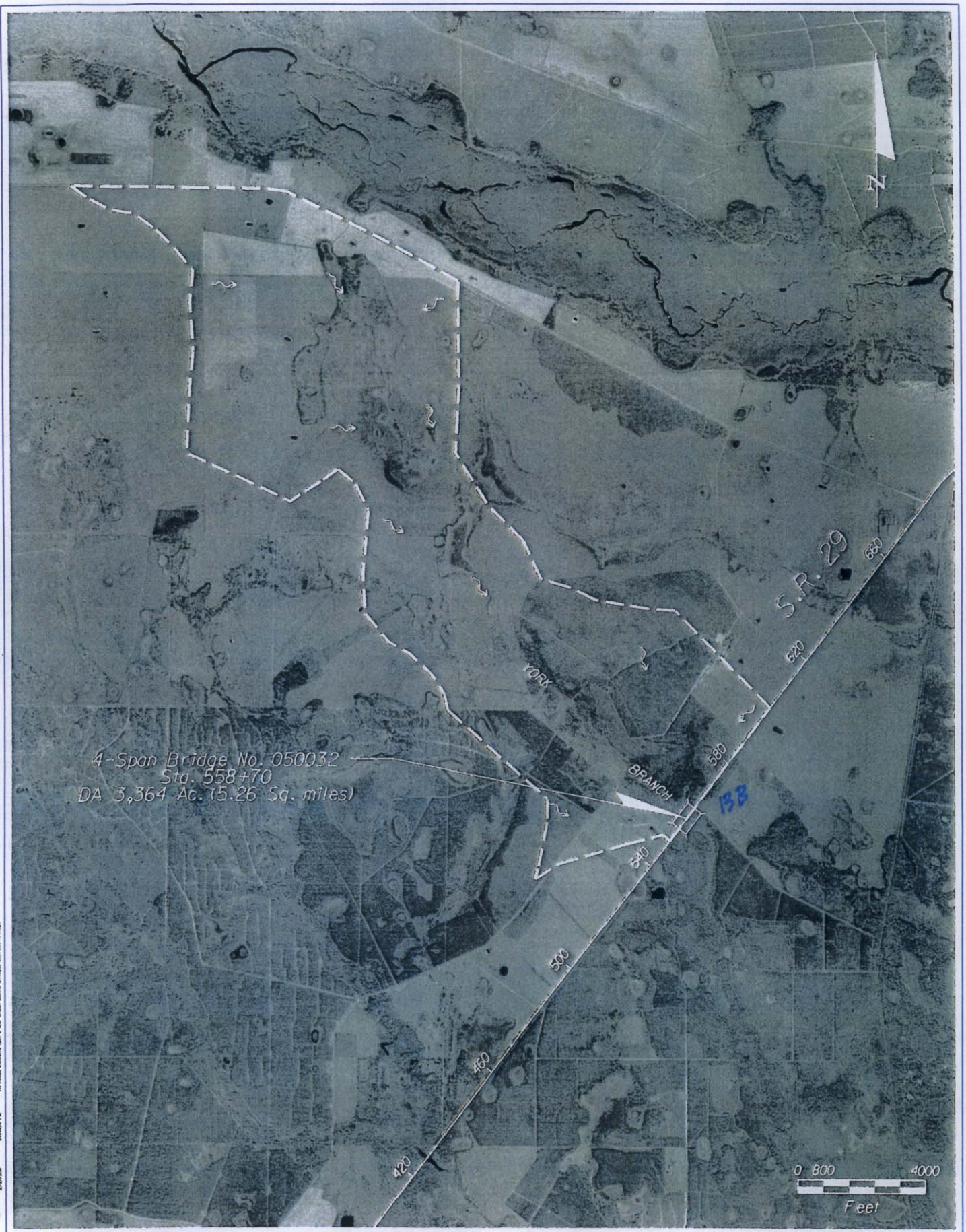
Pond 12-13A ↑

Pond 13B ↓



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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
BRIDGE AT STA. 558+70

SHEET NO.

1993

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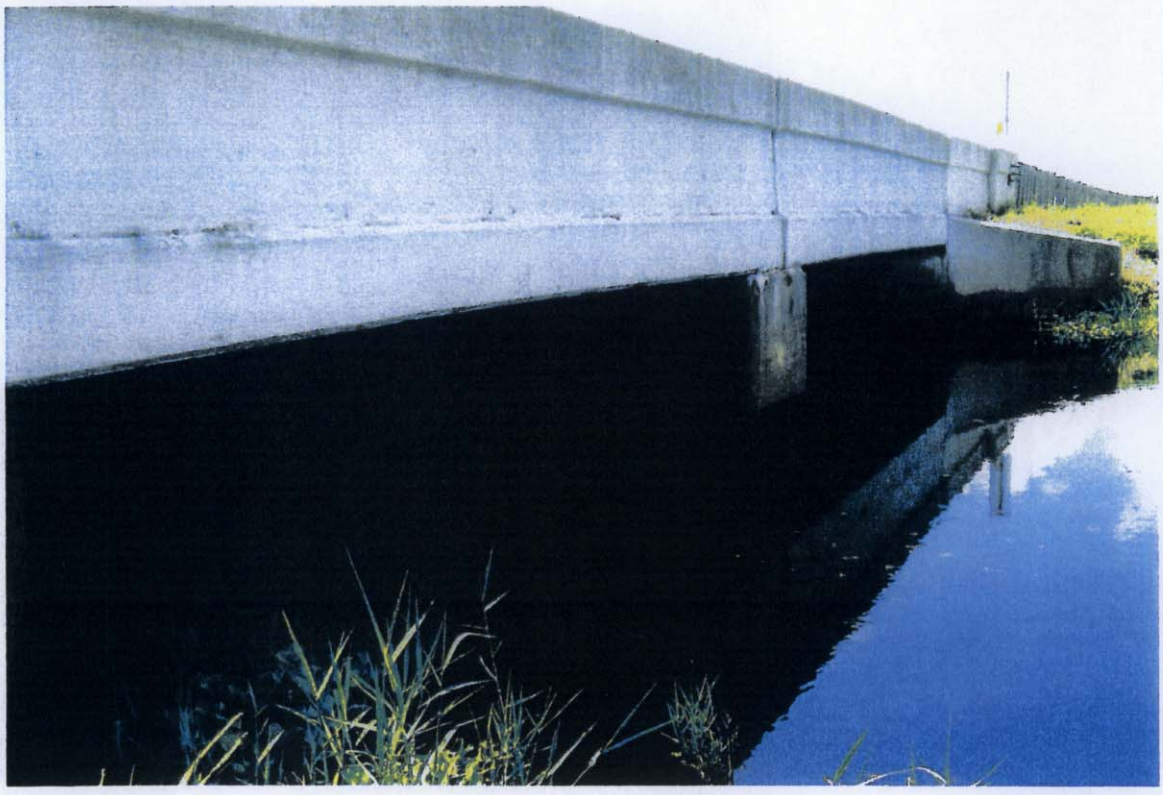
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

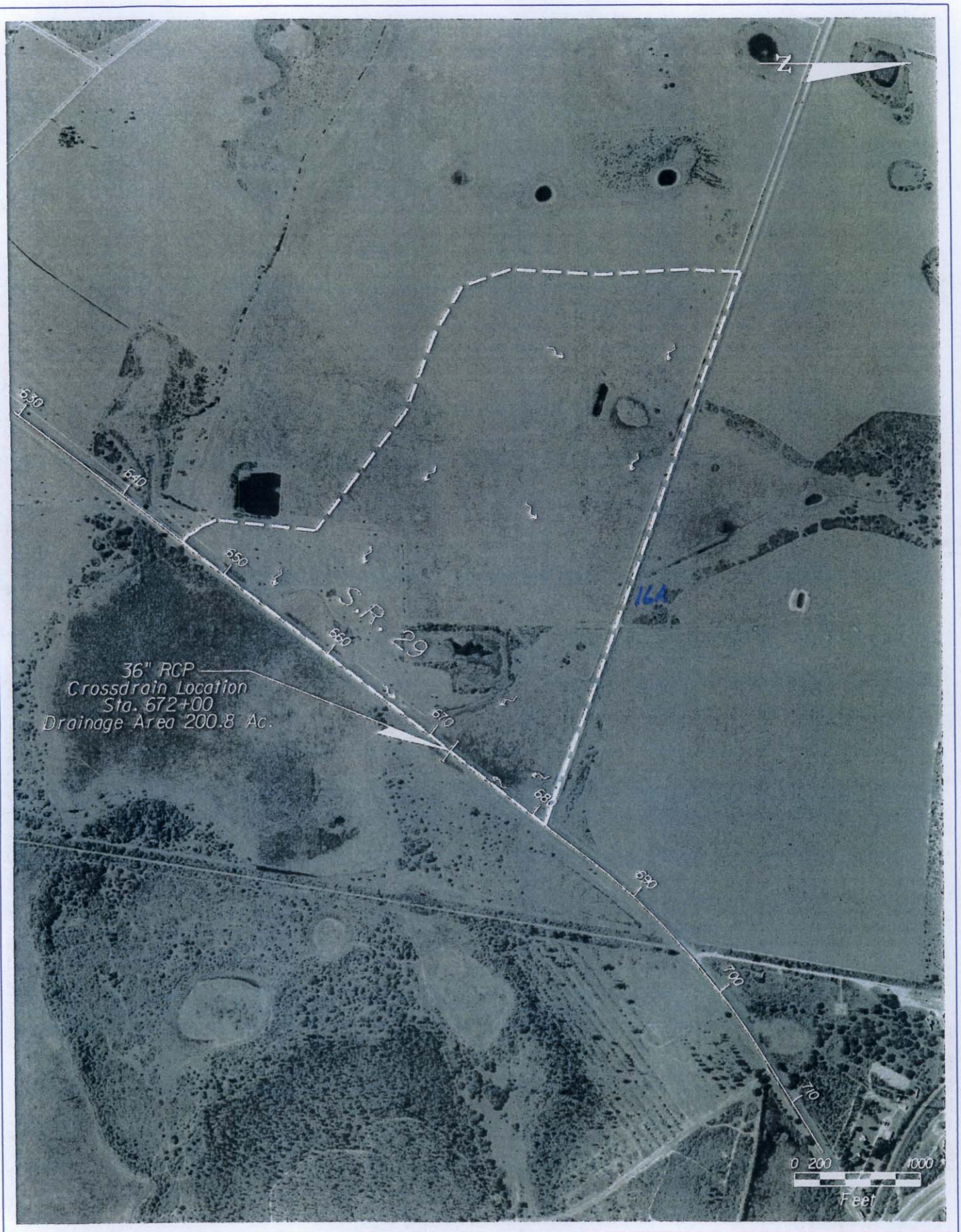
DRAINAGE AREA
BRIDGE AT STA. 642+00

SHEET NO.

TURKEY BRANCH
050031



Pond 14A ↑ Pond 14B-15 ↓



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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
CROSSDRAIN AT STA. 672+00

SHEET NO.

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
CROSSDRAIN AT STA. 705+00

SHEET NO.

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

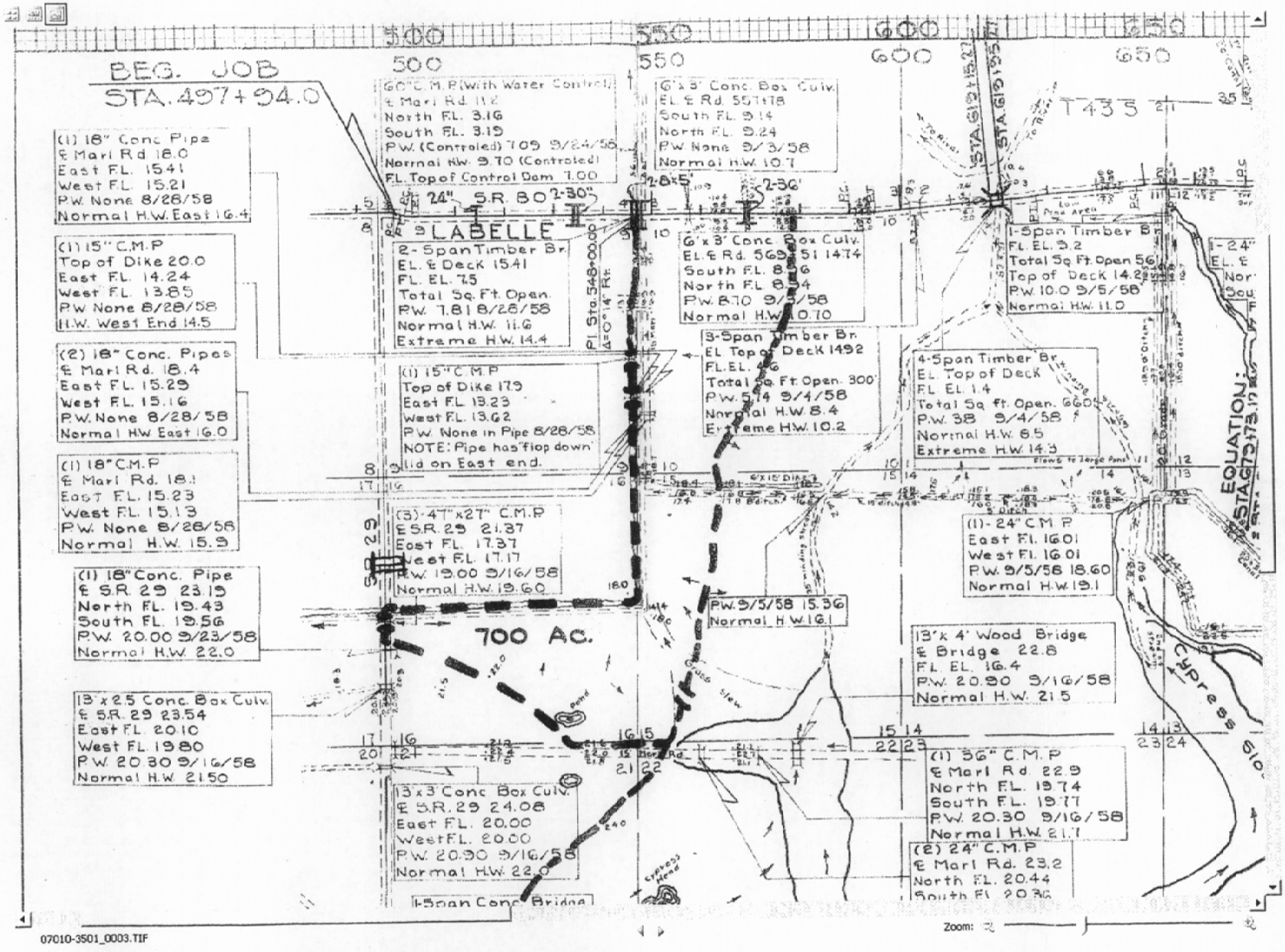
PROPOSED DRAINAGE AREA
NORTH EXTENSION

SHEET NO.

Appendix 2.0

Miscellaneous Maps

2.1 Historic FDOT Drainage Maps


BEG. JOB
STA. 497+94.0
500
550
600
650
(1) 18" Conc Pipe
℄ Mari Rd 18.0
East F.L. 15.41
West F.L. 15.21
P.W. None 8/28/58
Normal H.W. East 16.4
(1) 15" C.M.P
Top of Dike 20.0
East F.L. 14.24
West F.L. 13.85
P.W None 8/28/58
H.W. West End 14.5
(2) 18" Conc. Pipes
℄ Mari Rd. 18.4
East F.L. 15.29
West F.L. 15.16
P.W. None 8/28/58
Normal H.W East 16.0
(1) 18" C.M.P
℄ Mari Rd. 18.1
East F.L. 15.23
West F.L. 15.13
P.W. None 8/28/58
Normal H.W. 15.9
(1) 18" Conc. Pipe
℄ S.R. 29 23.19
North F.L. 19.43
South F.L. 19.56
P.W. 20.00 9/23/58
Normal H.W. 22.0
13' x 2.5 Conc. Box Culv.
℄ S.R. 29 23.54
East F.L. 20.10
West F.L. 19.80
P.W. 20.30 9/16/58
Normal H.W. 21.50
60" C.M.P (With Water Control)
℄ Mari Rd 11.2
North F.L. 3.16
South F.L. 3.19
P.W. (Controled) 7.09 9/24/58
Normal H.W. 9.70 (Controled)
F.L. Top of Control Dam 7.00
24" S.R. 80 2-30"
LABELLE
2-Span Timber Br.
EL. & Deck 15.41
F.L. EL. 7.5
Total Sq. Ft. Open
P.W. 7.81 8/28/58
Normal H.W. 11.6
Extreme H.W. 14.4
Pl. Sta. 548+00.00
4°-0°-14" Rt.
(1) 15" C.M.P
Top of Dike 17.9
East F.L. 13.23
West F.L. 13.02
P.W. None in Pipe 8/28/58
NOTE: Pipe has flop down lid on East end.
(3)-47" x27" C.M.P
℄ S.R. 29 21.37
East F.L. 17.37
West F.L. 17.17
H.W. 19.00 9/16/58
Normal H.W. 19.60
700 AC.
13' x 3' Conc Box Culv.
℄ S.R. 29 24.08
East F.L. 20.00
West F.L. 20.00
P.W. 20.90 9/16/58
Normal H.W. 22.0
4-Span Conc. Bridge
6' x 3' Conc. Box Culv.
EL. ℄ Rd. 557+78
South F.L. 9.14
North F.L. 9.24
P.W. None 9/3/58
Normal H.W. 10.7
2-8'x5'
2-36"
6' x 3' Conc. Box Culv.
EL. ℄ Rd. 569+51.74
South F.L. 8.16
North F.L. 8.24
P.W. 8.70 9/3/58
Normal H.W. 10.70
3-Span Timber Br.
EL. Top of Deck 14.92
F.L. EL. 4.6
Total Sq. Ft. Open. 300'
P.W. 5.14 9/4/58
Normal H.W. 8.4
Extreme H.W. 10.2
P.W. 9/5/58 15.36
Normal H.W. 16.1
STA. 615+15.22
1-Span Timber Br.
F.L. EL. 3.2
Total Sq. Ft. Open 56'
Top of Deck 14.2
P.W. 10.0 9/5/58
Normal H.W. 11.0
4-Span Timber Br.
EL. Top of Deck
F.L. EL. 1.4
Total Sq. ft. Open. 660'
P.W. 3.8 9/4/58
Normal H.W. 8.5
Extreme H.W. 14.3
(1)-24" C.M.P
East Fl. 16.01
West Fl. 16.01
P.W. 9/5/58 18.60
Normal H.W. 19.1
13' x 4' Wood Bridge
℄ Bridge 22.8
F.L. EL. 16.4
P.W. 20.90 9/16/58
Normal H.W. 21.5
(1) 36" C.M.P
℄ Mari Rd 22.9
North F.L. 19.74
South F.L. 19.77
P.W. 20.30 9/16/58
Normal H.W. 21.7
(2) 24" C.M.P
℄ Mari Rd. 23.2
North F.L. 20.44
South Fl. 20.36
STA. 615+15.22 EQUATION STA. 613+15.22
Cypress Creek
T43S
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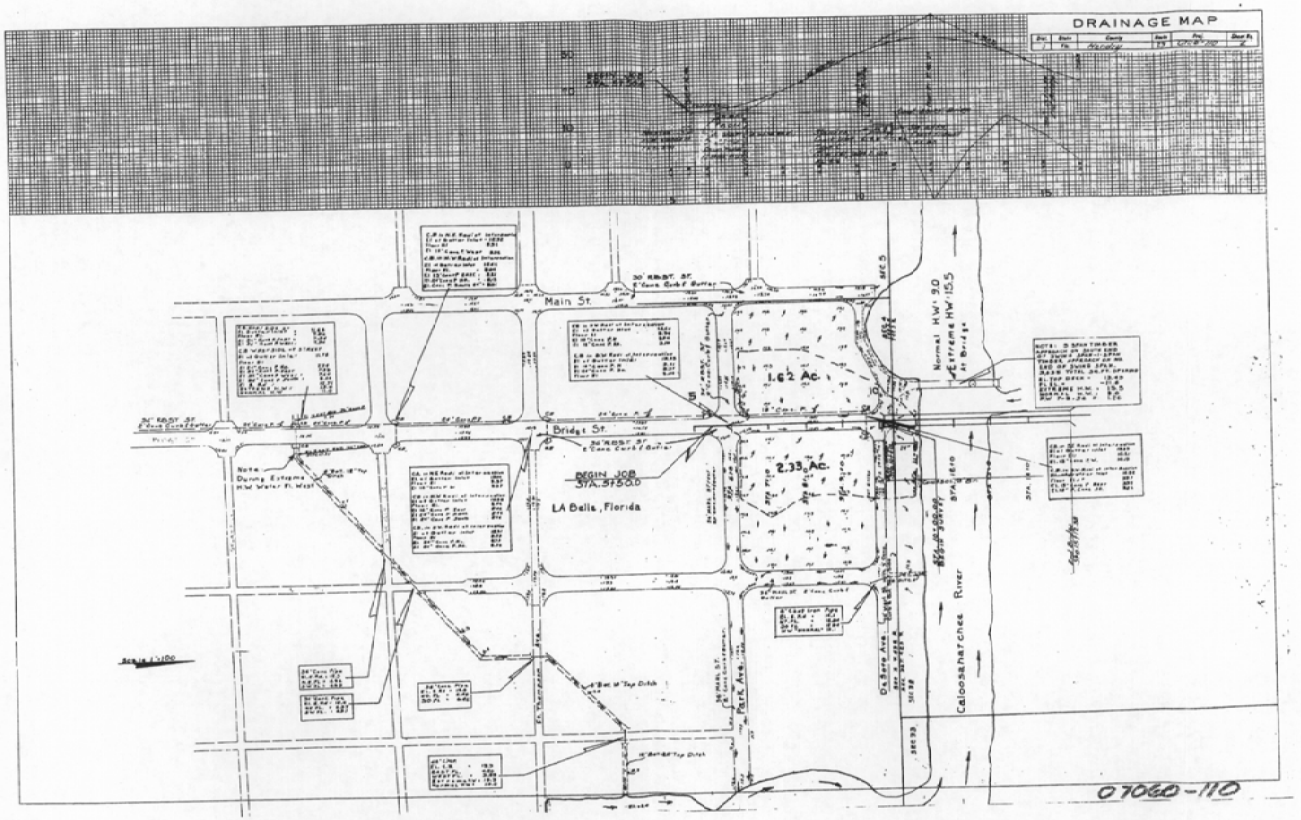
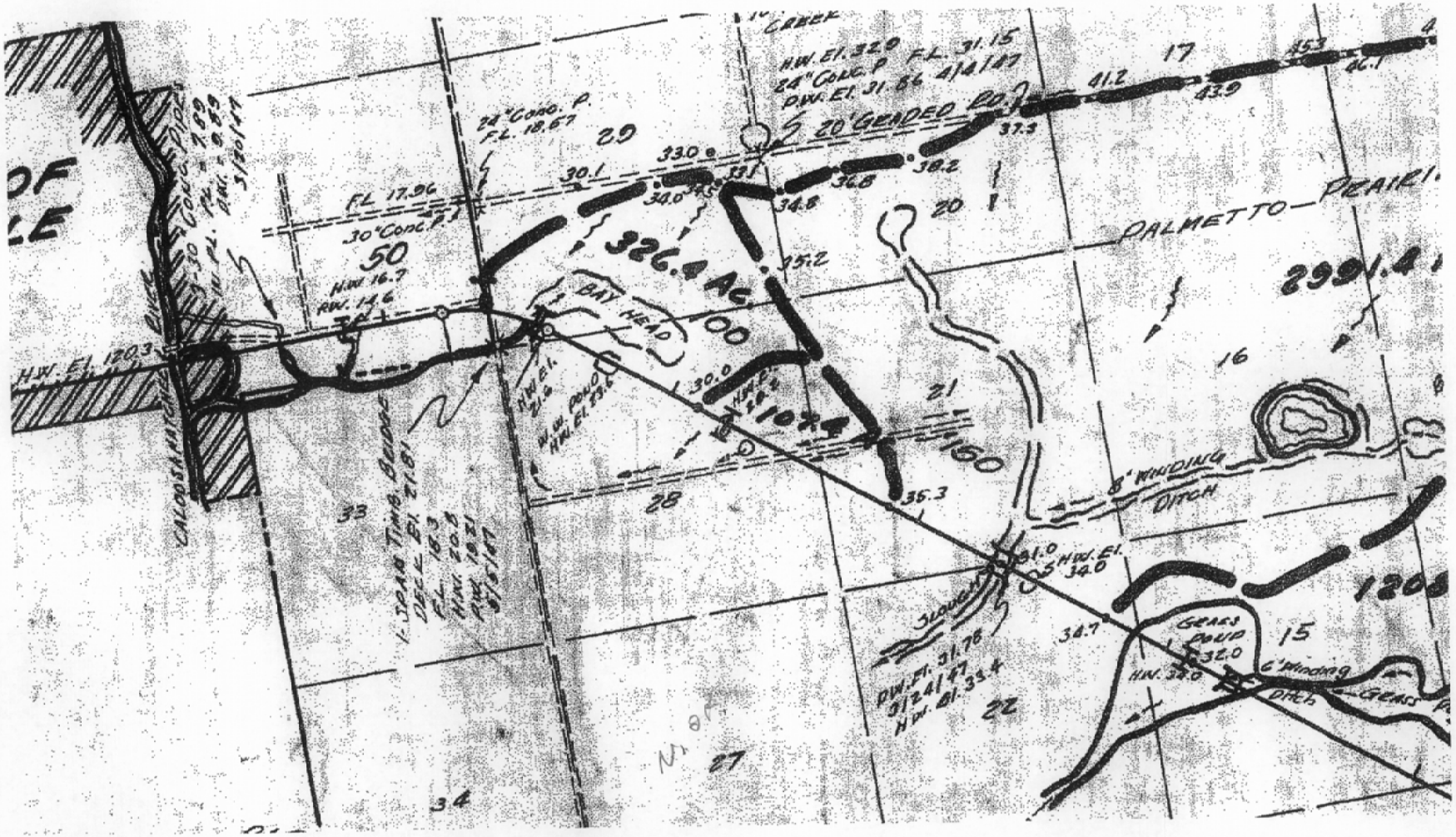
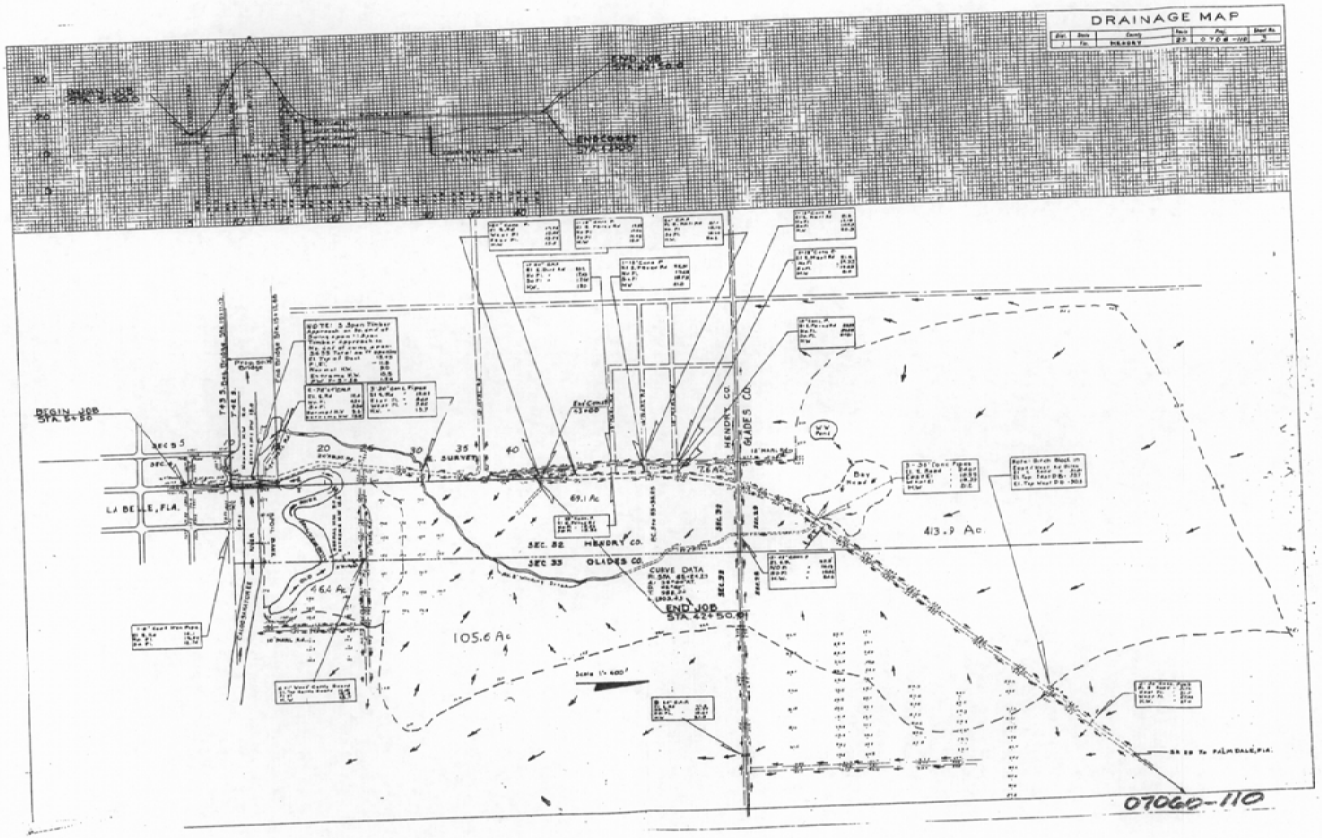
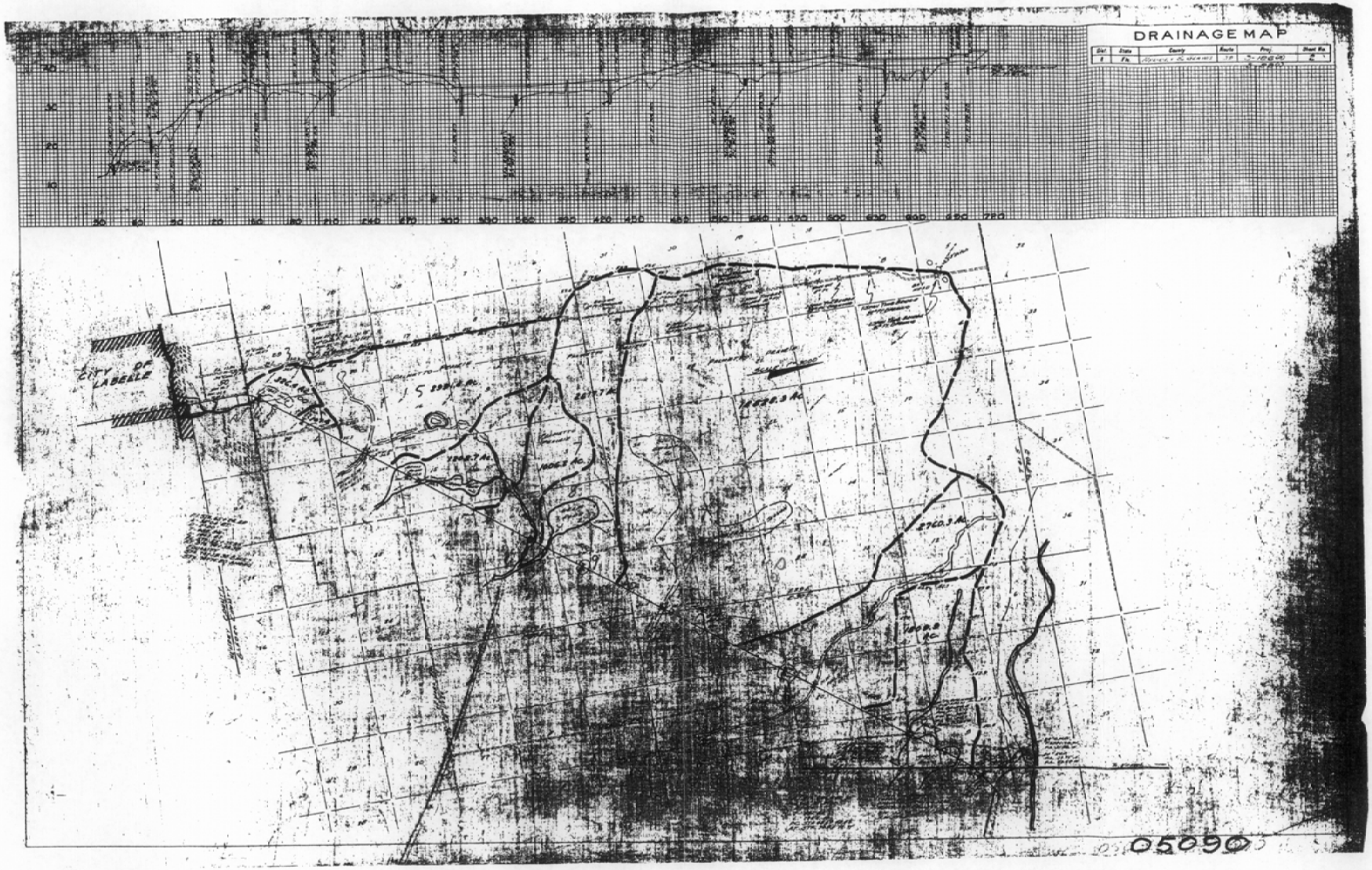
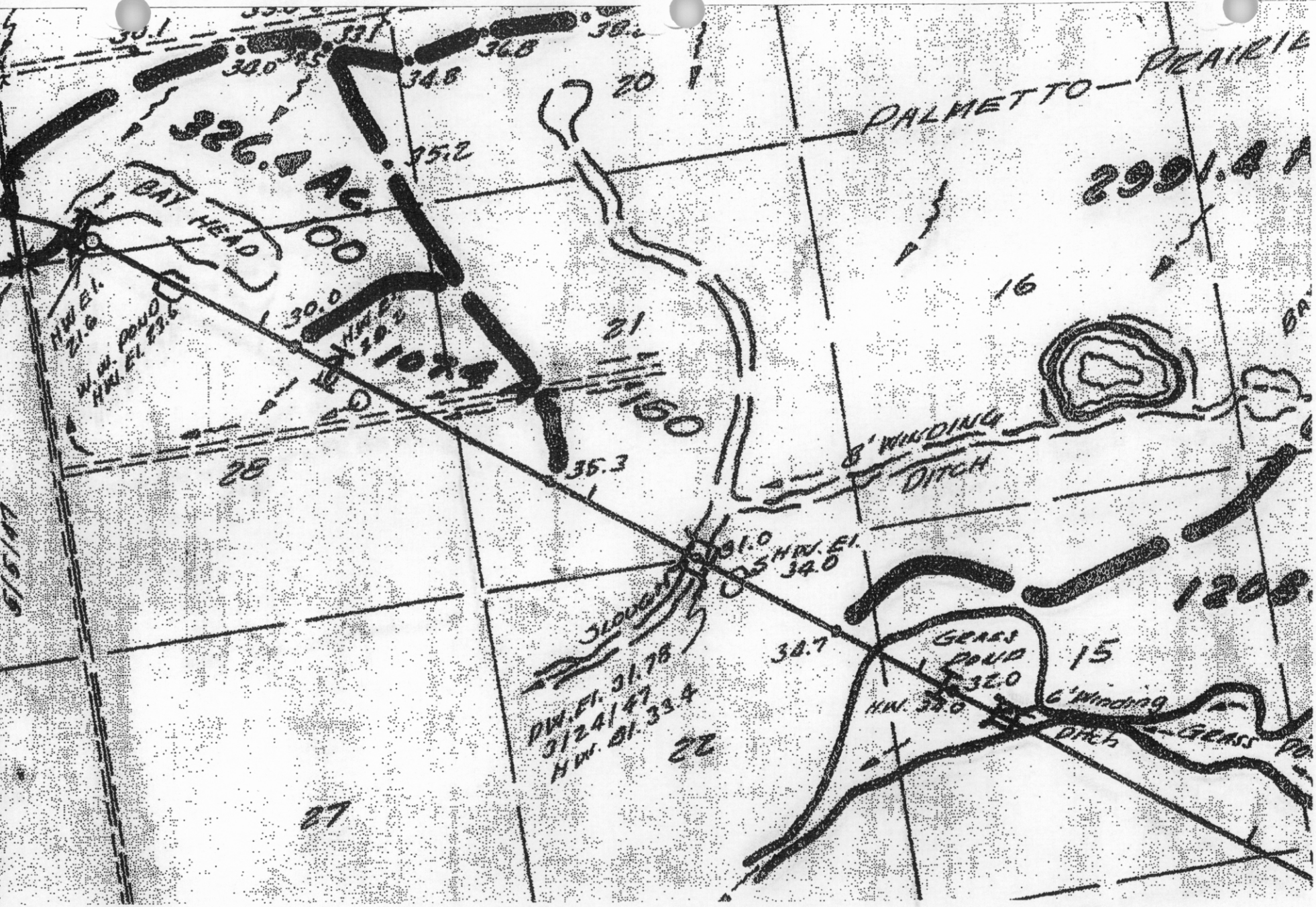

DRAINAGE MAP
Main St.
Bridge St.
1.62 Ac.
2.33 Ac.
BEGIN JOB
STA. 575+00
LA Belle, Florida
Caloosahatchee River
Park Ave.
Normal HW 9.0
Extreme HW 15.5
07060-110



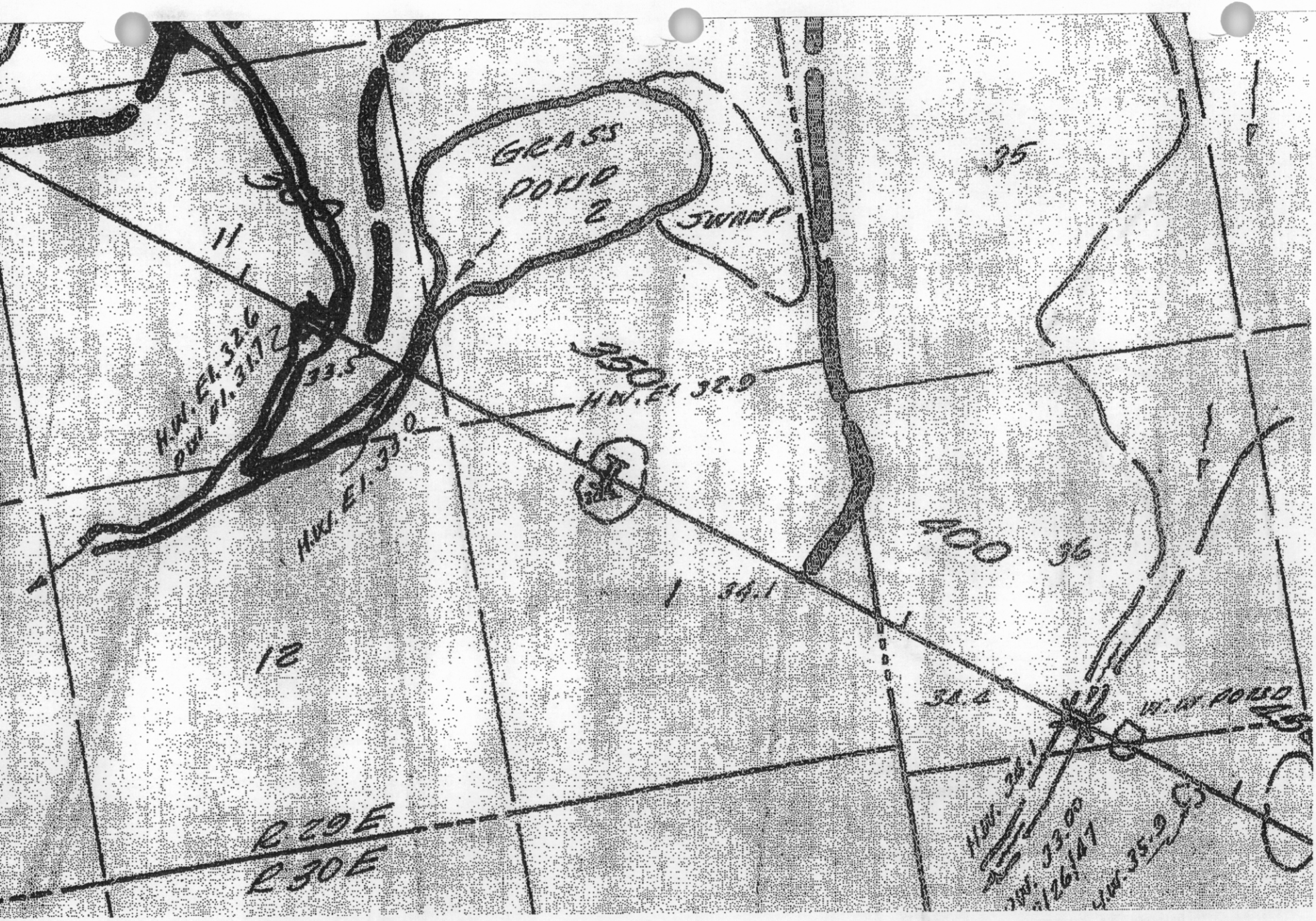
CREEK
H.W. El. 32.0
24" Conc. P
F.L. 31.15
P.W. El. 31.86 4/4/47
20' GRADED RD.
24" Conc. P.
F.L. 18.67
F.L. 17.96
30" Conc. P.
H.W. 16.7
R.W. 14.6
326.4 Ac.
BAY HEAD
PALMETTO—PRAIRI
2991.4
H.W. El. 120.3
CALOOSAHATCHEE RIVER
1-SPAN TIMB. BRIDGE
DECK El. 21.81
F.L. 18.3
H.W. 20.8
R.W. 19.31
8' WINDING DITCH
SLOUGH
P.W. El. 31.78
3/24/47
H.W. El. 33.4
GRASS POND
6' Winding Ditch
GRASS

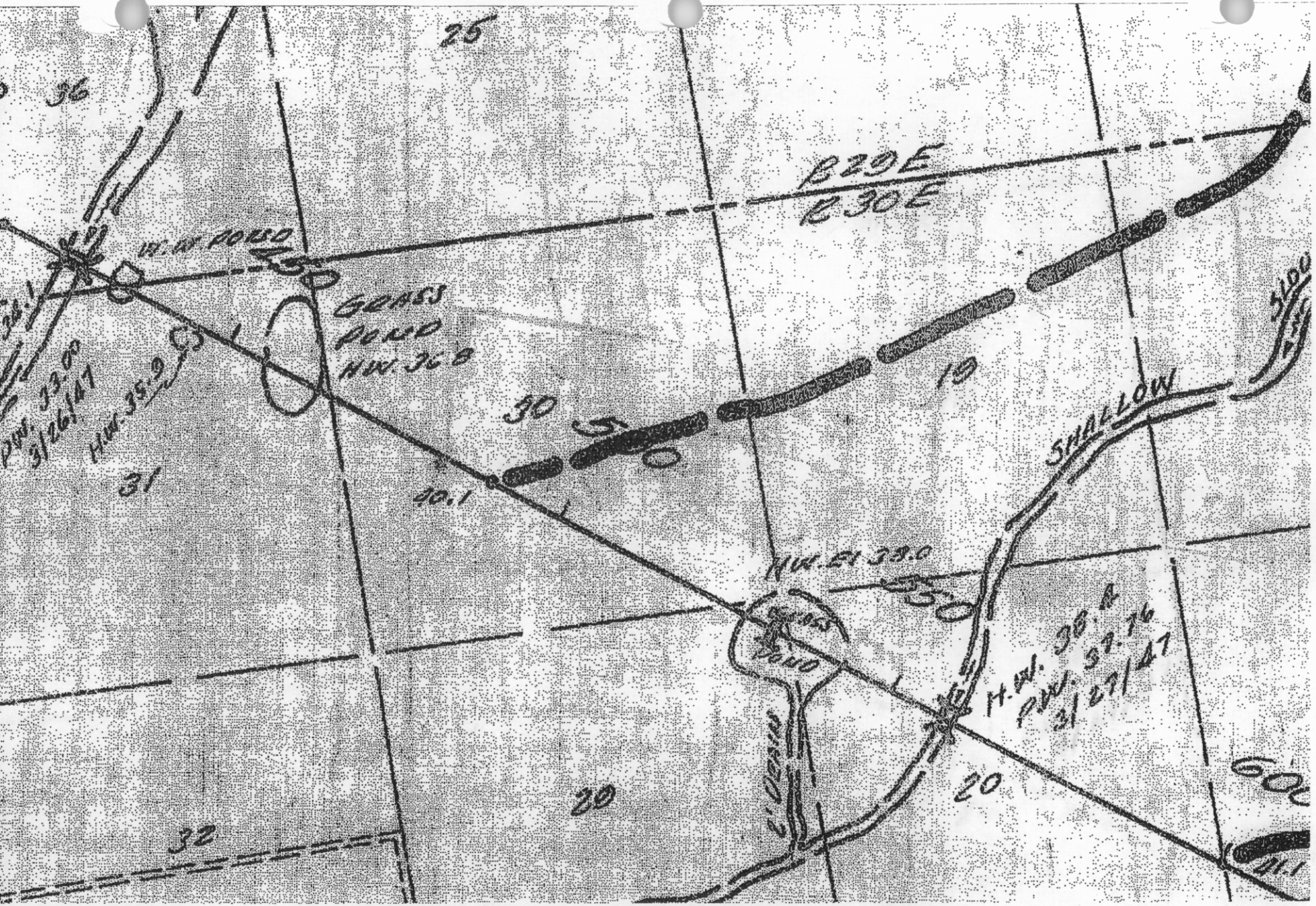

DRAINAGE MAP
END JOB
BEGIN JOB
LA BELLE, FLA.
HENDRY CO.
GLADES CO.
SEC. 32
SEC. 33
69.1 Ac.
413.9 Ac.
46.4 Ac.
105.6 Ac.
CURVE DATA
END JOB
07060-110


DRAINAGE MAP
CITY OF LABELLE
05090

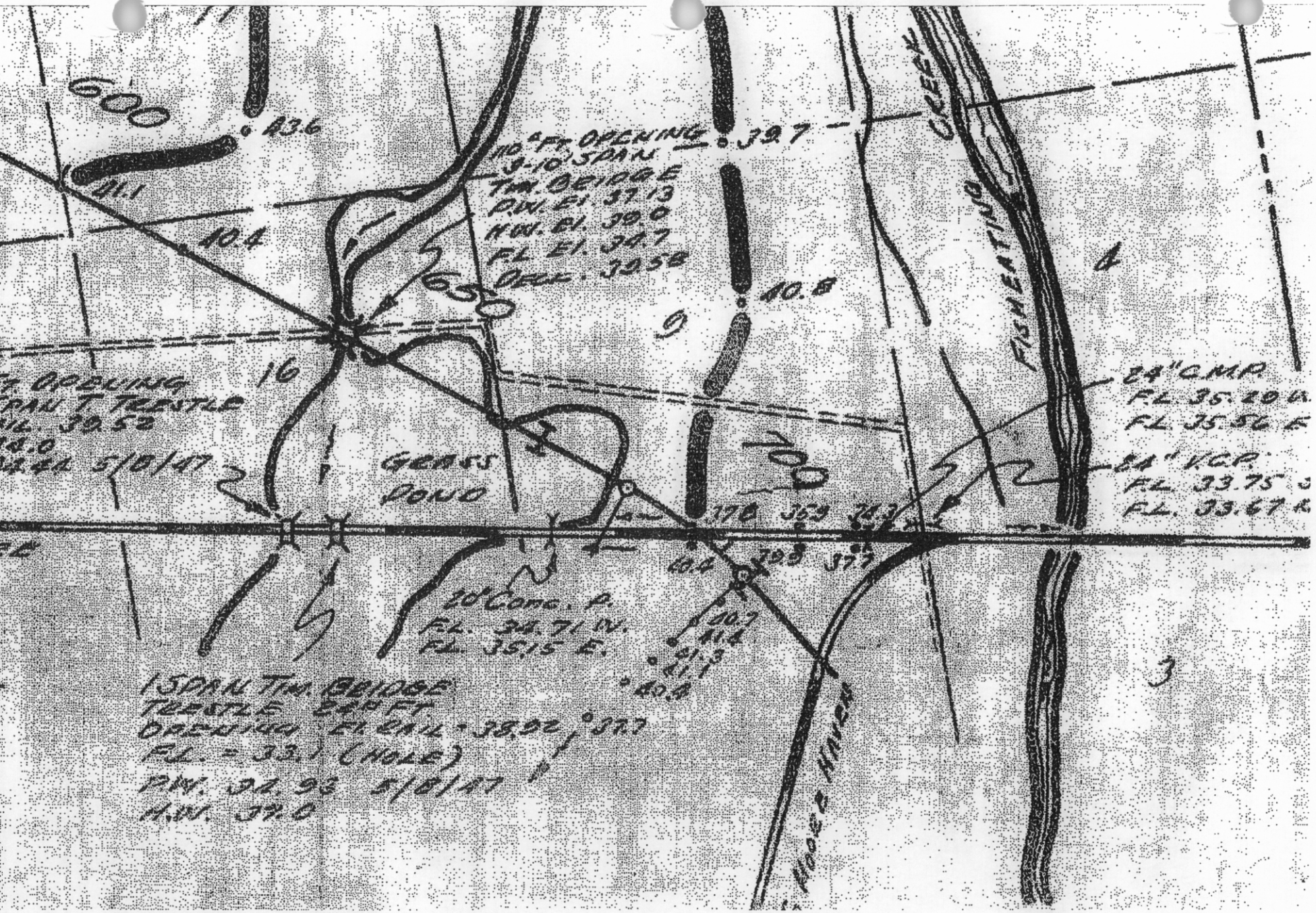


PALMETTO—PRAIRIE
326.4 Ac.
BAY HEAD
100
160
2991.4 A
16
21
28
27
22
15
20
8' WINDING DITCH
SLOUGH
GRASS POND
6' Winding Ditch
GRASS
HW. El. 21.6
W.W. POND HW. El. 23.6
HW. El. 34.0
HW. El. 31.78
3/24/47
HW. El. 33.4
HW. 34.0


GRASS POND 2
SWAMP
35
11
350
H.W. El. 32.9
H.W. El. 32.6
P.W. El. 31.7
33.5
H.W. El. 33.0
400
36
34.1
12
34.4
W.W. POND
R 29E
R 30E



25
36
R29E
R30E
W.W. POND
GRASS POND
H.W. 36.8
30
19
SHALLOW
31
40.1
H.W. El 38.0
H.W. 38.4
P.W. 37.76
3/27/47
20
29
32
41.1



600
43.6
41.1
40.4
110' FT. OPENING
3-10' SPAN
TIM. BRIDGE
P.W. El. 37.13
H.W. El. 39.0
F.L. El. 34.7
DECK. 39.58
39.7
40.8
650
9
16
FT. OPENING
SPAN T. TRESTLE
GRASS
POND
700
24" C.M.P.
F.L. 35.20
F.L. 35.56
24" V.C.P.
F.L. 33.75
F.L. 33.67
FISHEATING CREEK
4
3
20' Conc. P.
F.L. 34.71 W.
F.L. 35.15 E.
1 SPAN TIM. BRIDGE
TRESTLE 24" FT.
OPENING El. RAIL = 38.92
F.L. = 33.1 (HOLE)
P.W. 34.93 5/8/47
H.W. 37.0
37.7
40.4
39.9
37.7
40.7
41.4
41.3
41.1
40.4

2.2 Pond Site Alternatives Maps

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5525 W. CYPRESS ST. - SUITE 300
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CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	407878 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
1

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SR 29	HENDRY/GLADES	417575 1 22 01

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DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

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Hendry and Glades Counties, Florida

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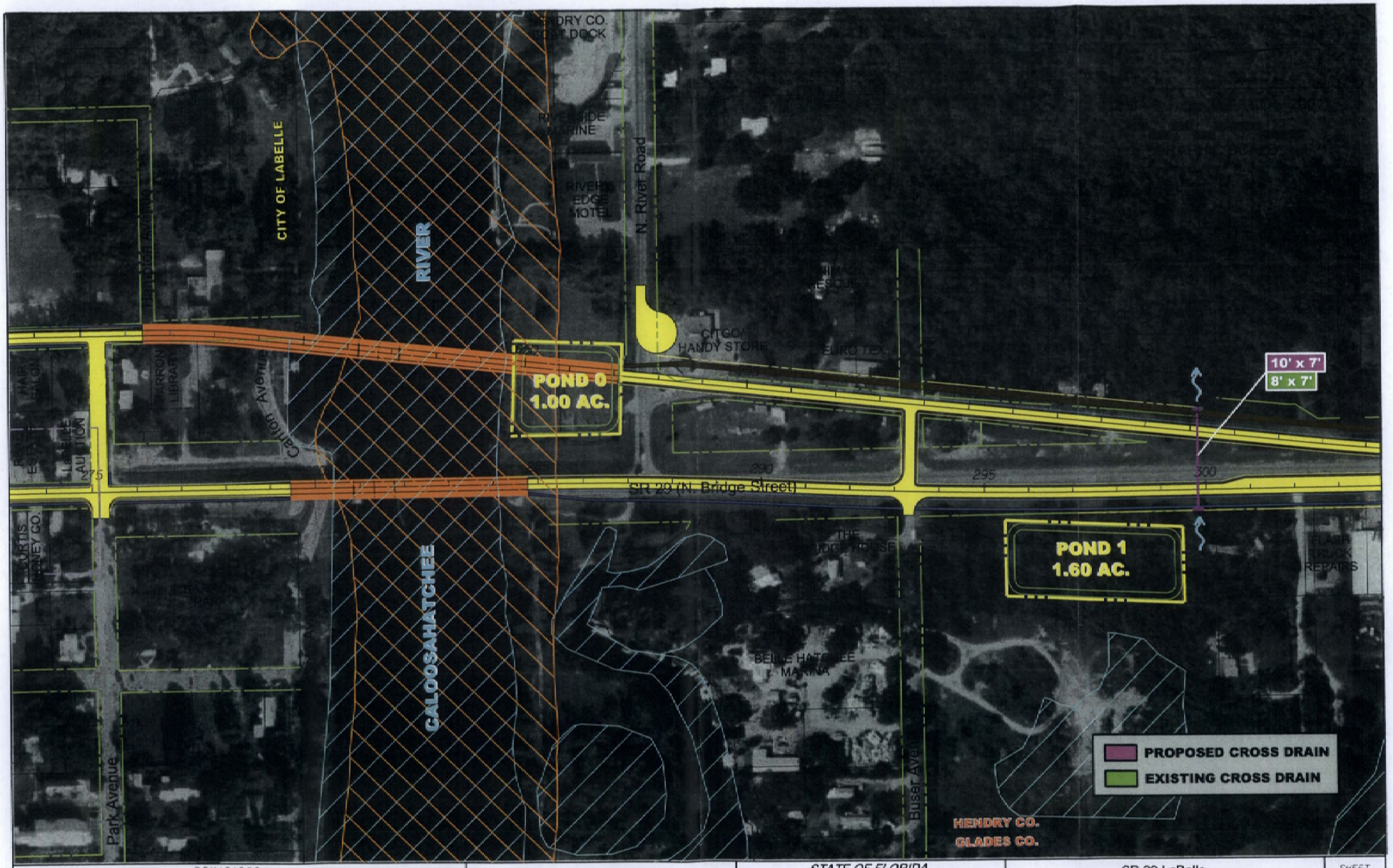

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417578 1 22 01

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POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
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Hendry and Glades Counties, Florida

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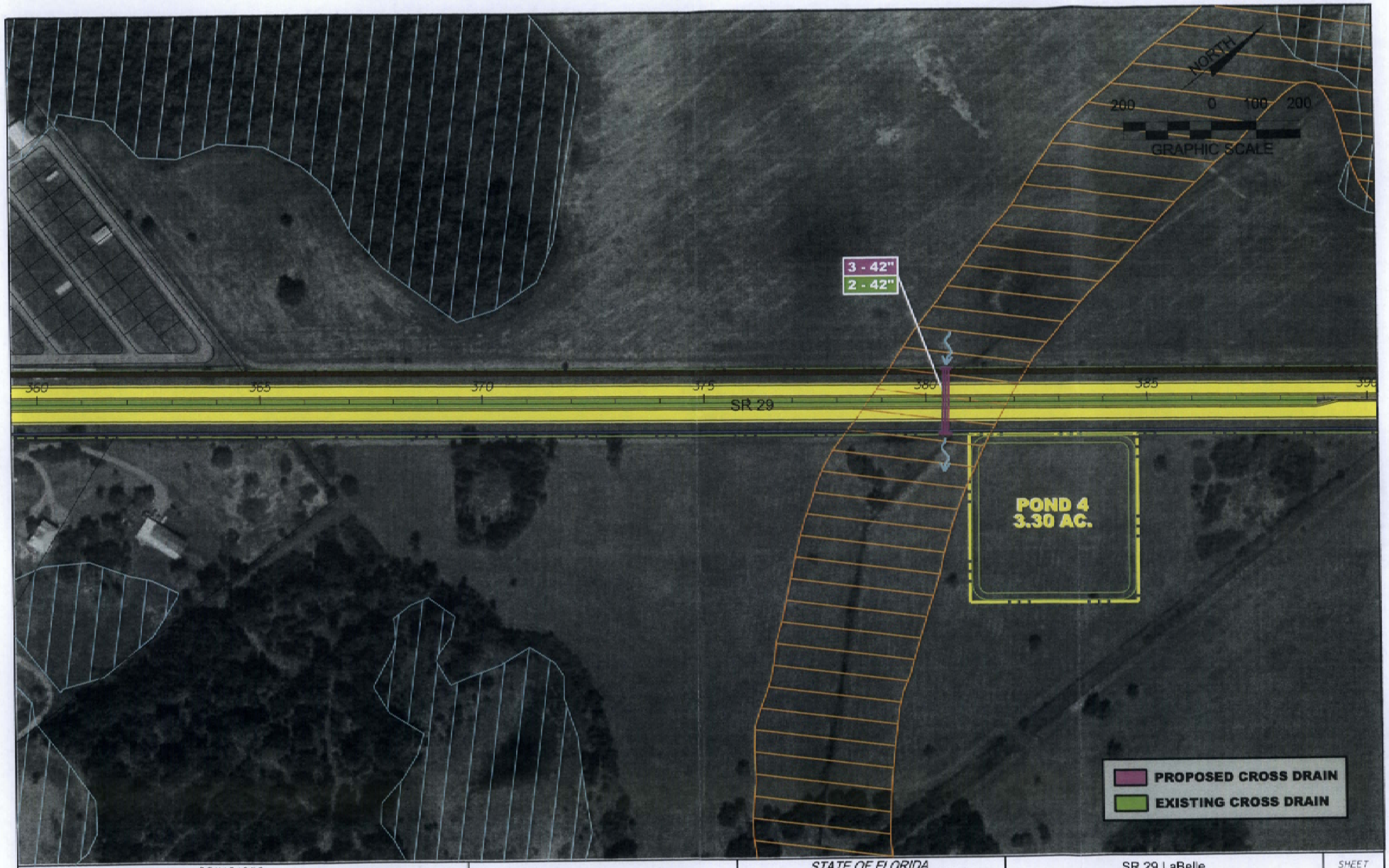

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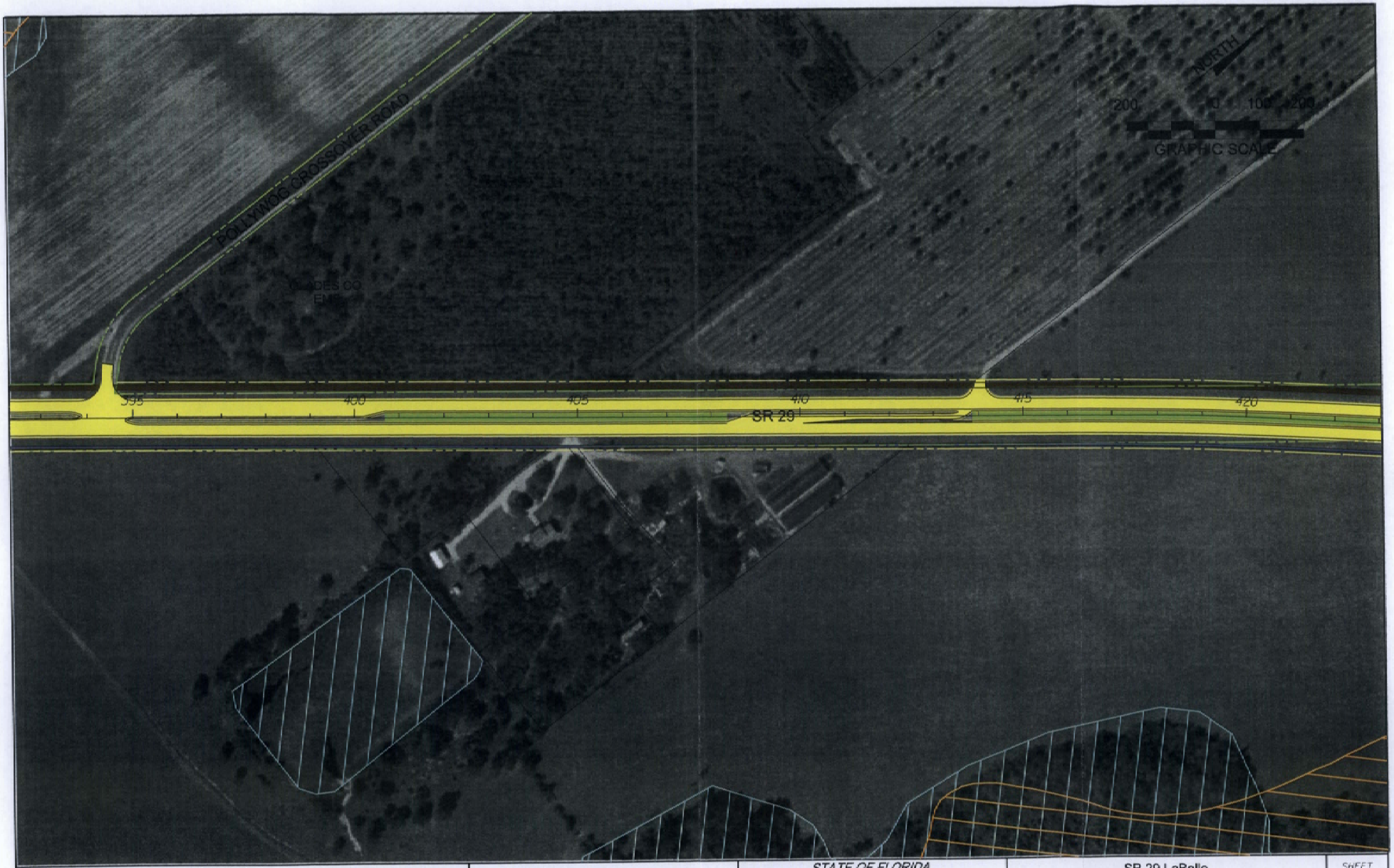

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From CR 80A (Cowboy Way) to US 27
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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417875 1 22 01

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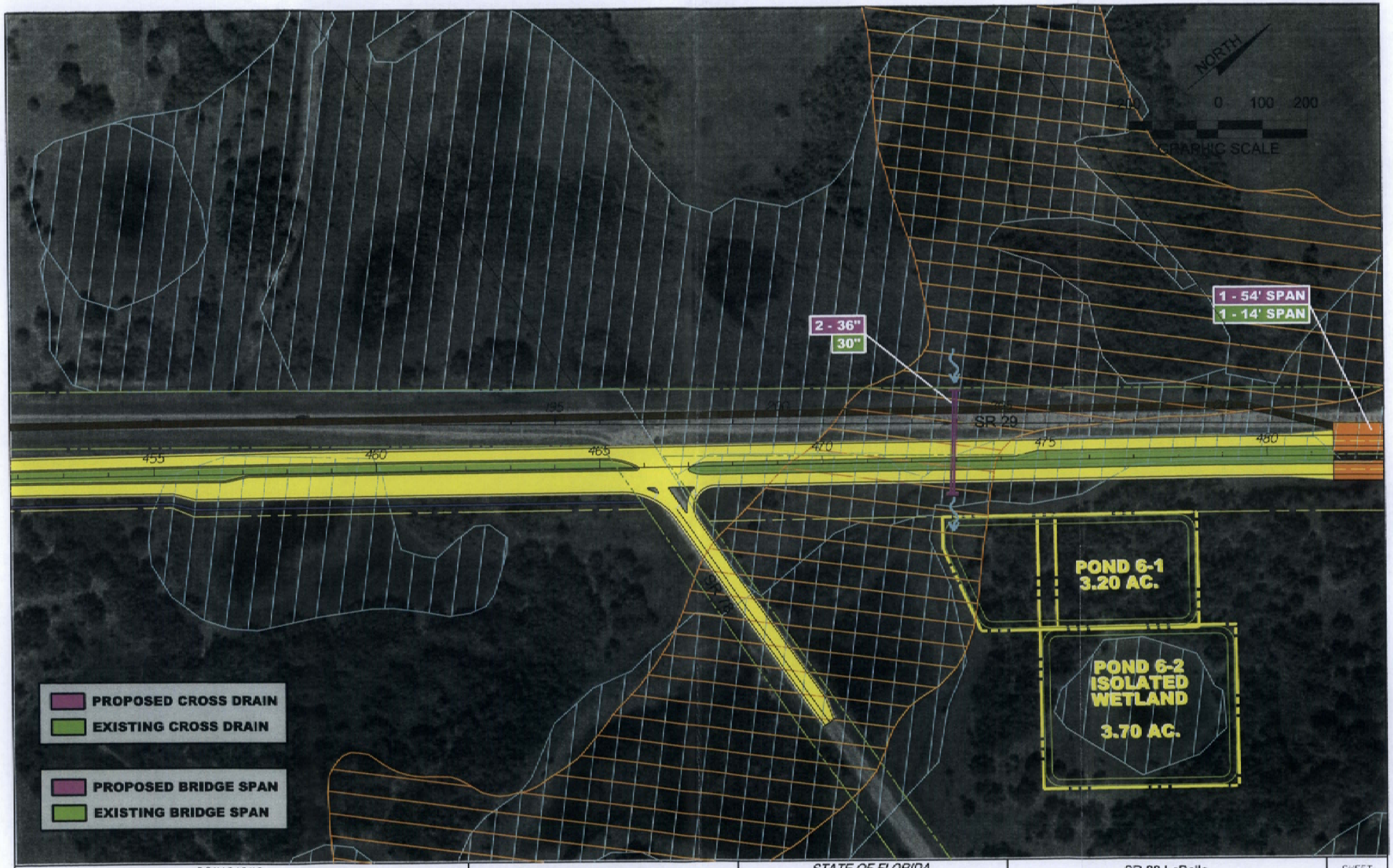

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SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

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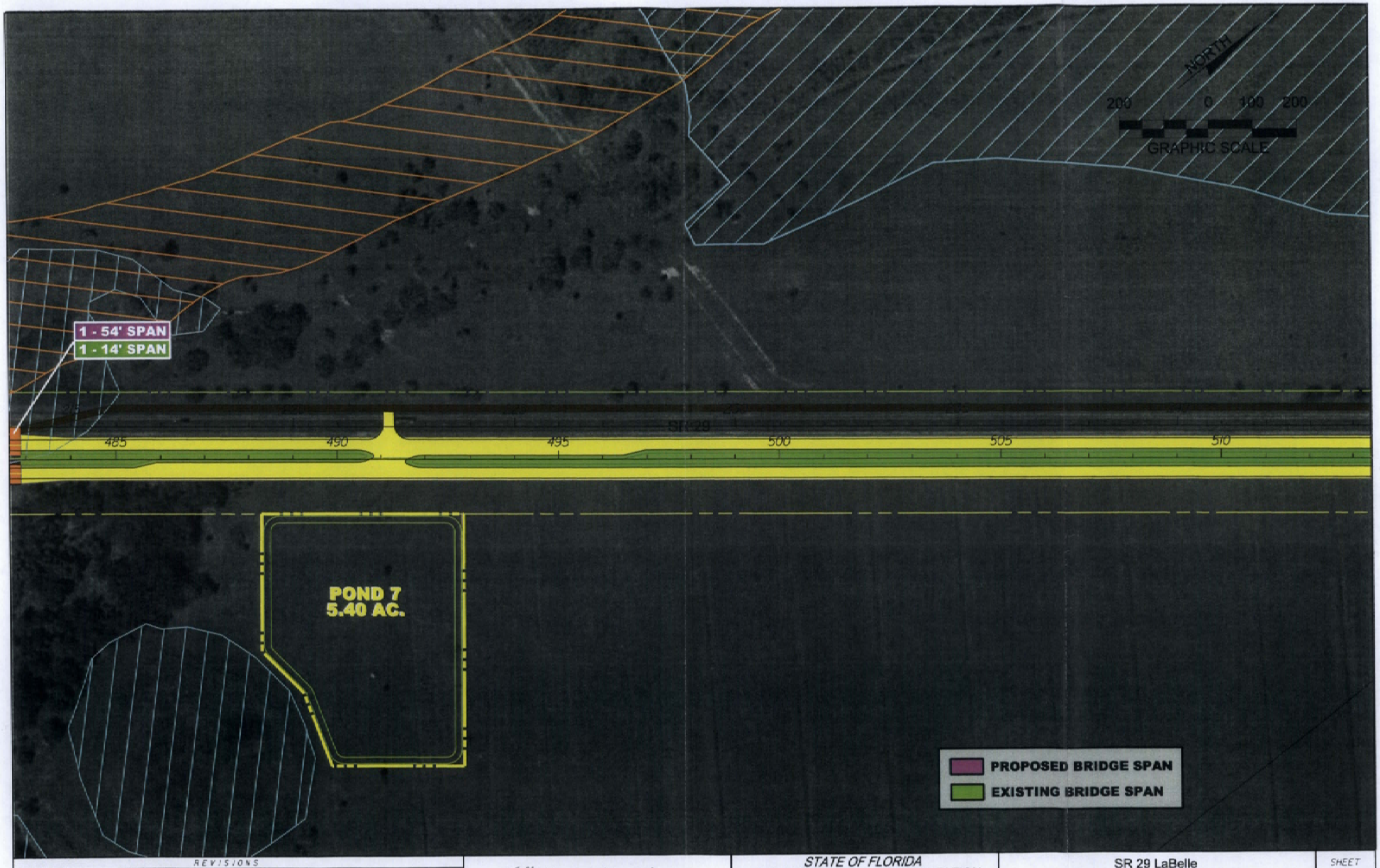

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SR 29	HENDRY/GLADES	417878 1 22 01

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POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

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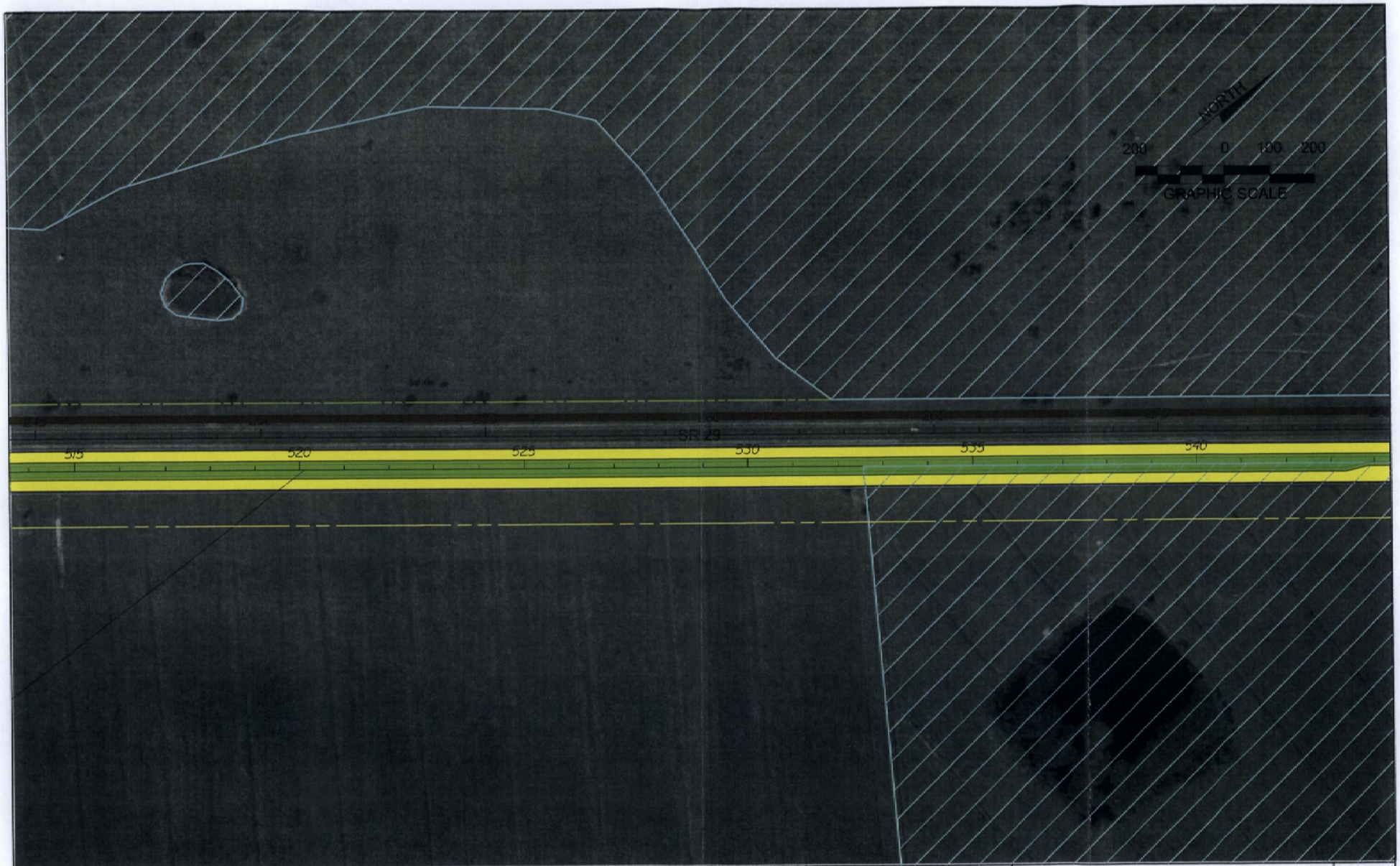

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	407578 1 22 01

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POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
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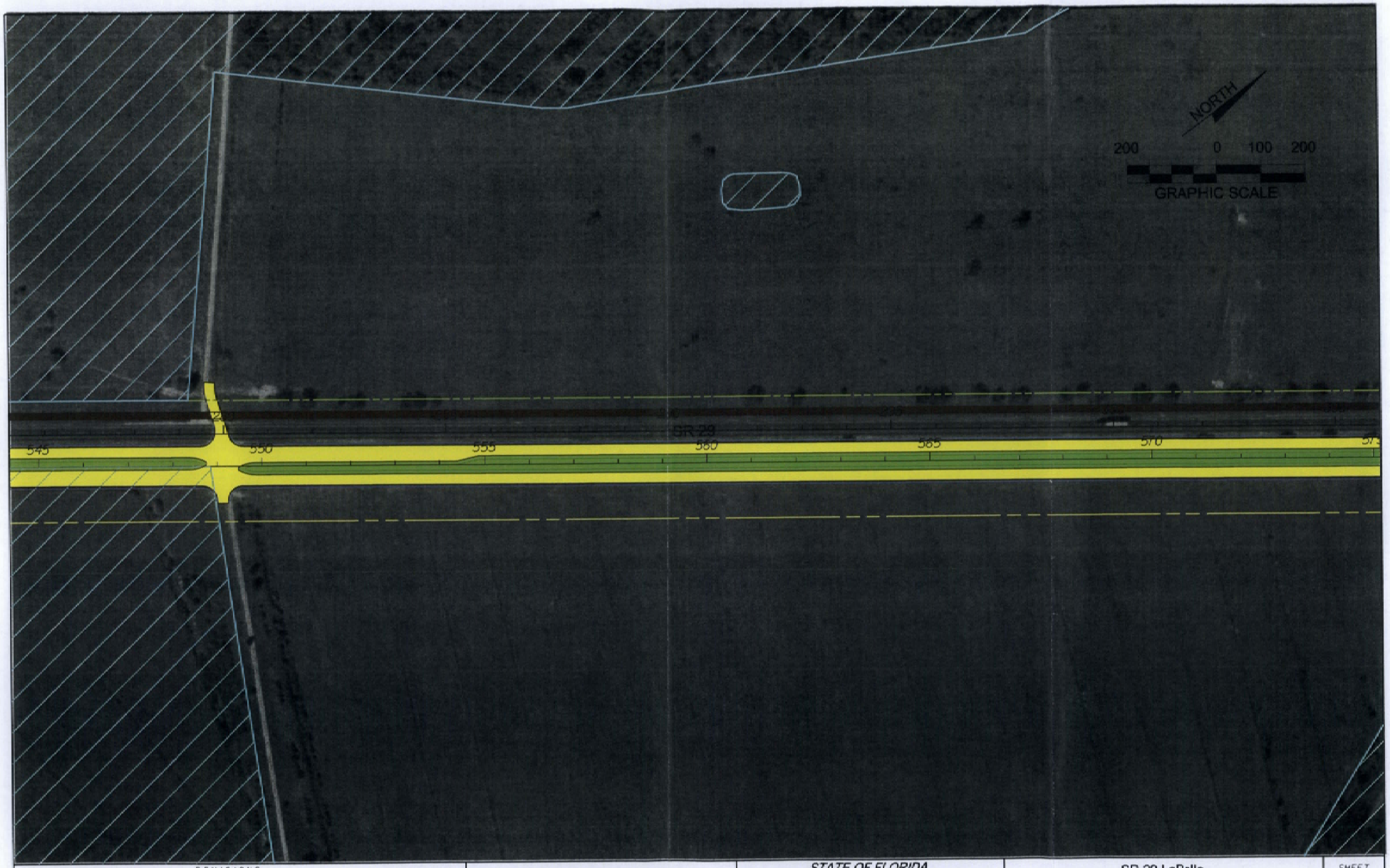

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SR 29	HENDRY/GLADES	417878 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

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SR 29	HENDRY/GLADES	407878 1 22 01

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POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

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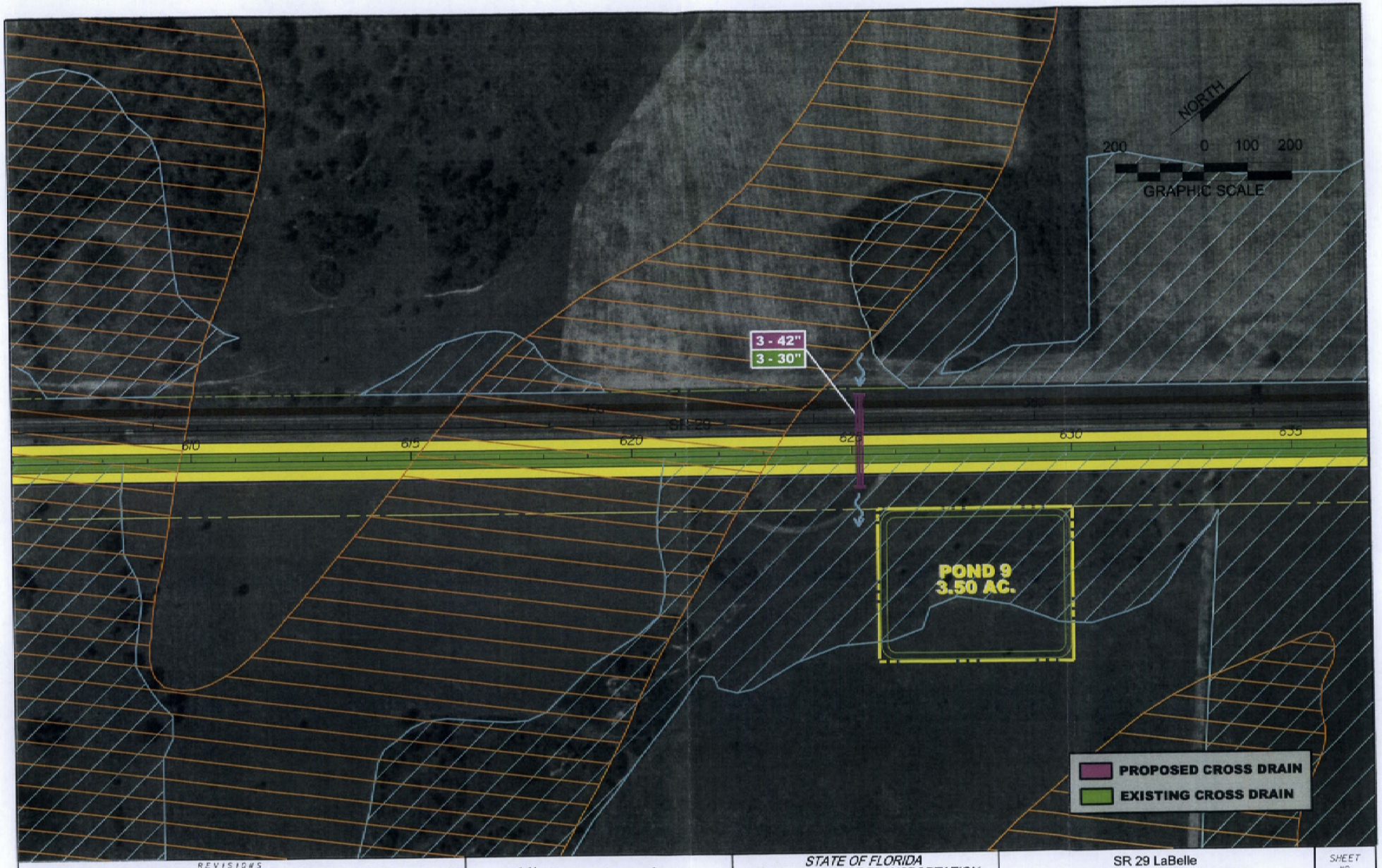

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417578 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
16

4/14/2011 12:30:39 PM H:\4929\CADD\Pond Exhibits\SheetORIG.dgn

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Fuller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5854

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417676 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
17

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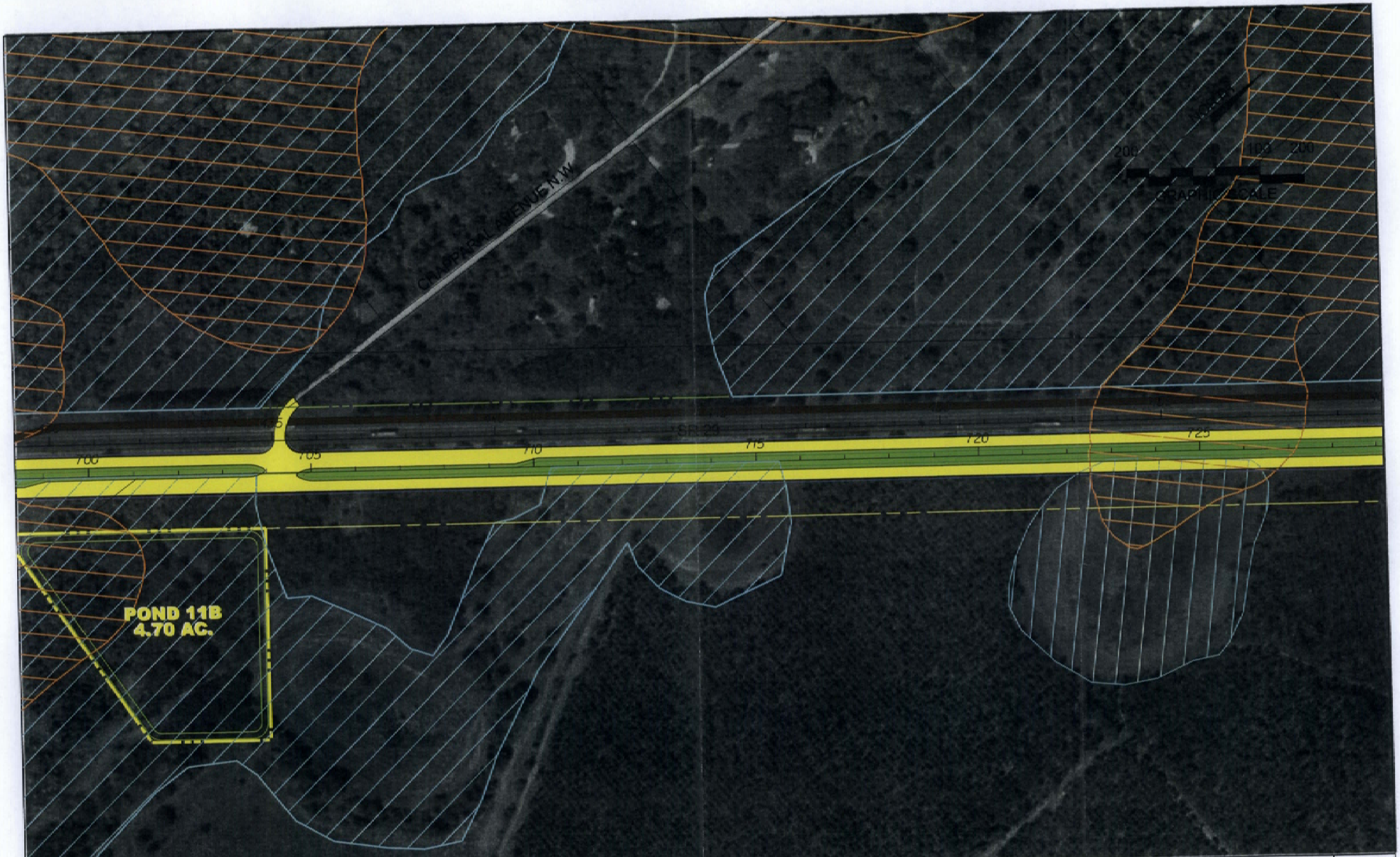

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Fuller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
18

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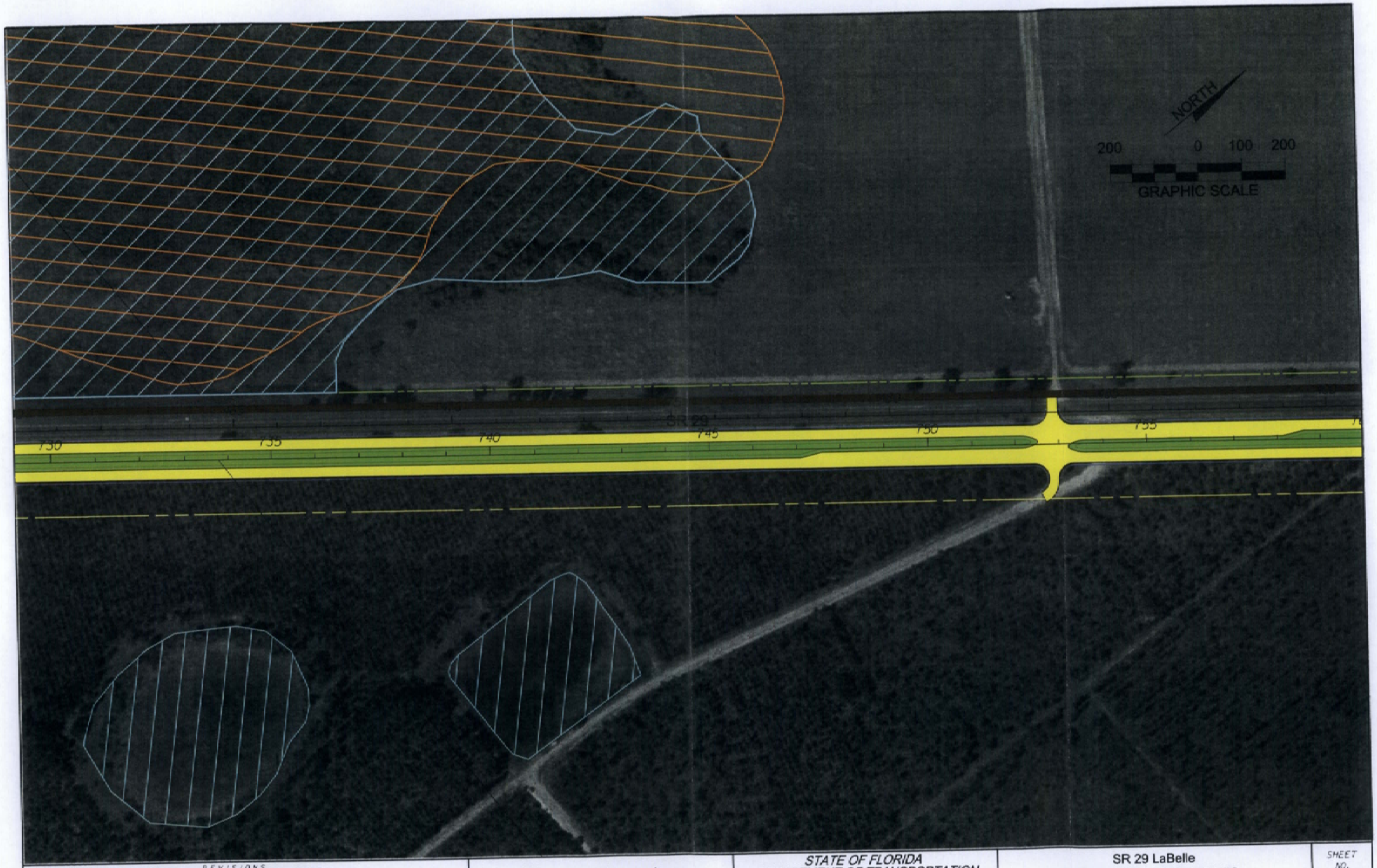

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Fuller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO. 19

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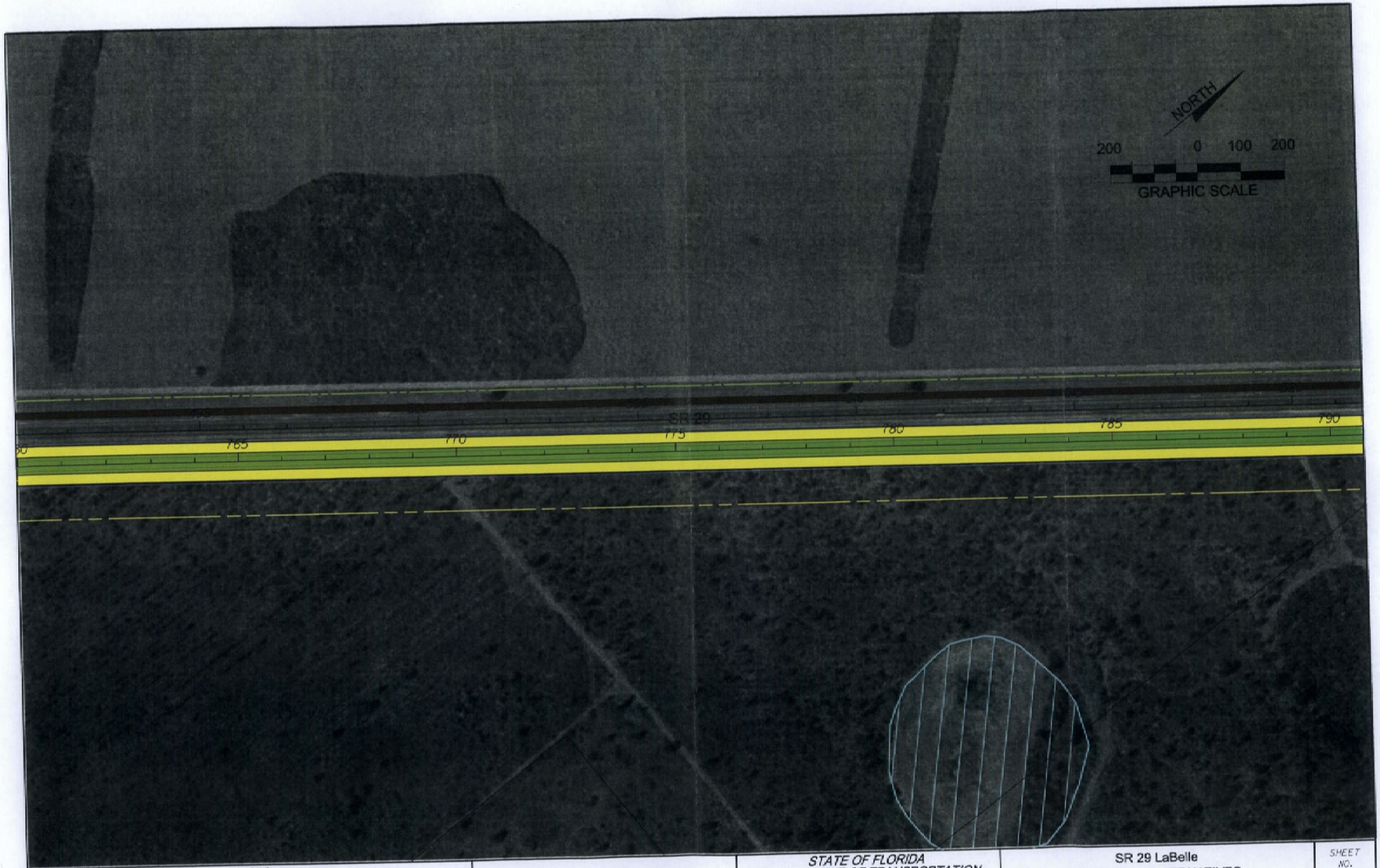

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Faller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
20

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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Fuller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	407878 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
21

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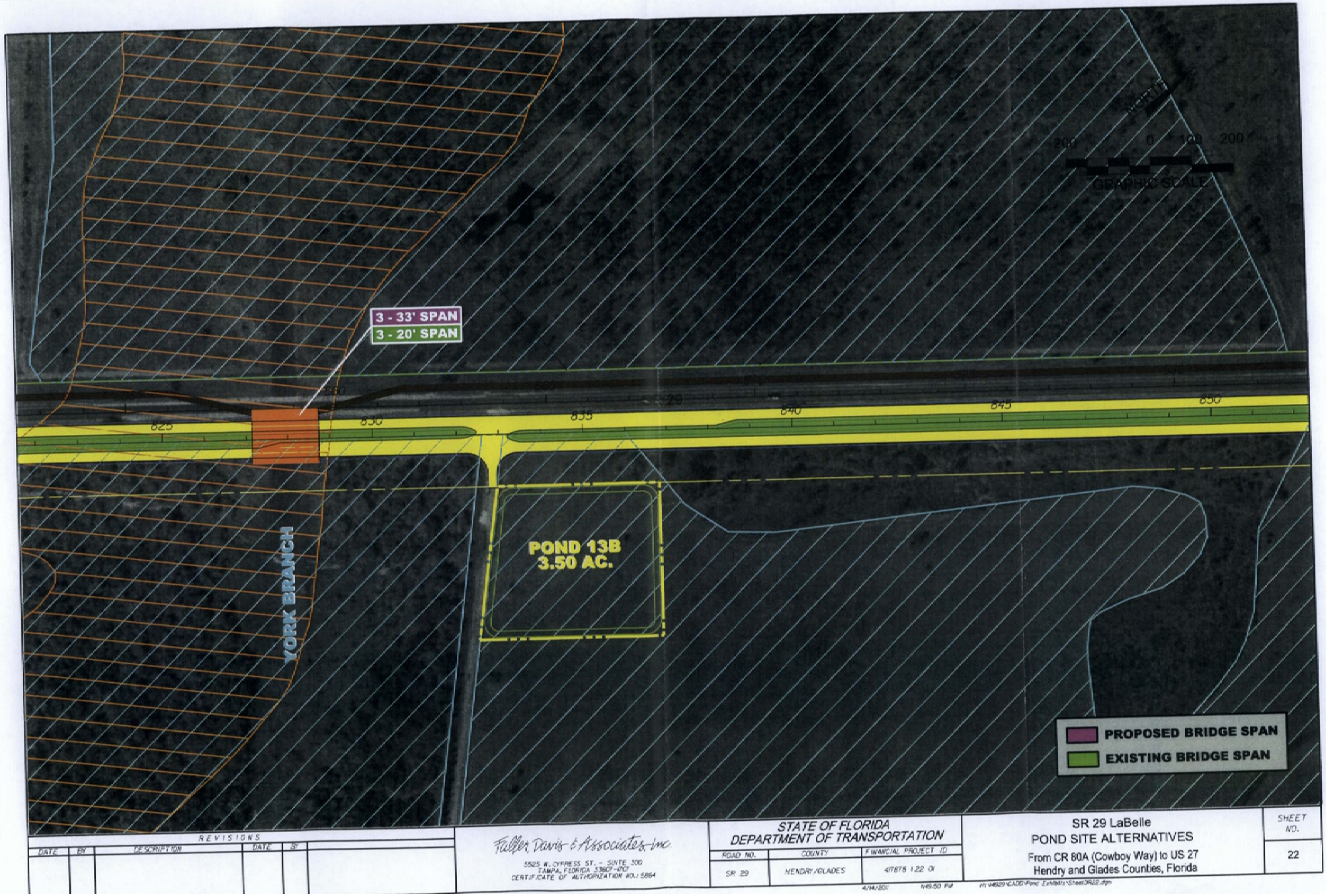

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Fuller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-4707
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

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SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
22

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Faller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

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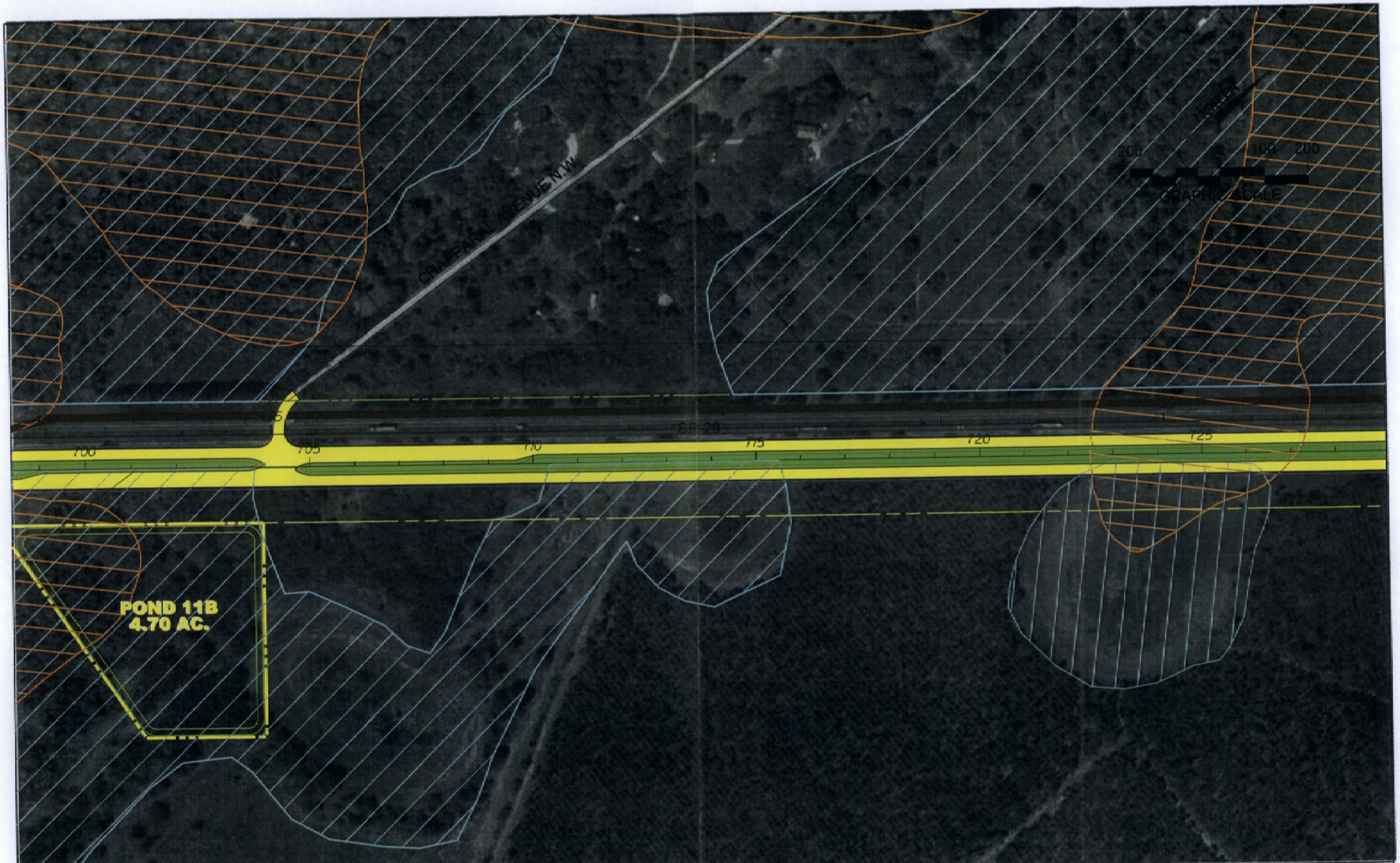
SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
17



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Fuller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1702
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
18

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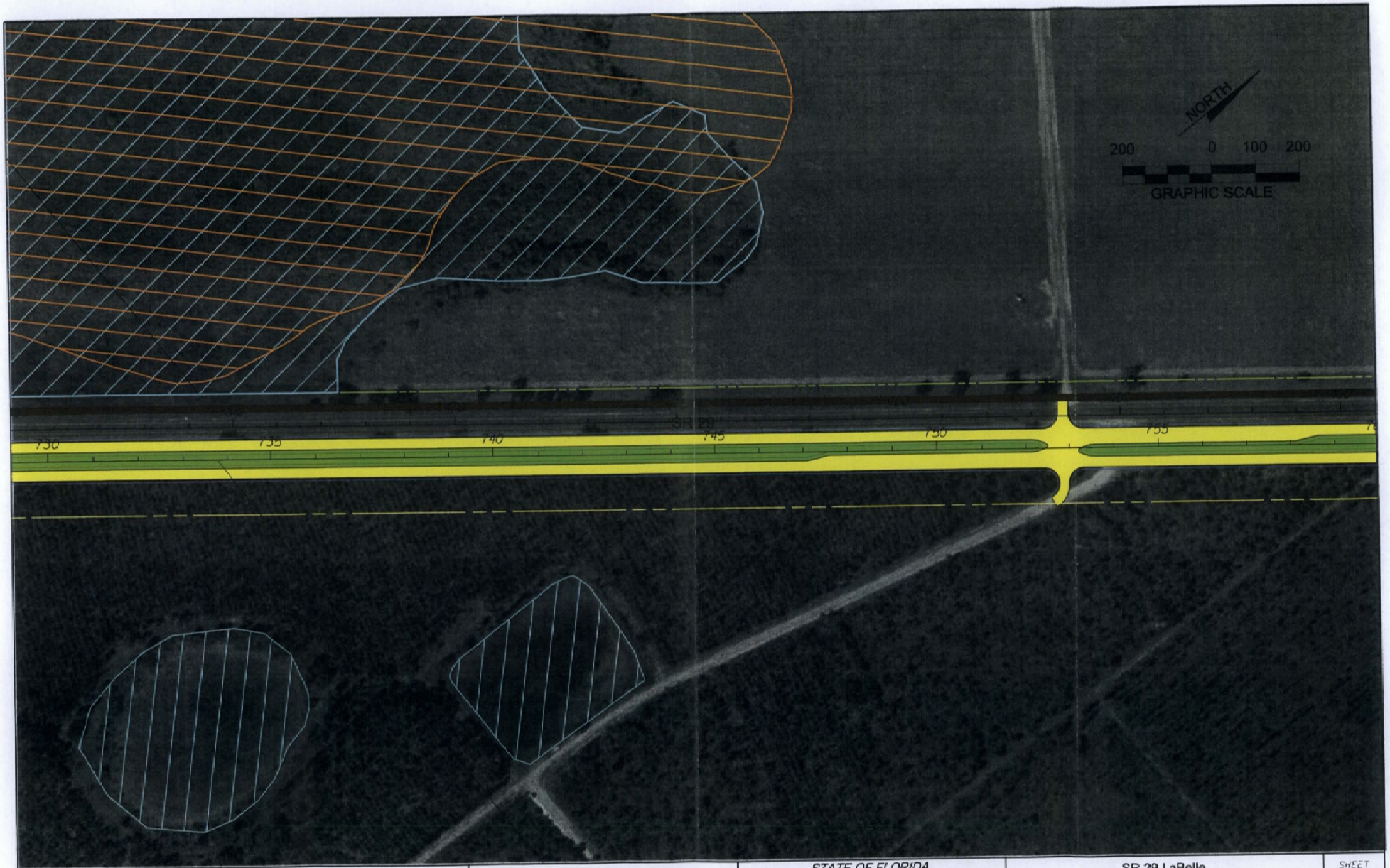

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Fuller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO. 19

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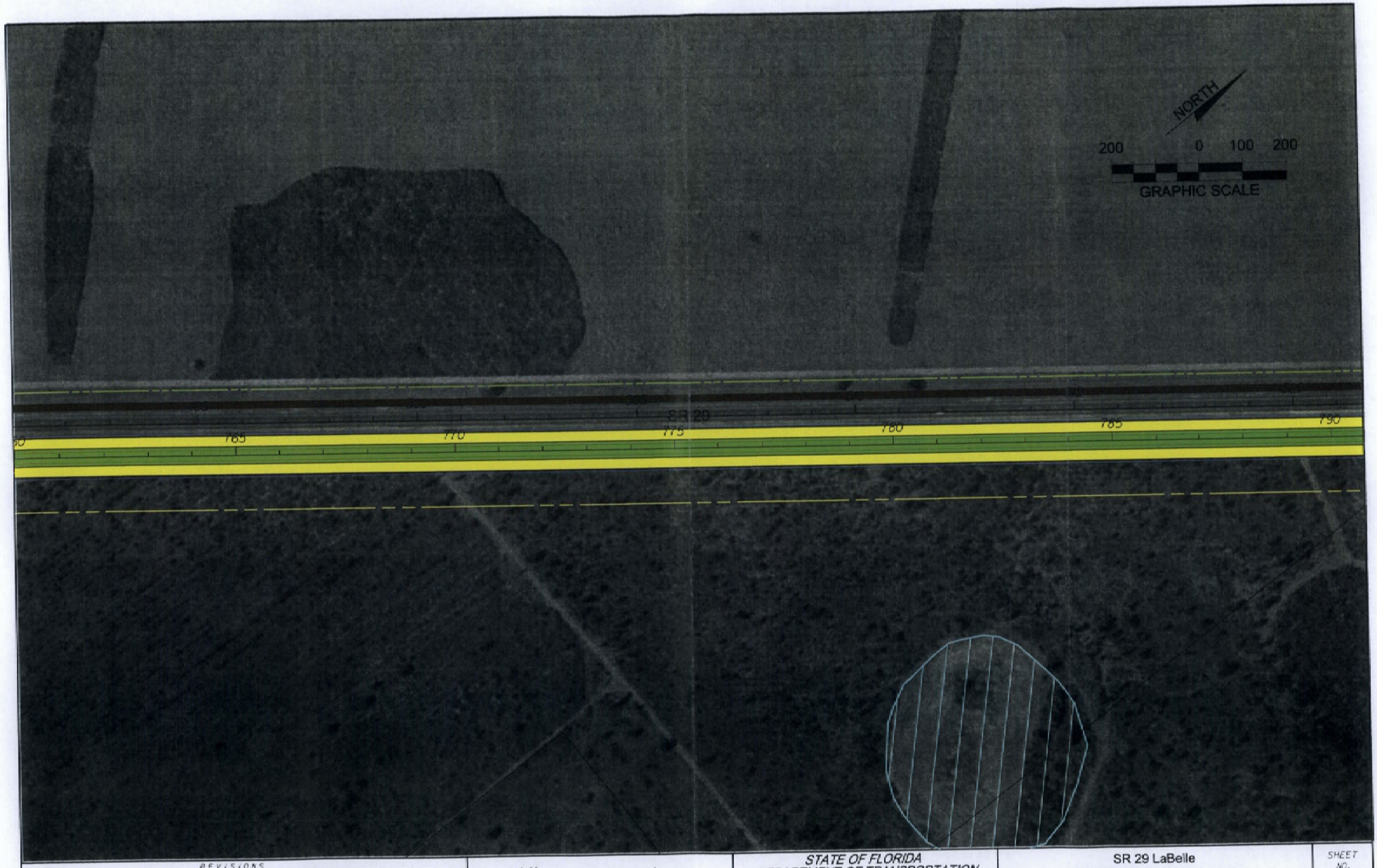

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Fuller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33609-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.: 20

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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Fuller, Davis & Associates, Inc.
5585 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
21

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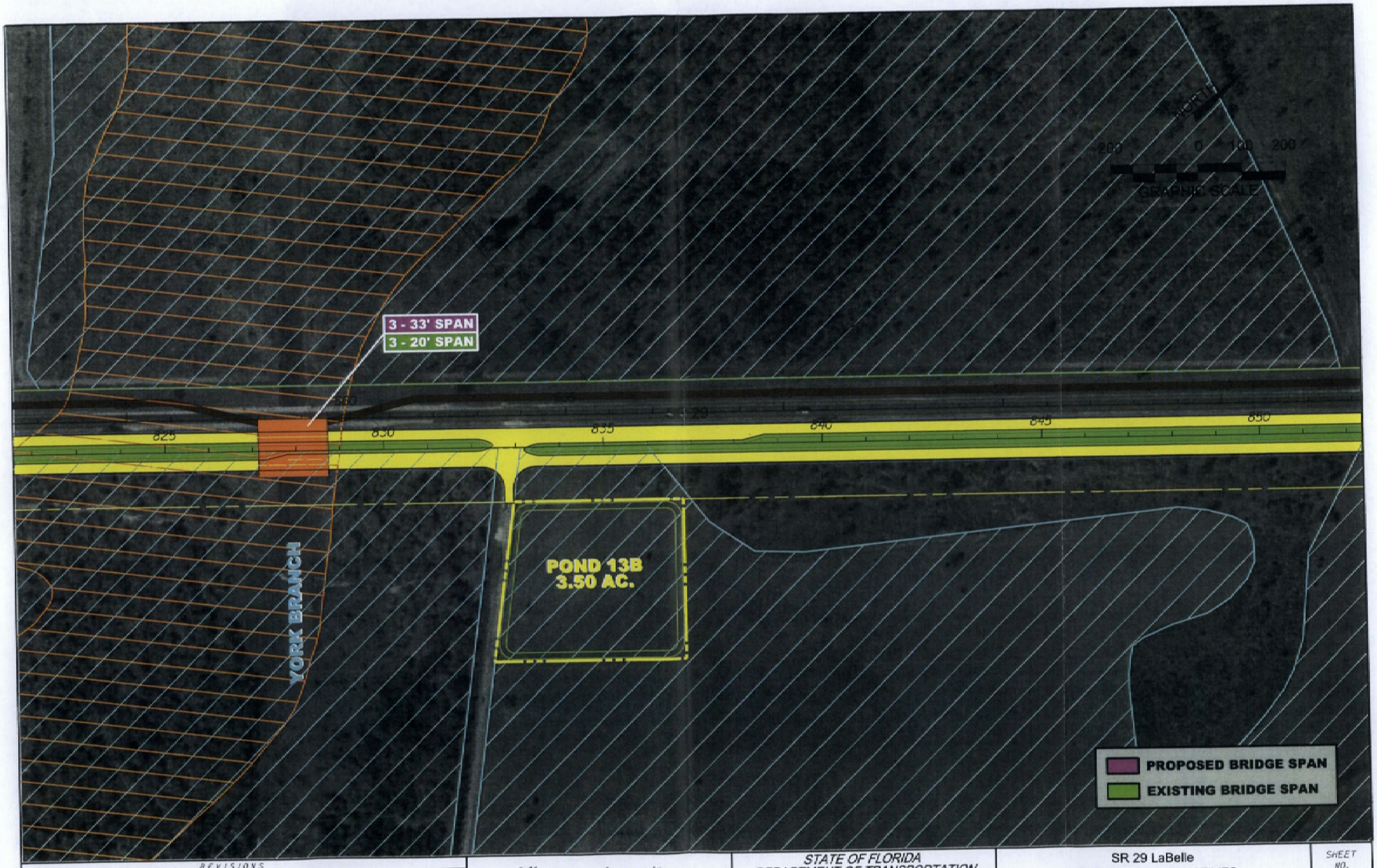

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Fuller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO. 22

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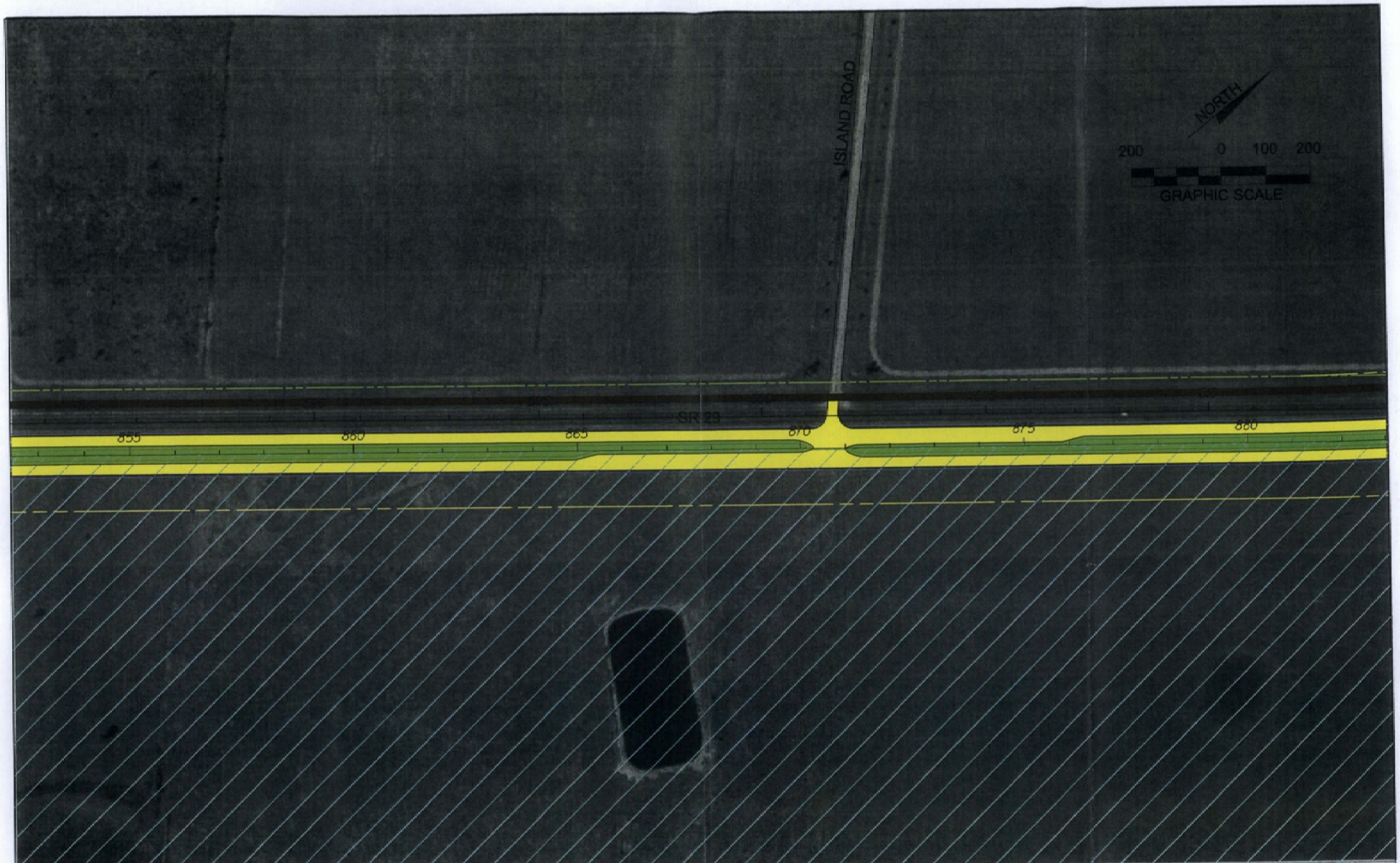

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Faller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

DATE *TIME* *FILE*

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
23

REVISIONS				
DATE	BY	DESCRIPTION	DATE	BY

Fuller Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
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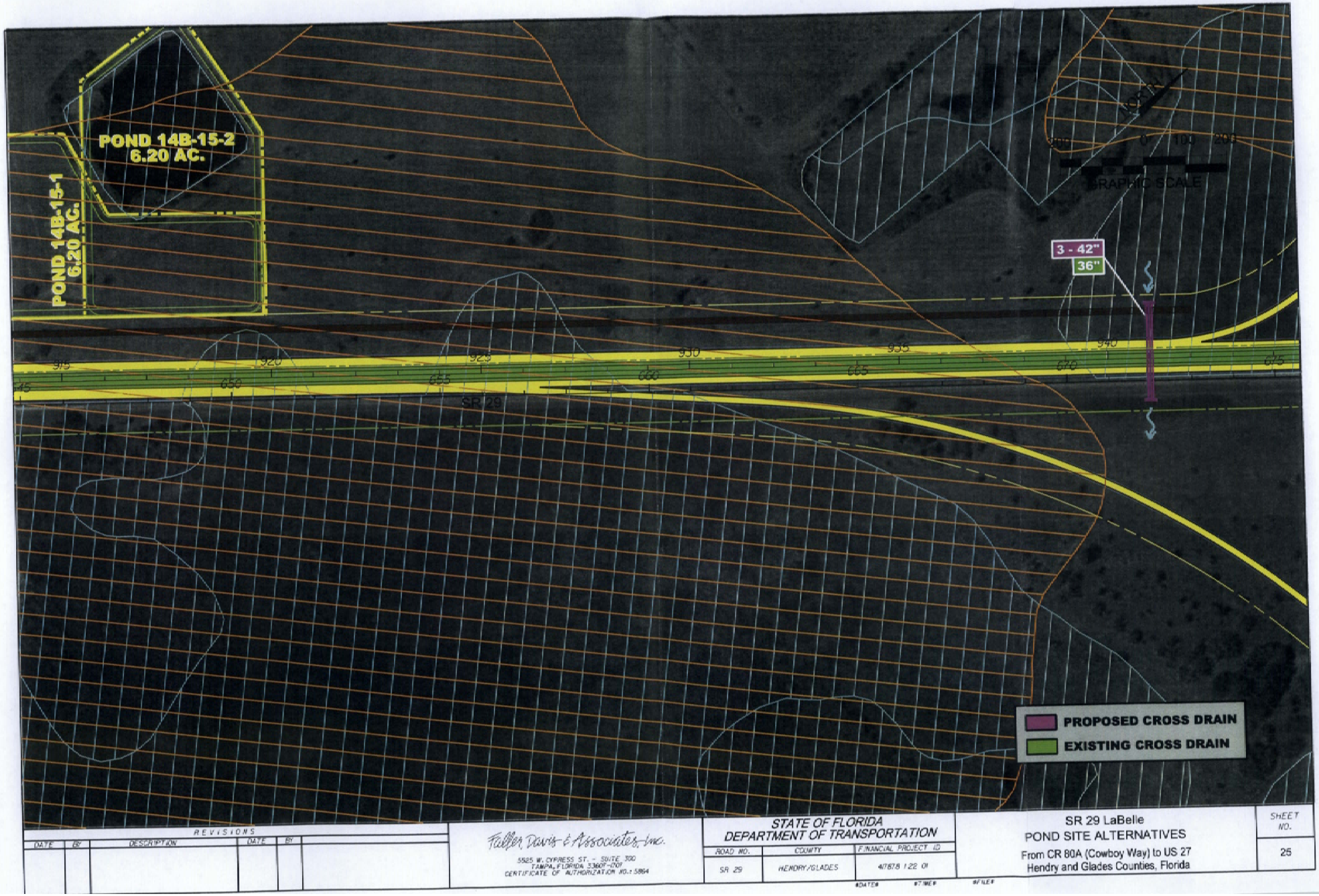


REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Fuller Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

#DATE# #TIME# #FILE#

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
25

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Kolter, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1702
CERTIFICATE OF AUTHORIZATION NO.: 5864

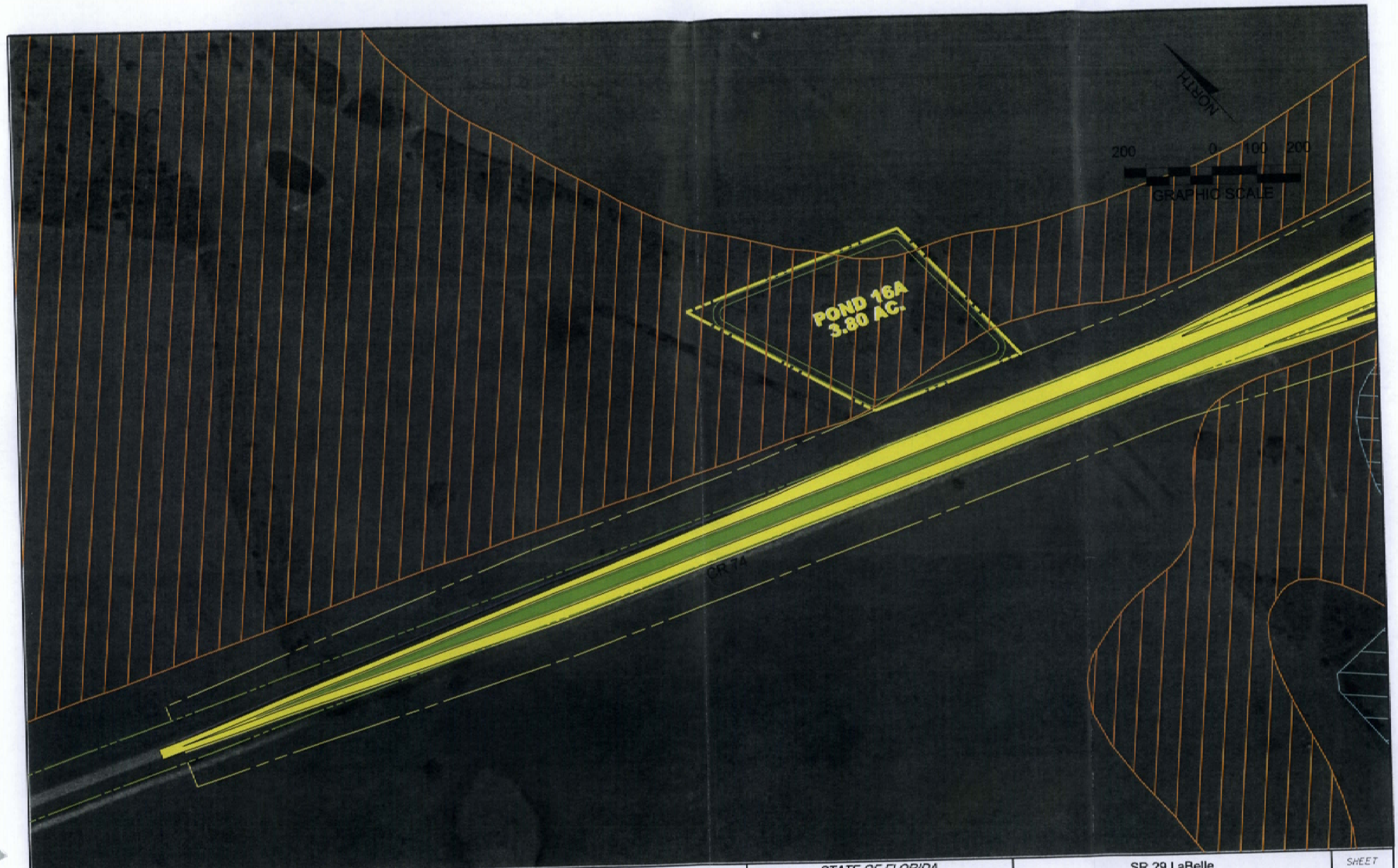
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417678 1 22 01

#DATE# #TIME# #FILE#

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO. 26



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Faller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417678 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
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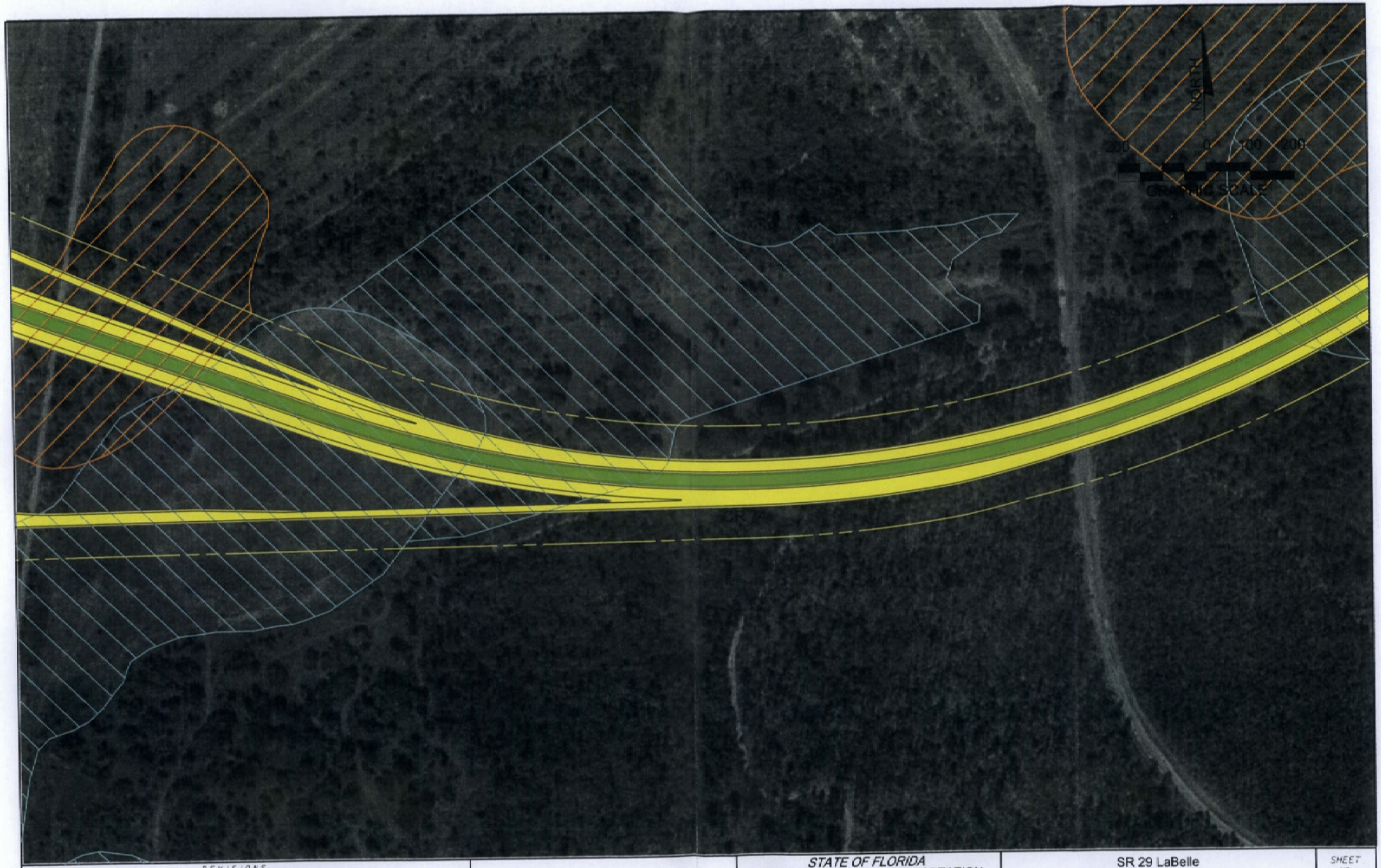

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Fuller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5854

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

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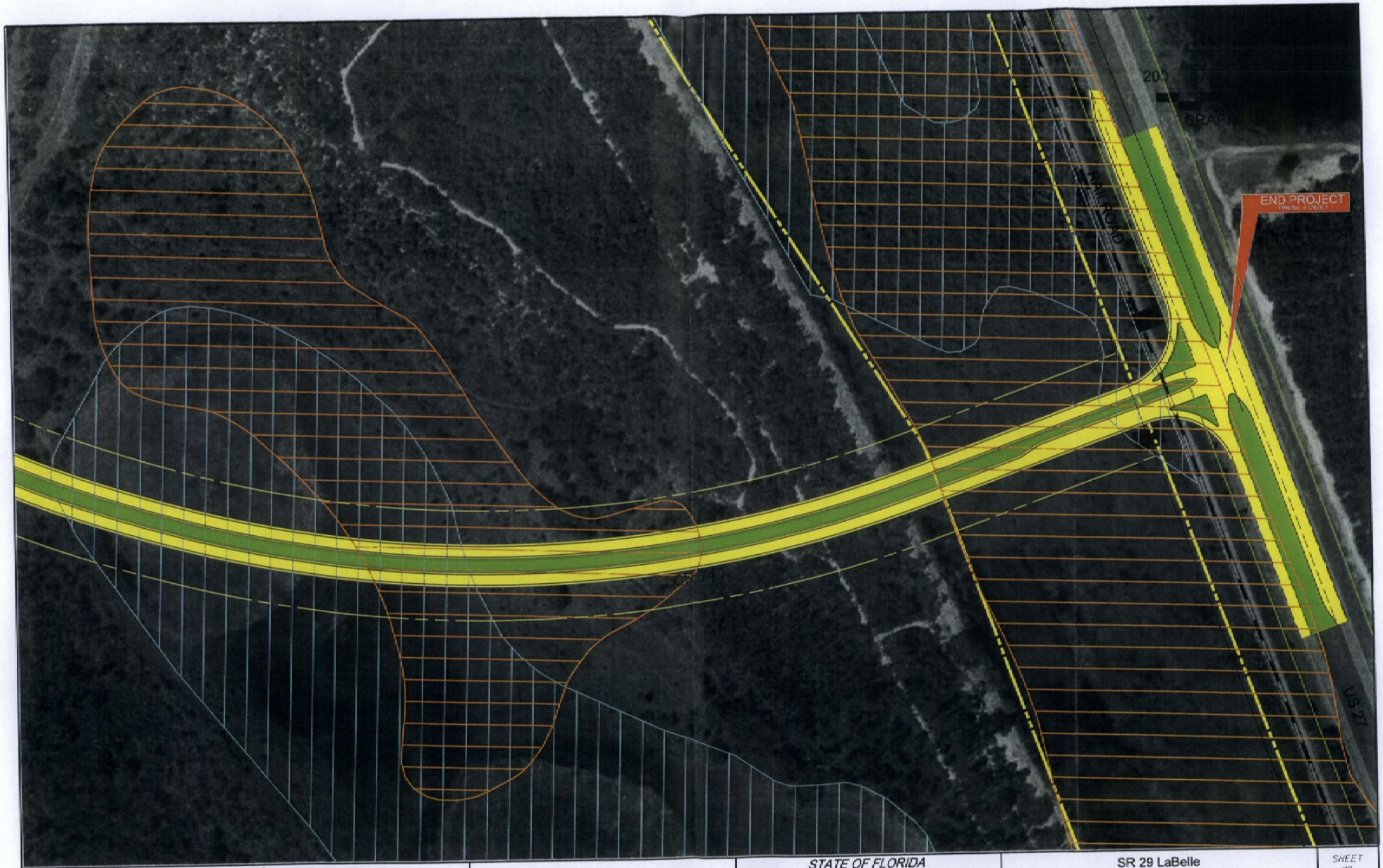
SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
26B



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Faller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33609-1709
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

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SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
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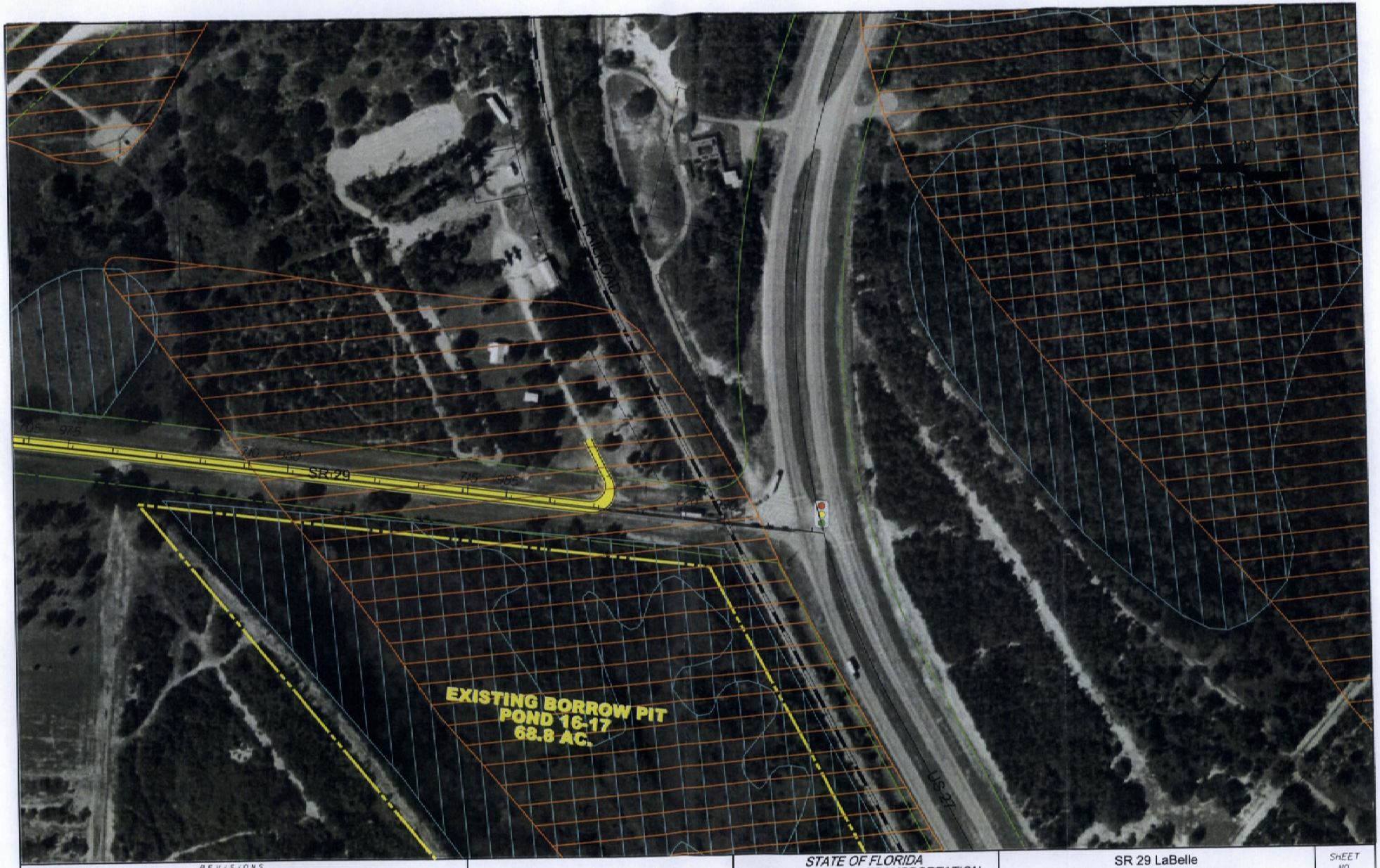


REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	

Fuller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1701
CERTIFICATE OF AUTHORIZATION NO.: 5864

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

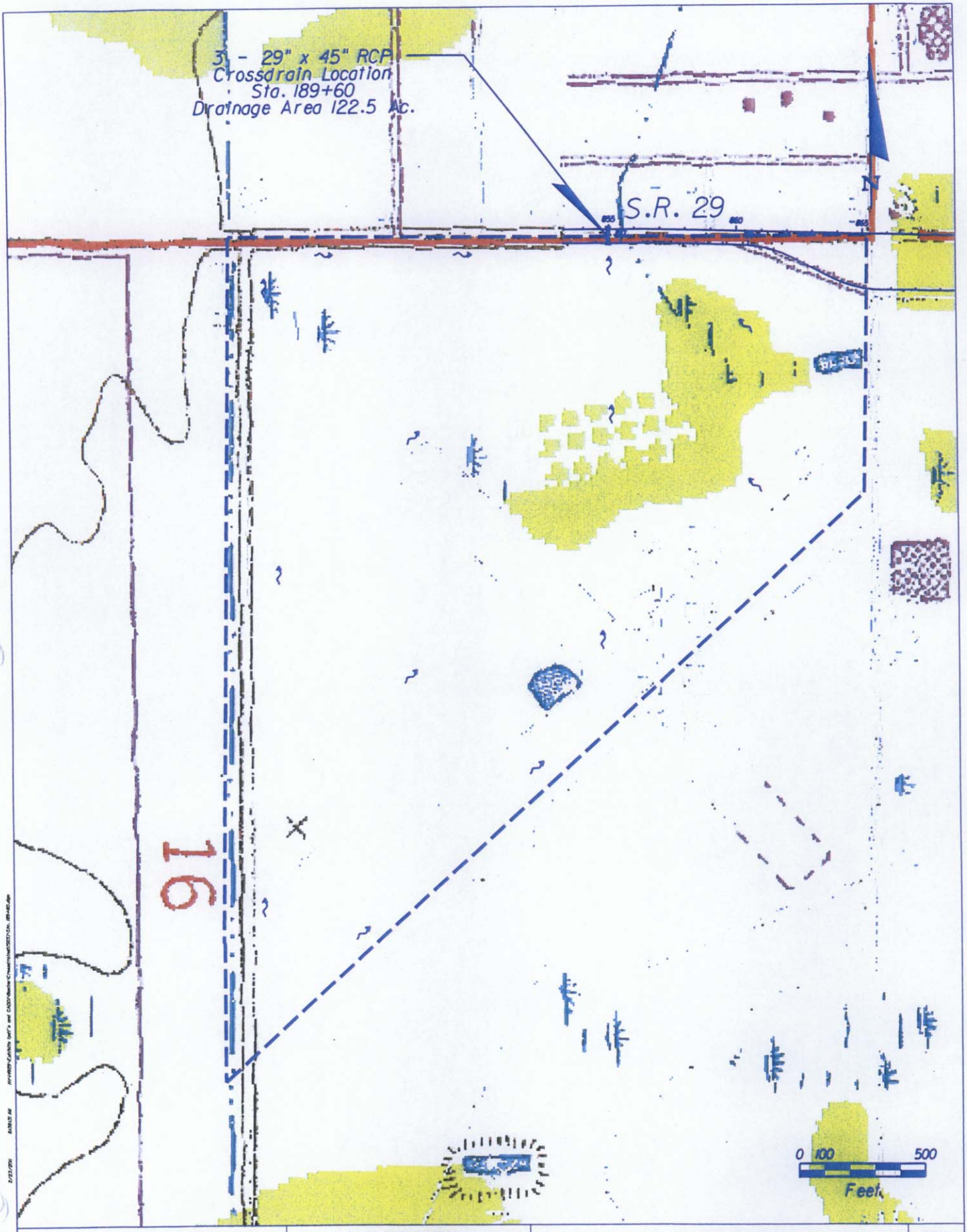
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878 1 22 01

SR 29 LaBelle
POND SITE ALTERNATIVES
From CR 80A (Cowboy Way) to US 27
Hendry and Glades Counties, Florida

SHEET NO.
27

#DATE# #TIME# #FILE#

2.3 USGS Maps



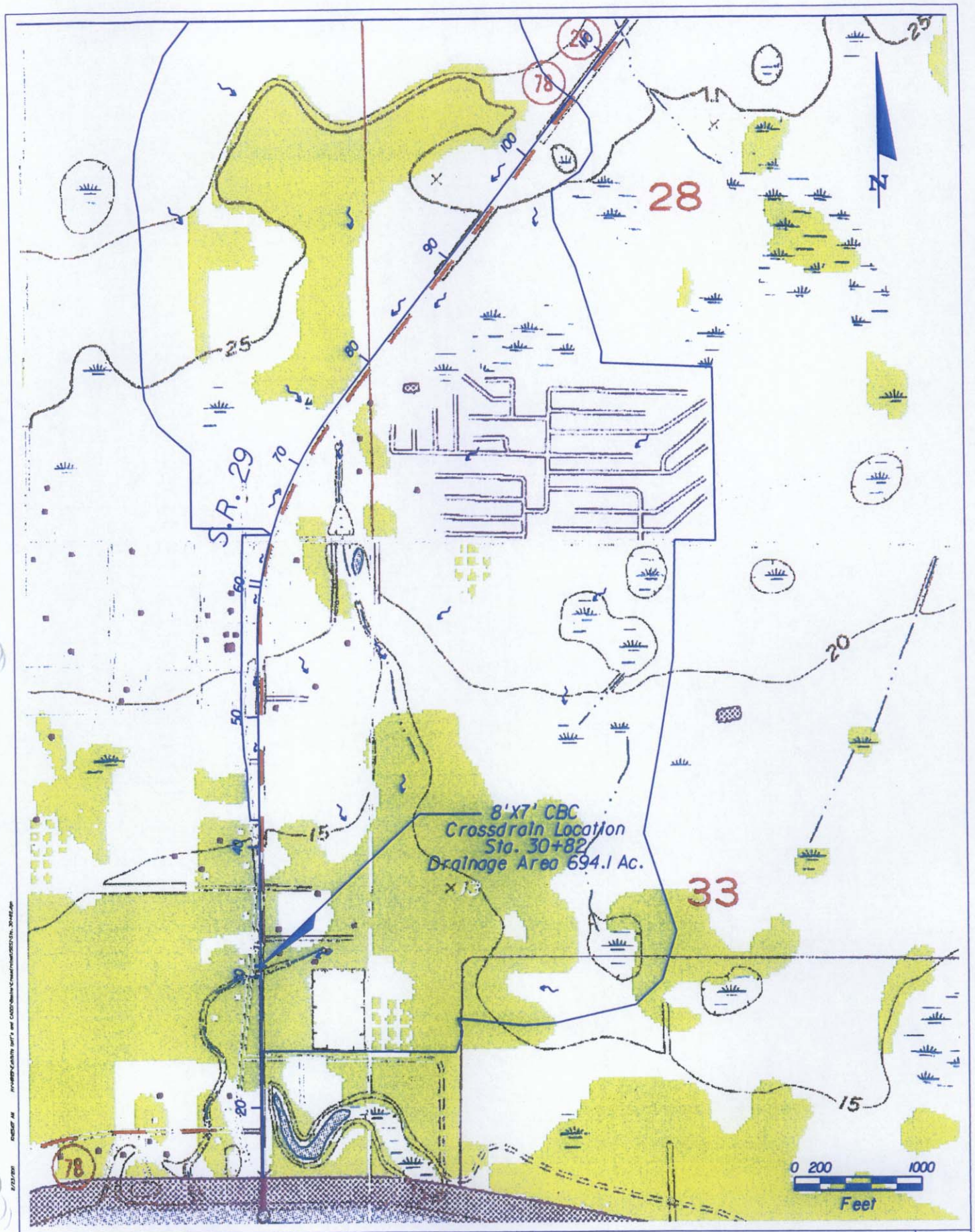
Faller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864
DEBORAH L. KNIGHTON, P.E. NO.: 43920

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY	417878-1-22-01

DRAINAGE AREA
CROSSDRAIN AT STA. 189+60

SHEET NO.



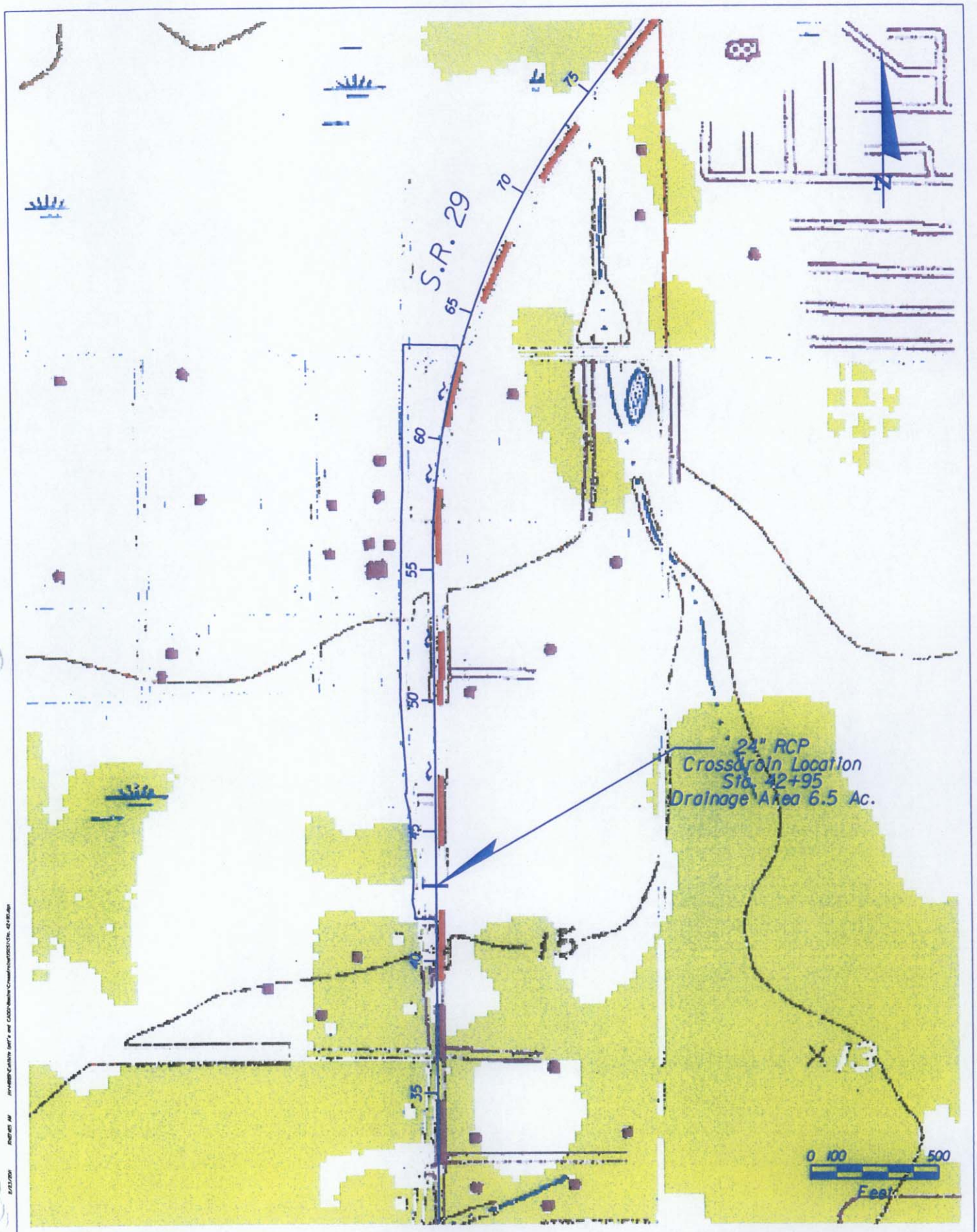
Faller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864
DEBORAH L. KNIGHTON, P.E. NO.: 43920

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY	417878-1-22-01

DRAINAGE AREA
CROSSDRAIN AT STA. 30+82

SHEET NO.



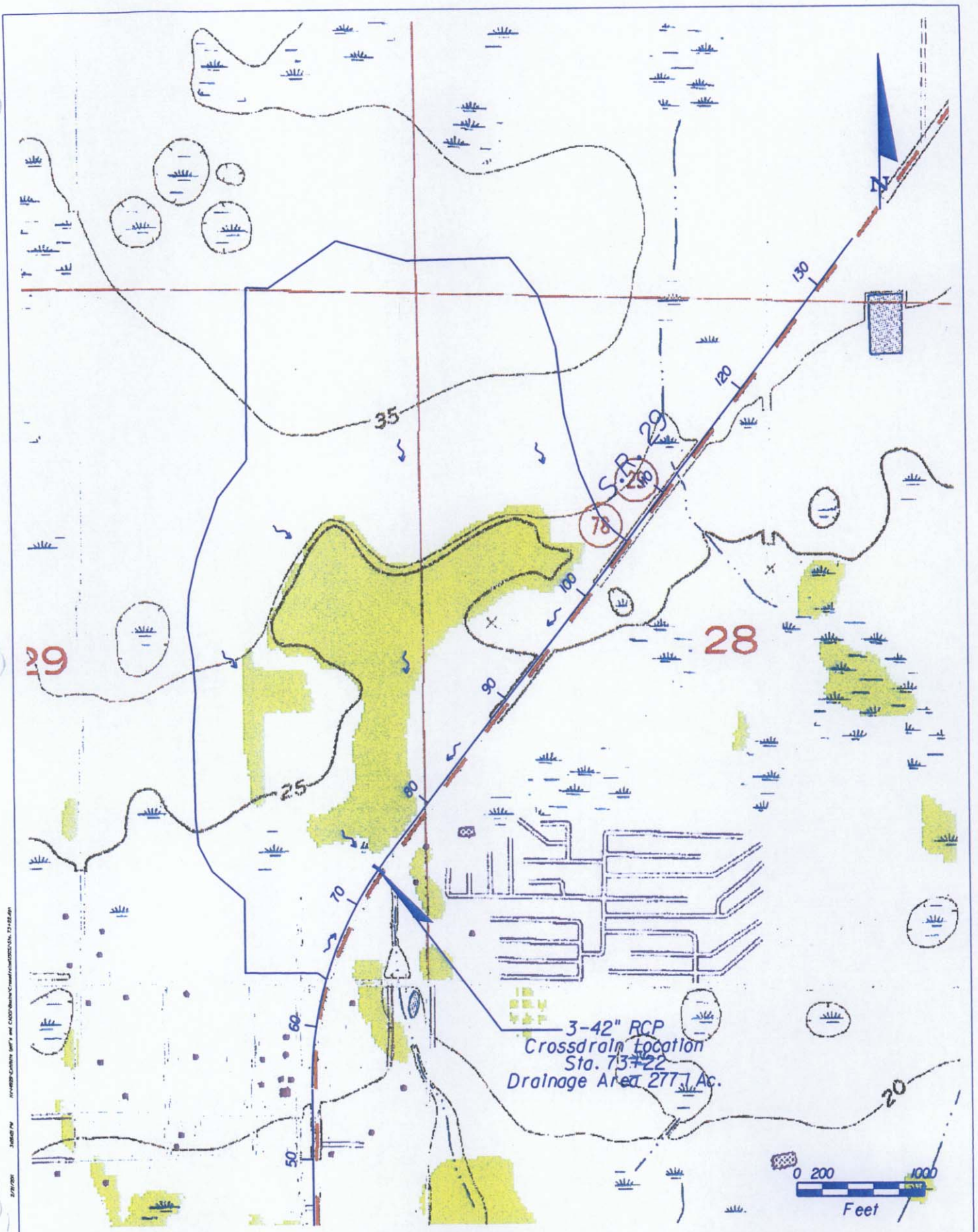
Faller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864
DEBORAH L. KNIGHTON, P.E. NO.: 43920

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY	417878-1-22-01

DRAINAGE AREA
CROSSDRAIN AT STA. 42+95

SHEET NO.



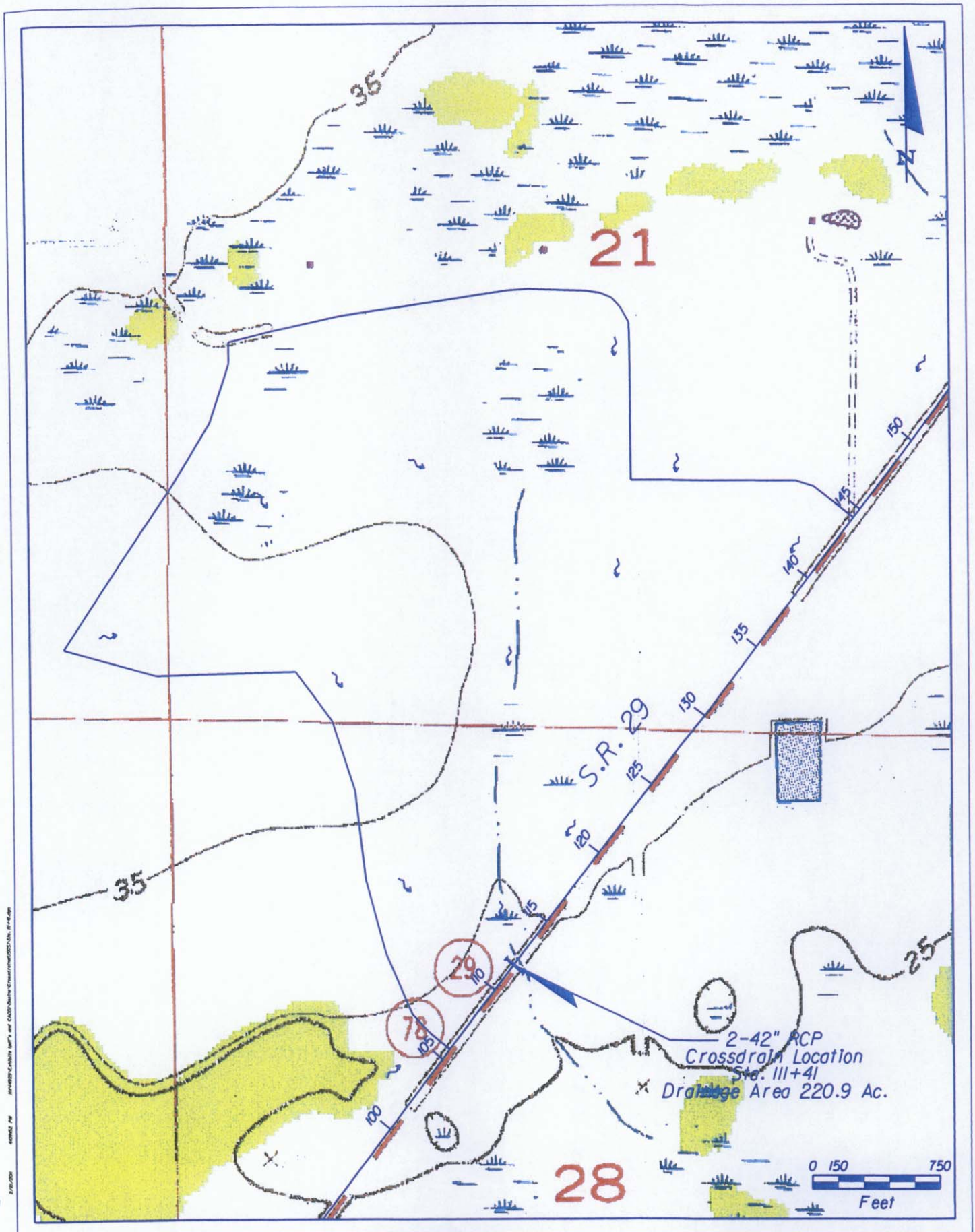
Fuller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864
DEBORAH L. KNIGHTON, P.E. NO.: 43920

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
CROSSDRAIN AT STA. 73+22

SHEET NO.



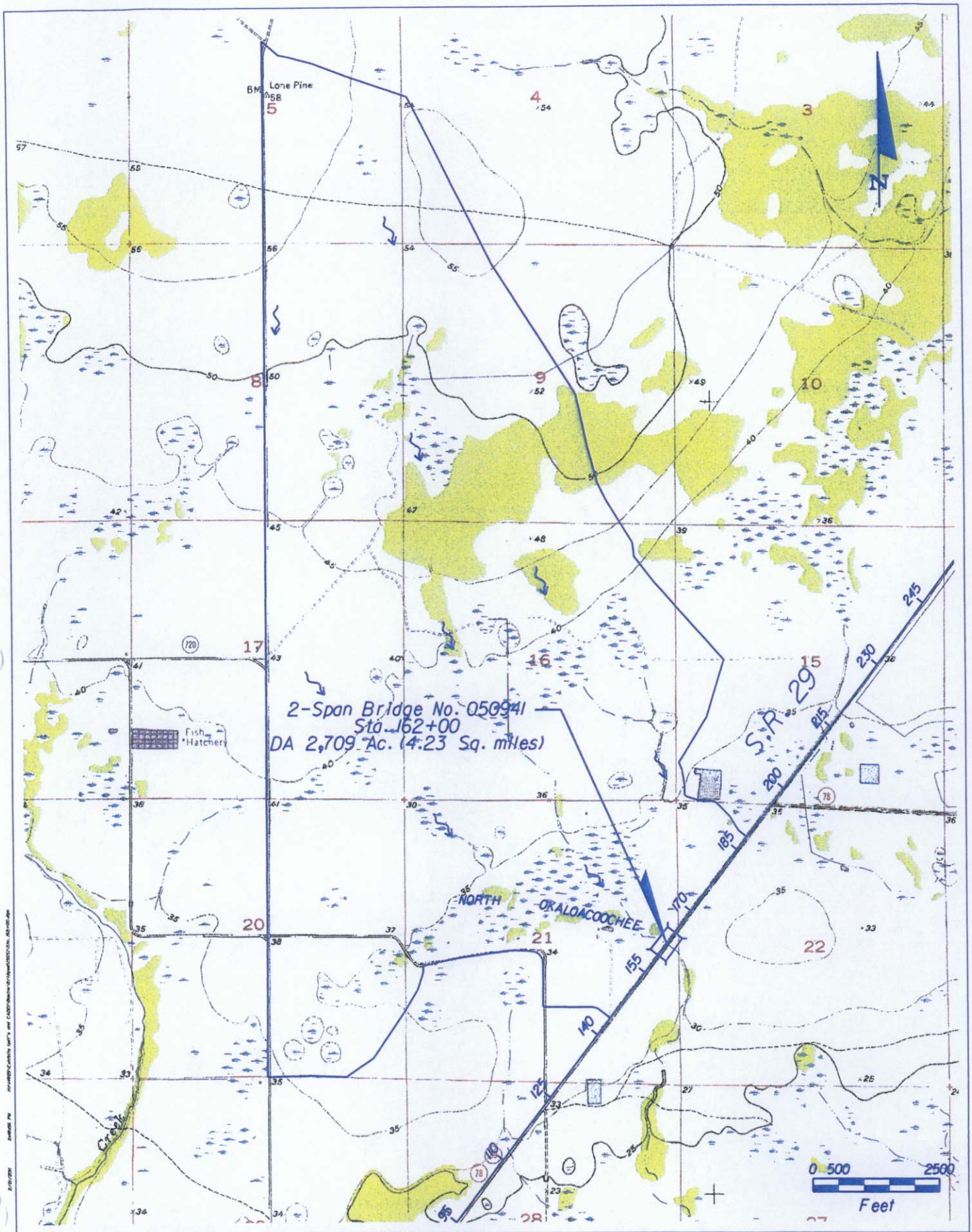
Fuller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864
DEBORAH L. KNIGHTON, P.E. NO.: 43920

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
CROSSDRAIN AT STA. 111+41

SHEET NO.



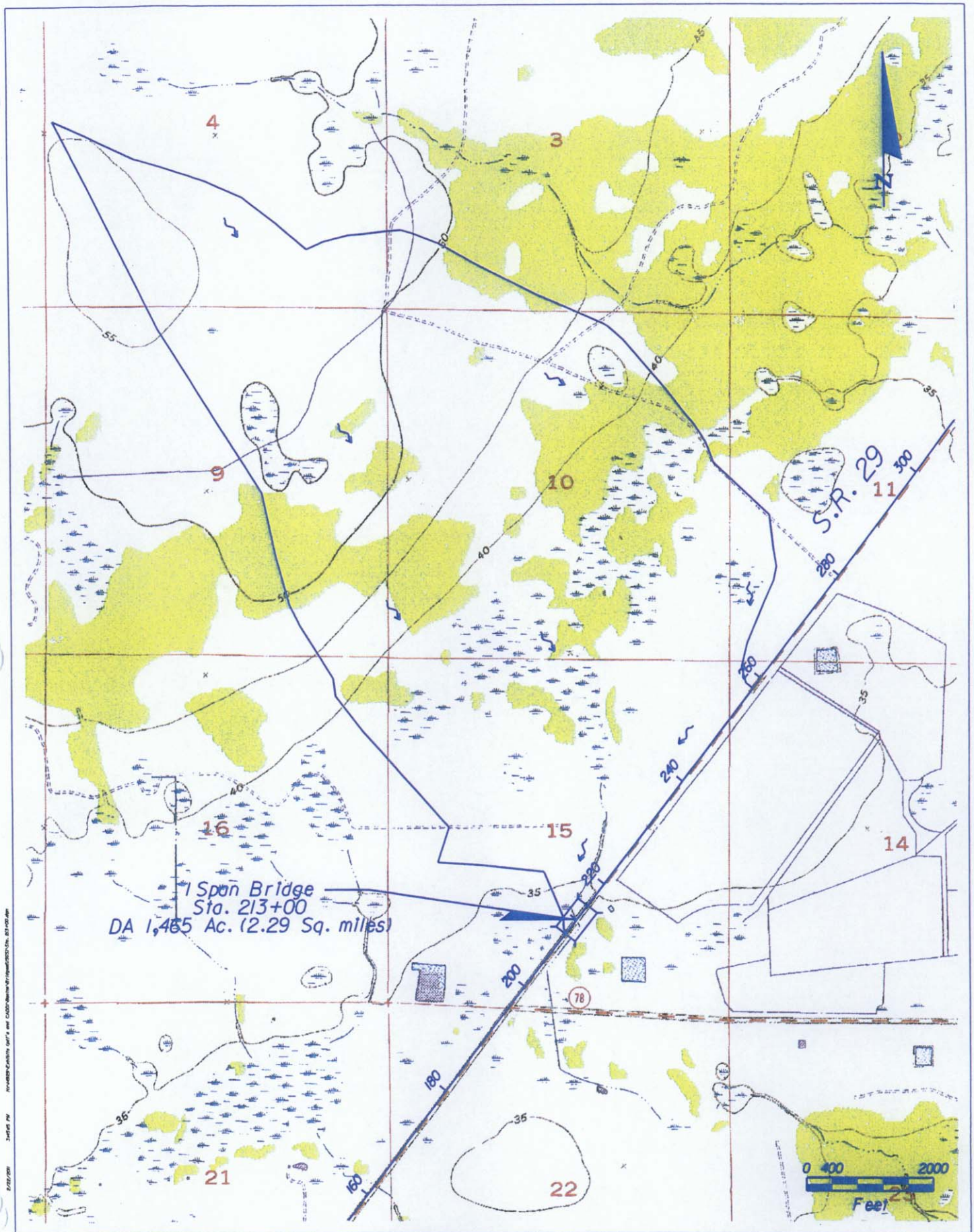
Fuller, Davis & Associates, Inc.
5525 W. CYPRESS ST. – SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864
DEBORAH L. KNIGHTON, P.E. NO.: 43920

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
BRIDGE AT STA. 162+00

SHEET NO.



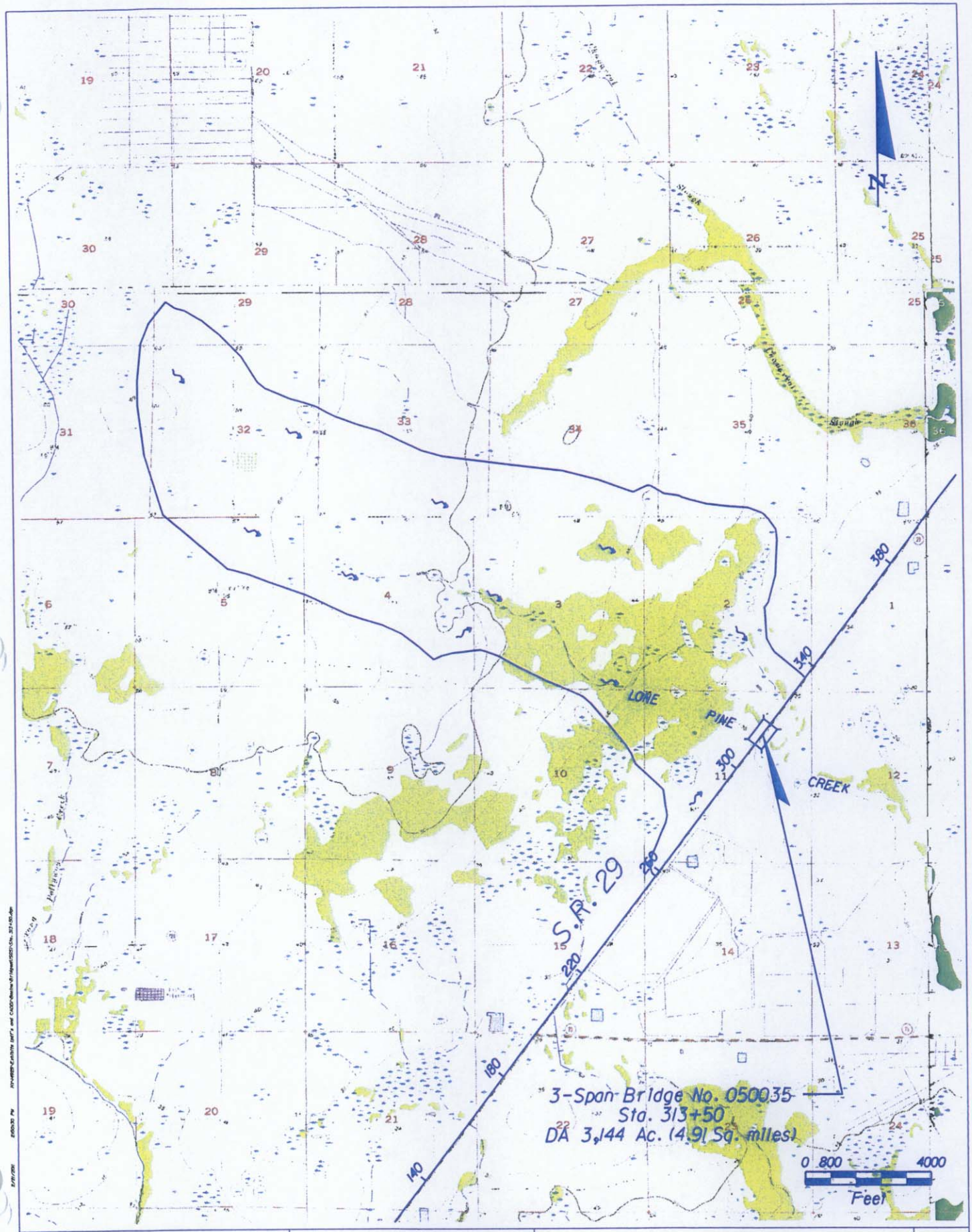
Faller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864
DEBORAH L. KNIGHTON, P.E. NO.: 43920

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
BRIDGE AT STA. 213+00

SHEET NO.



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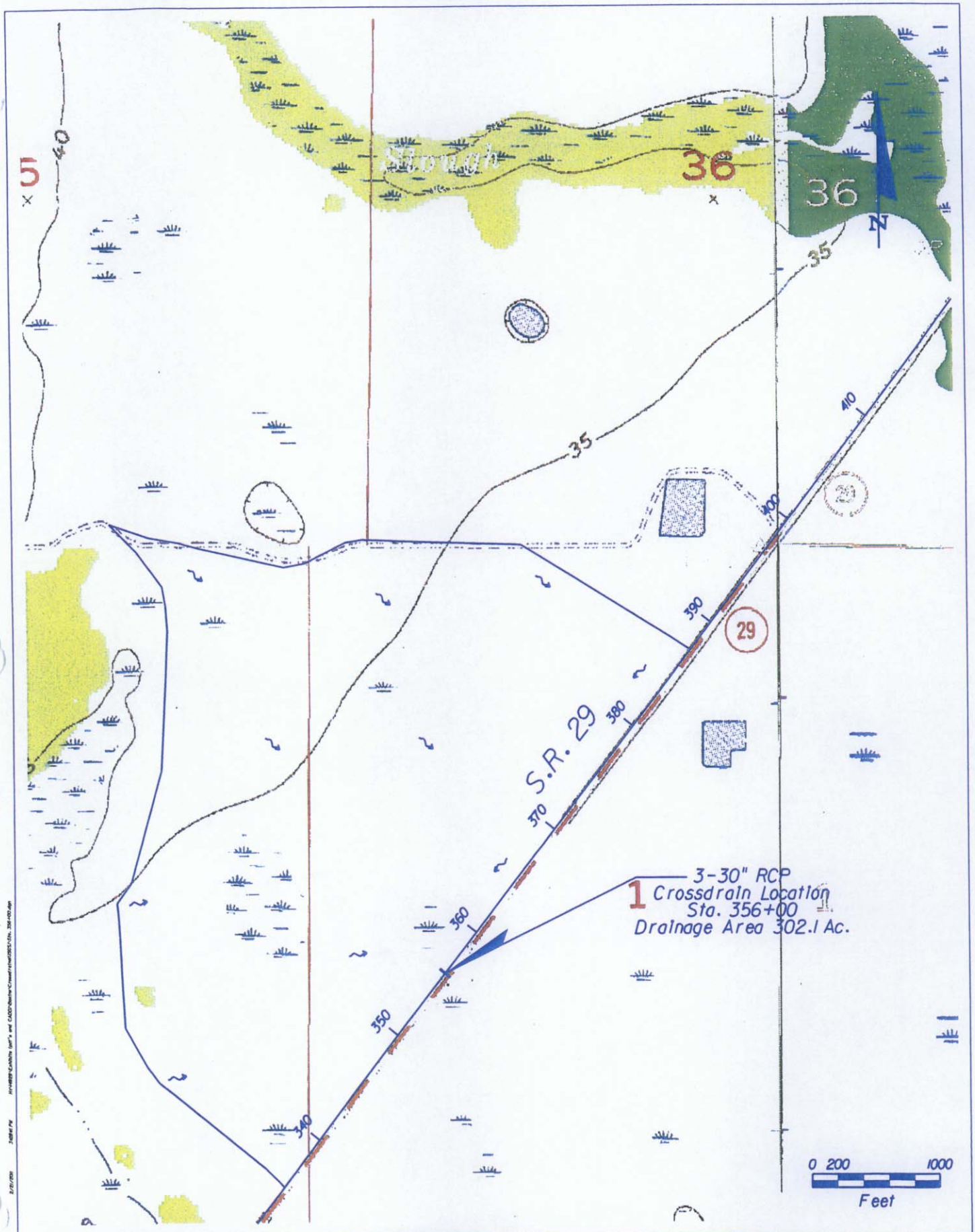
CERTIFICATE OF AUTHORIZATION NO.: 5864
DEBORAH L. KNIGHTON, P.E. NO.: 43920

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
BRIDGE AT STA. 313+50

SHEET NO.



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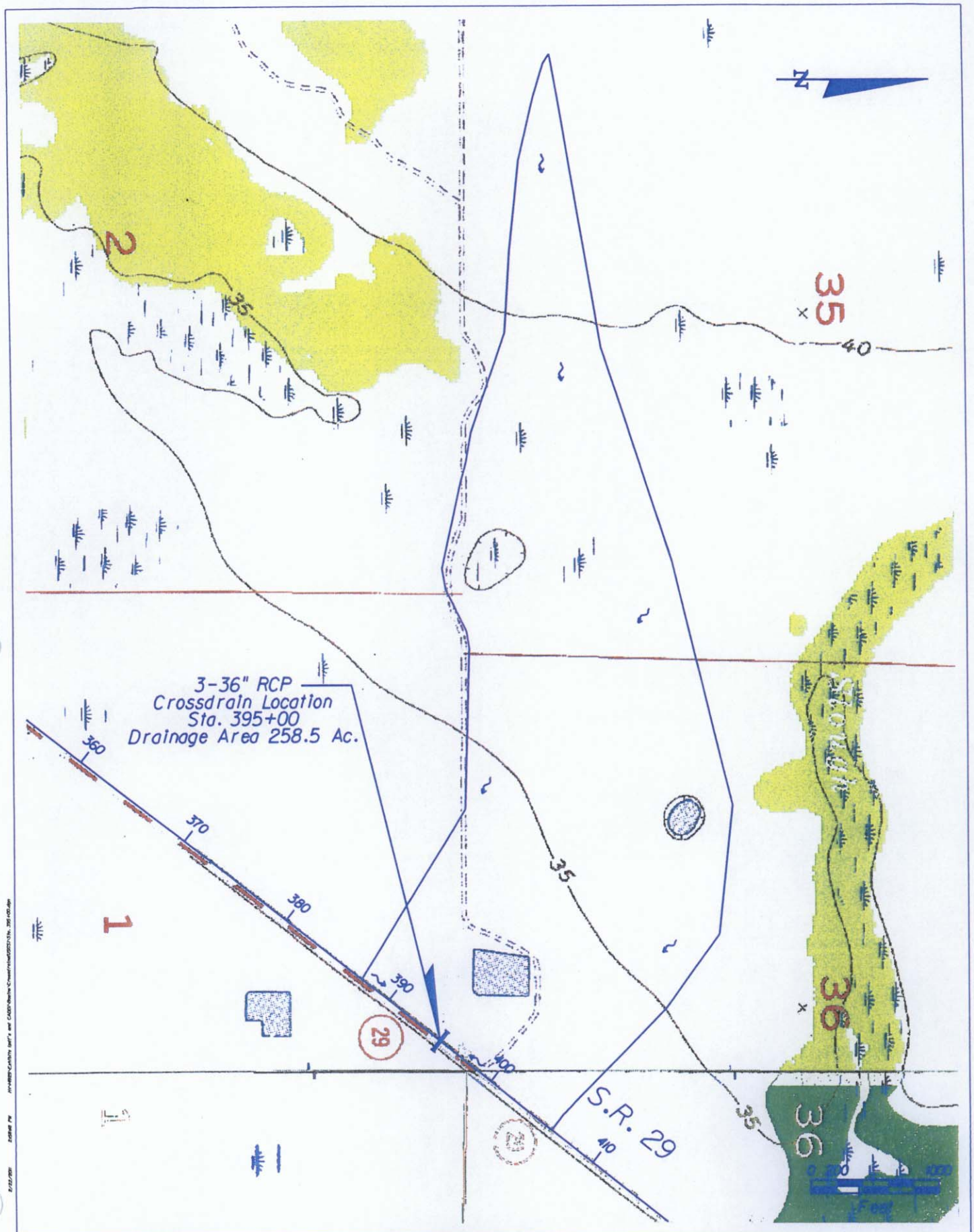
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864
DEBORAH L. KNIGHTON, P.E. NO.: 43920

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
CROSSDRAIN AT STA. 356+00

SHEET NO.



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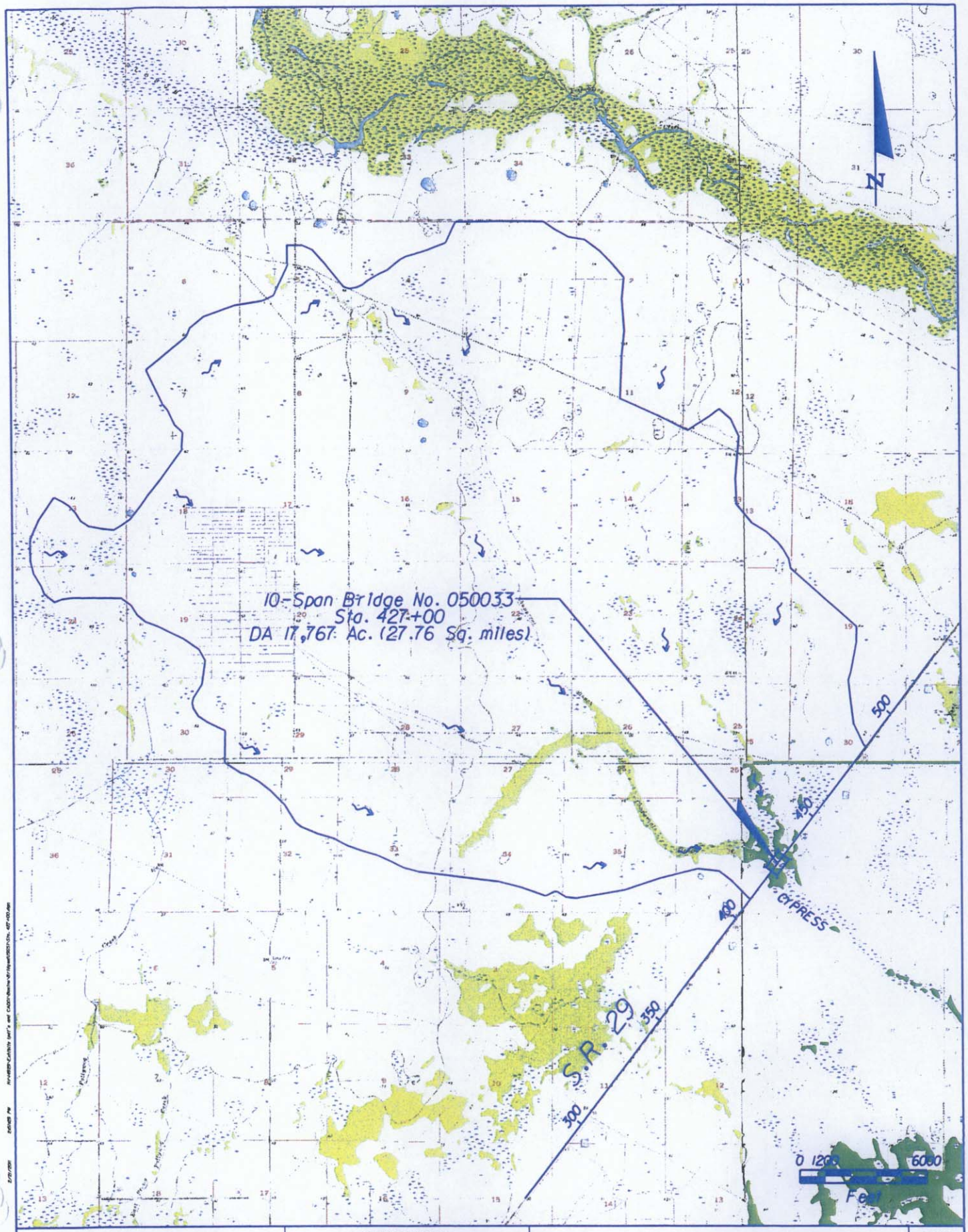
CERTIFICATE OF AUTHORIZATION NO.: 5864
DEBORAH L. KNIGHTON, P.E. NO.: 43920

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

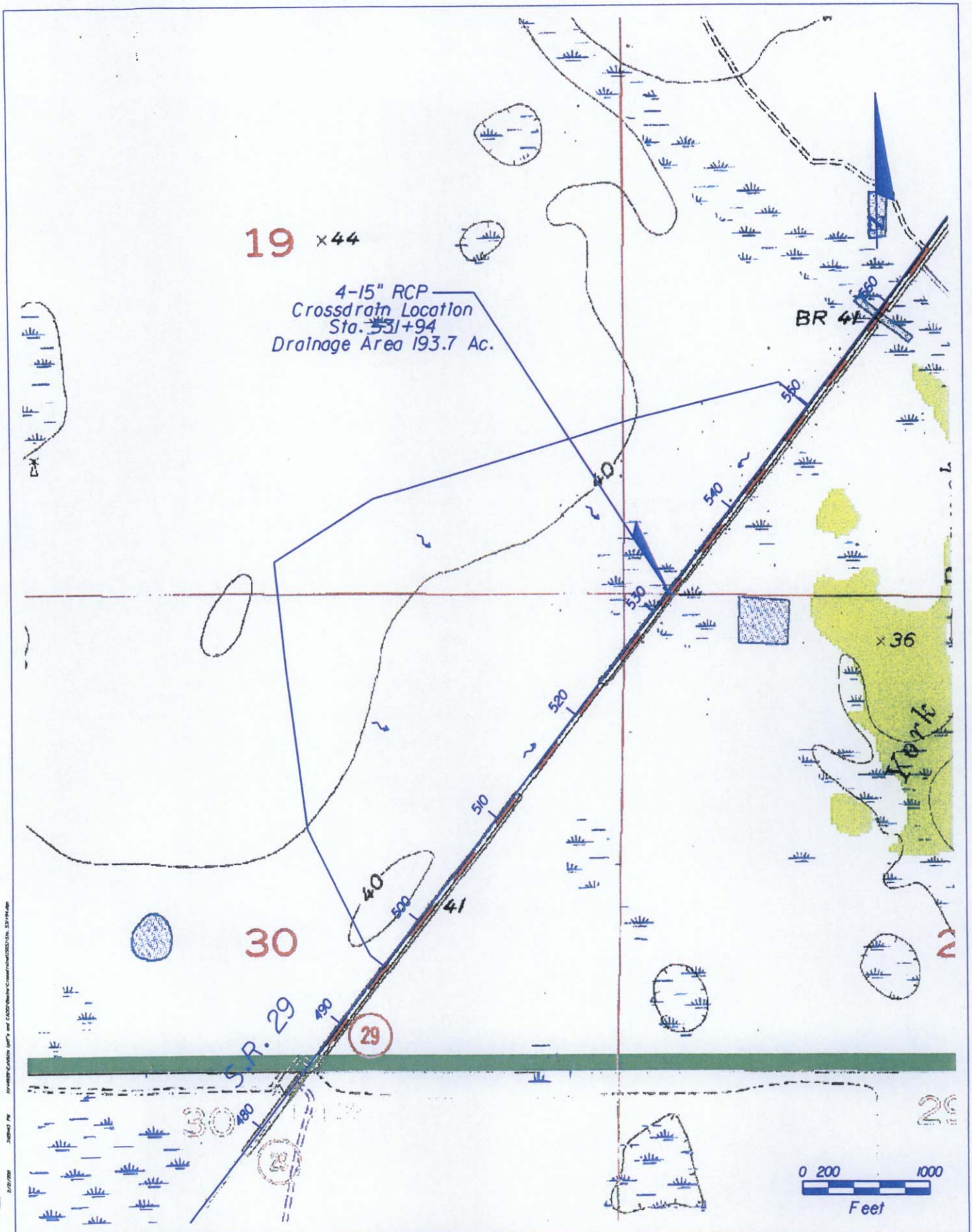
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
CROSSDRAIN AT STA. 395+00

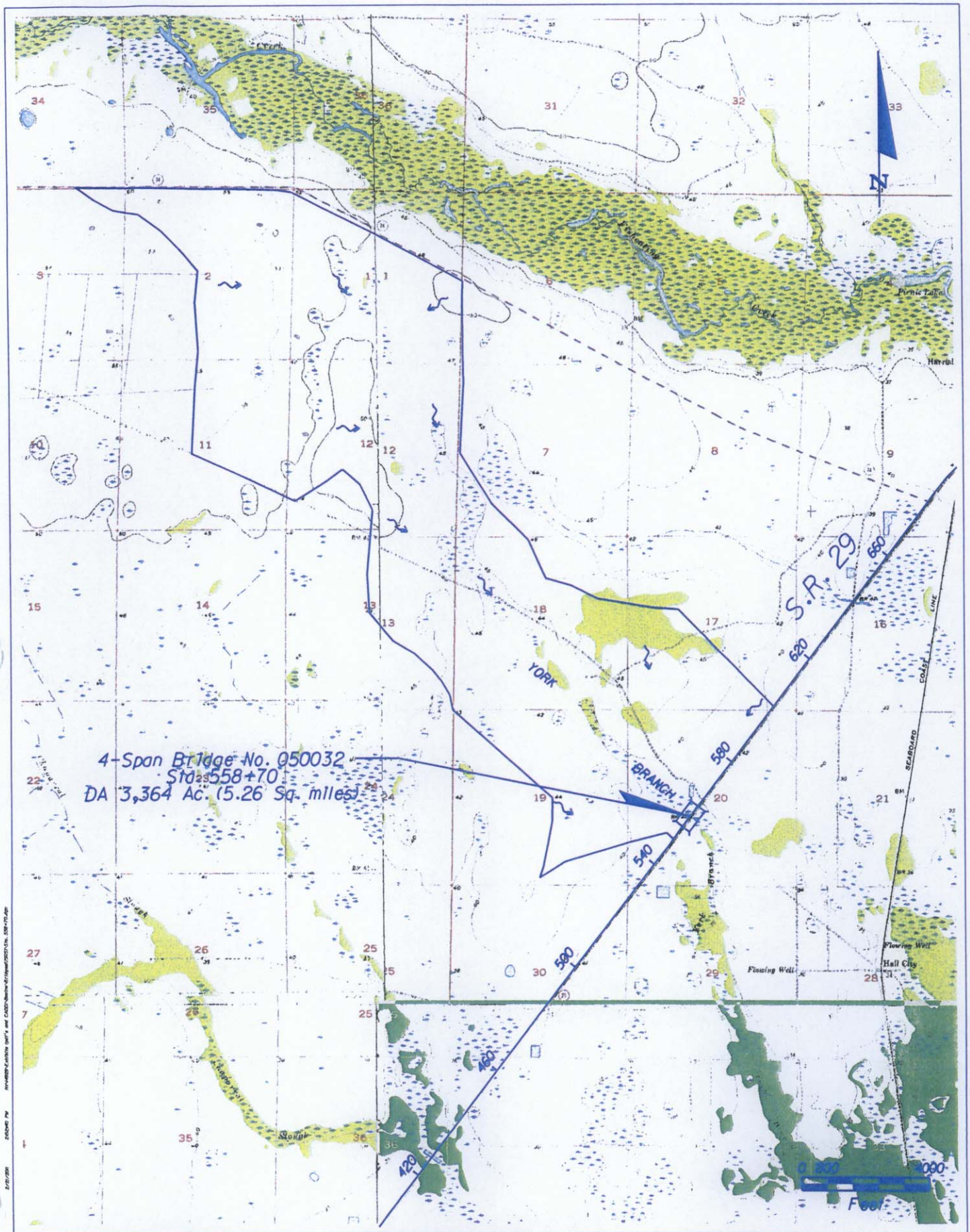
SHEET NO.



Faller, Davis & Associates, Inc. 5525 W. CYPRESS ST. - SUITE 300 TAMPA, FLORIDA 33607-1707 CERTIFICATE OF AUTHORIZATION NO.: 5864 DEBORAH L. KNIGHTON, P.E. NO.: 43920	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			DRAINAGE AREA BRIDGE AT STA. 427+00	SHEET NO.
	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
	SR 29	GLADES	417878-1-22-01		



Faller, Davis & Associates, Inc. 5525 W. CYPRESS ST. - SUITE 300 TAMPA, FLORIDA 33607-1707 CERTIFICATE OF AUTHORIZATION NO.: 5864 DEBORAH L. KNIGHTON, P.E. NO.: 43920	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD NO. / COUNTY / FINANCIAL PROJECT ID SR 29 / GLADES / 417878-1-22-01	DRAINAGE AREA CROSSDRAIN AT STA. 531+94	SHEET NO.



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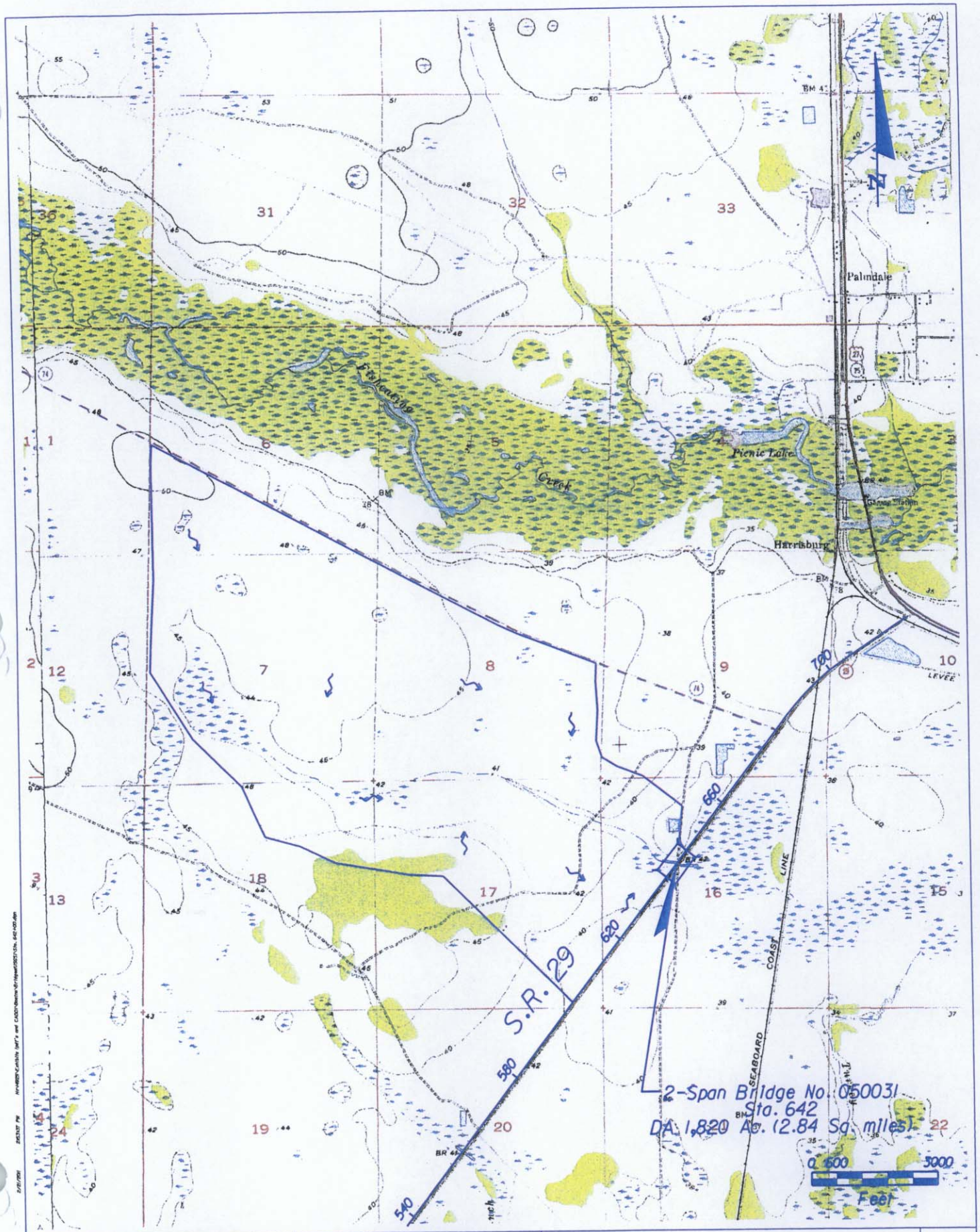
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864
DEBORAH L. KNIGHTON, P.E. NO.: 43920

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
BRIDGE AT STA. 558+70

SHEET NO.



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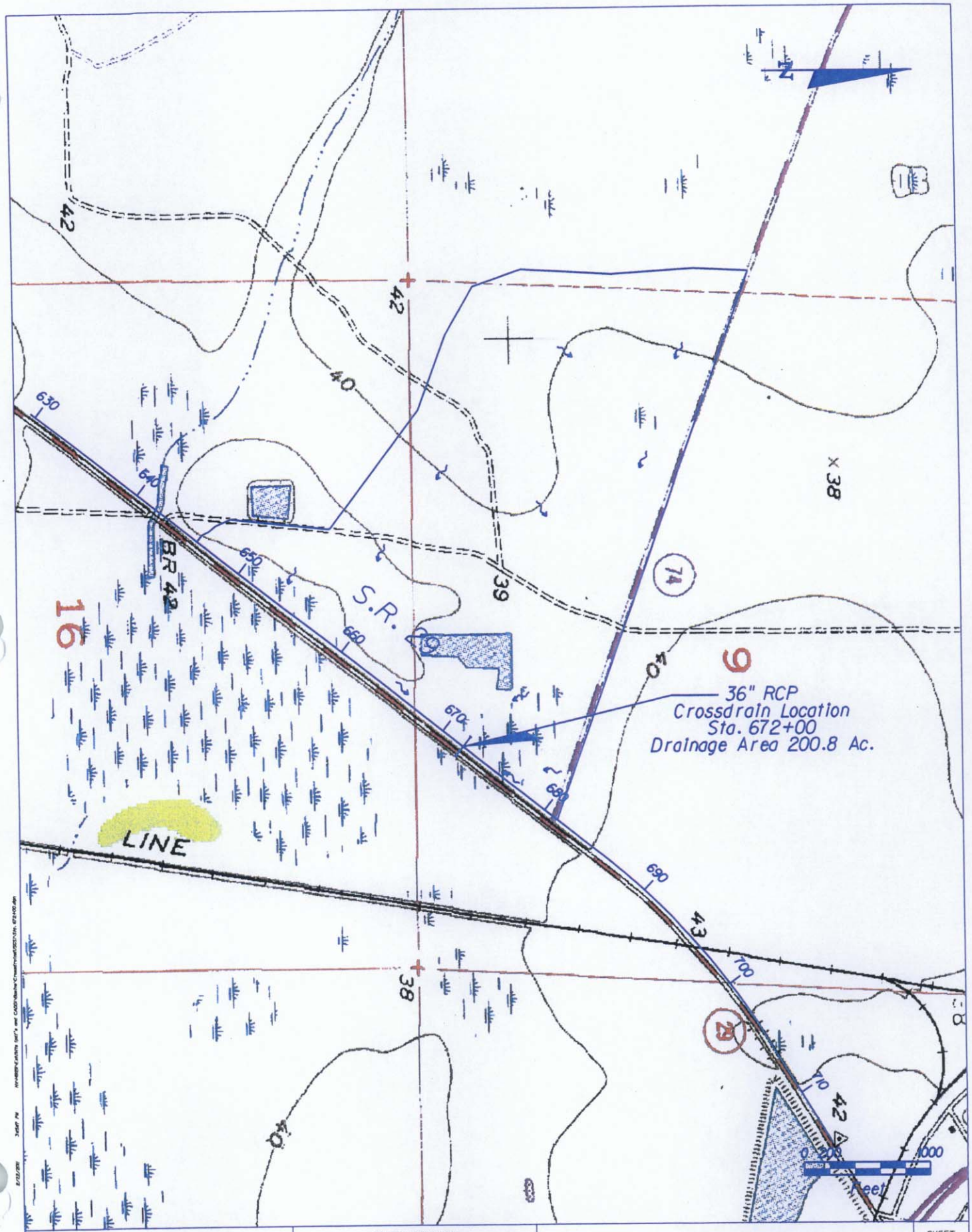
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864
DEBORAH L. KNIGHTON, P.E. NO.: 43920

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
BRIDGE AT STA. 642400

SHEET NO.



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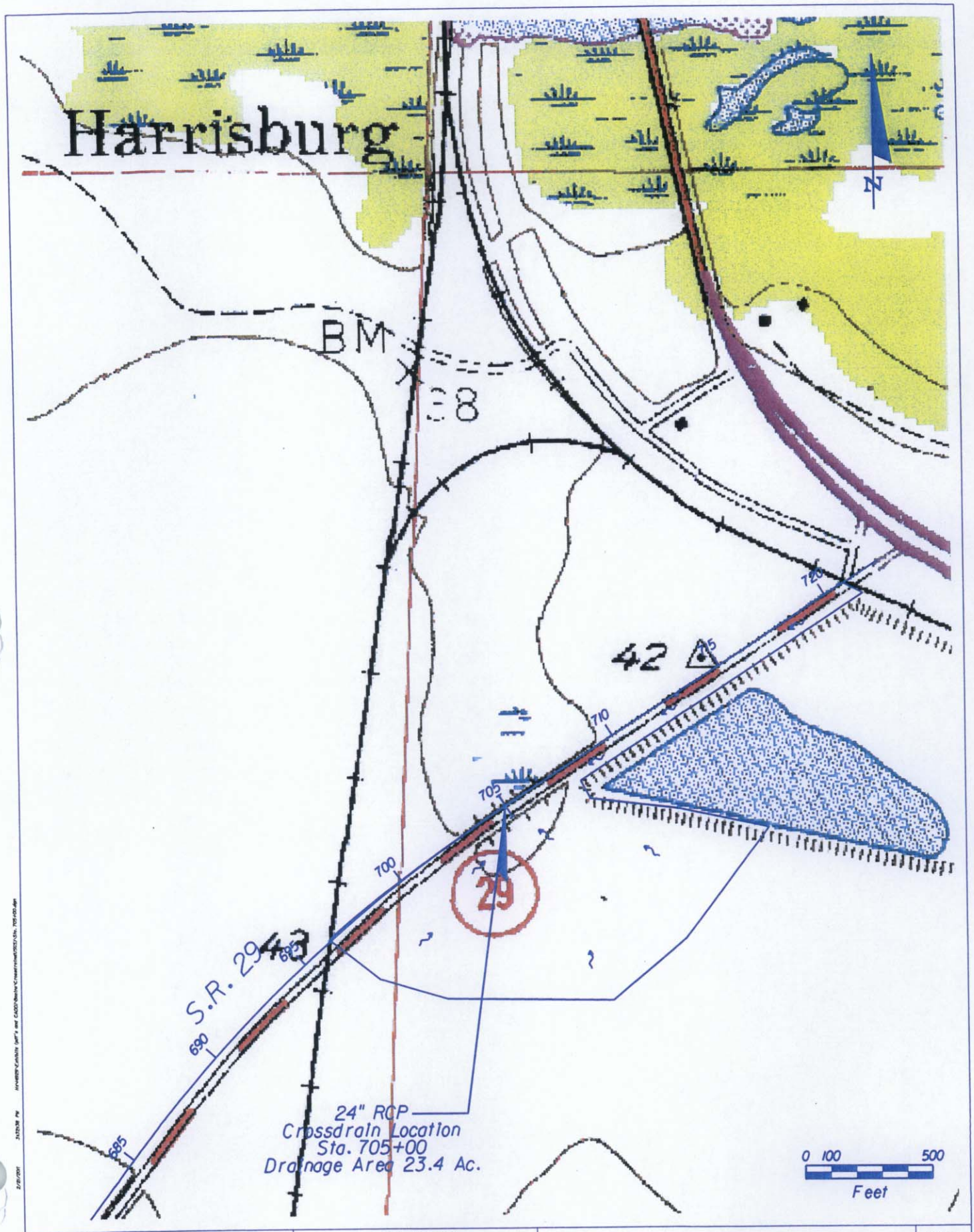
TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864
DEBORAH L. KNIGHTON, P.E. NO.: 43920

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
CROSSDRAIN AT STA. 672+00

SHEET NO.



Fuller, Davis & Associates, Inc.
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TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864
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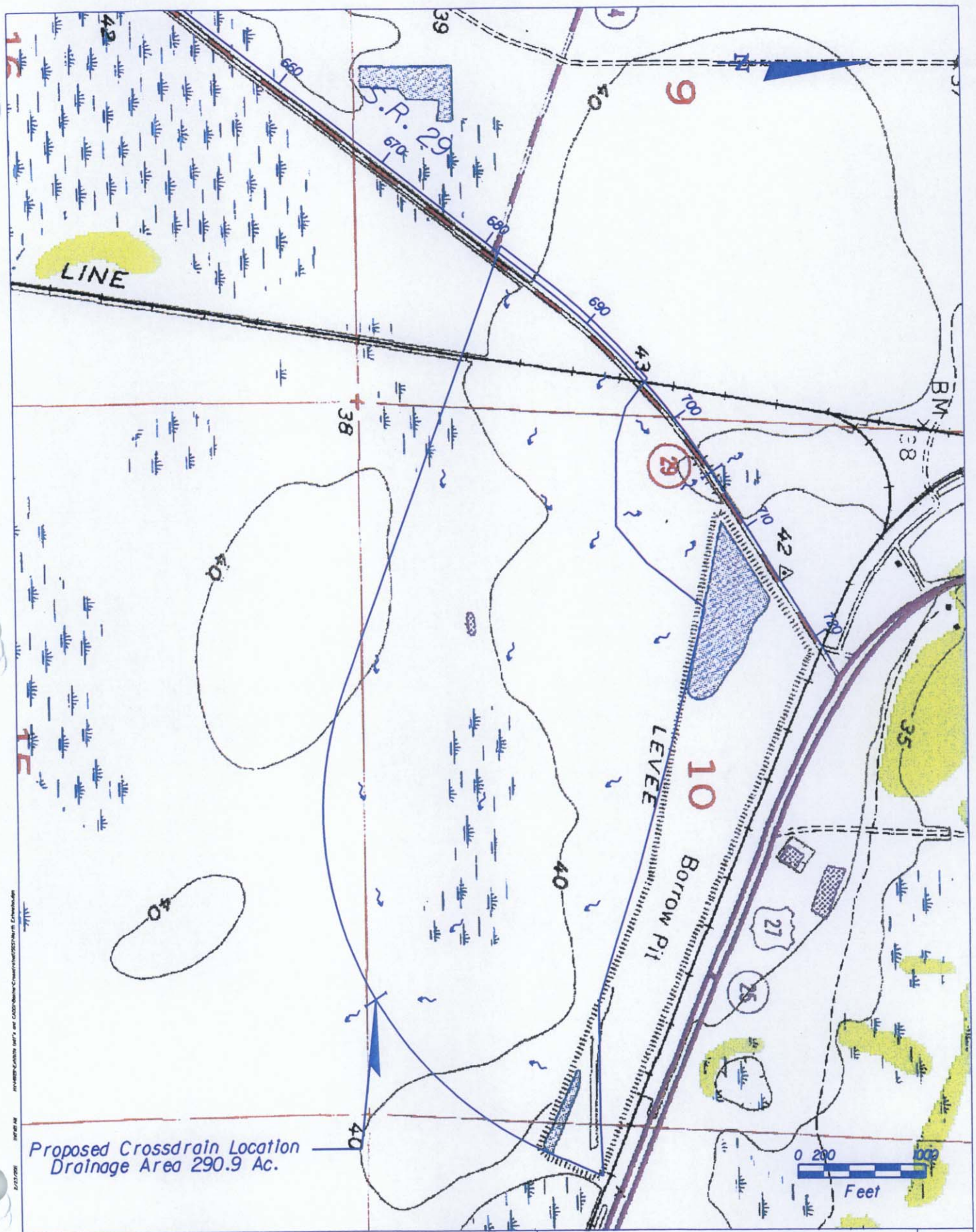
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

DRAINAGE AREA
CROSSDRAIN AT STA. 705+00

SHEET NO.



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TAMPA, FLORIDA 33607-1707
CERTIFICATE OF AUTHORIZATION NO.: 5864
DEBORAH L. KNIGHTON, P.E. NO.: 43920

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	GLADES	417878-1-22-01

PROPOSED DRAINAGE AREA
NORTH EXTENSION

SHEET NO.

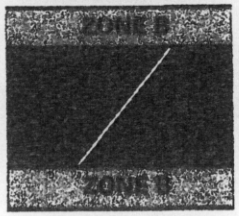
2.4 FIRMettes

KEY TO MAP

500-Year Flood Boundary

100-Year Flood Boundary

Zone Designations*



100-Year Flood Boundary

500-Year Flood Boundary

Base Flood Elevation Line With Elevation In Feet** — 513

Base Flood Elevation in Feet Where Uniform Within Zone** — (EL 987)

Elevation Reference Mark — RM7×

Zone D Boundary

River Mile — •M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.

ZONE B

N

APPROXIMATE SCALE

400 0 400 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

CITY OF
LA BELLE, FLORIDA
HENDRY COUNTY

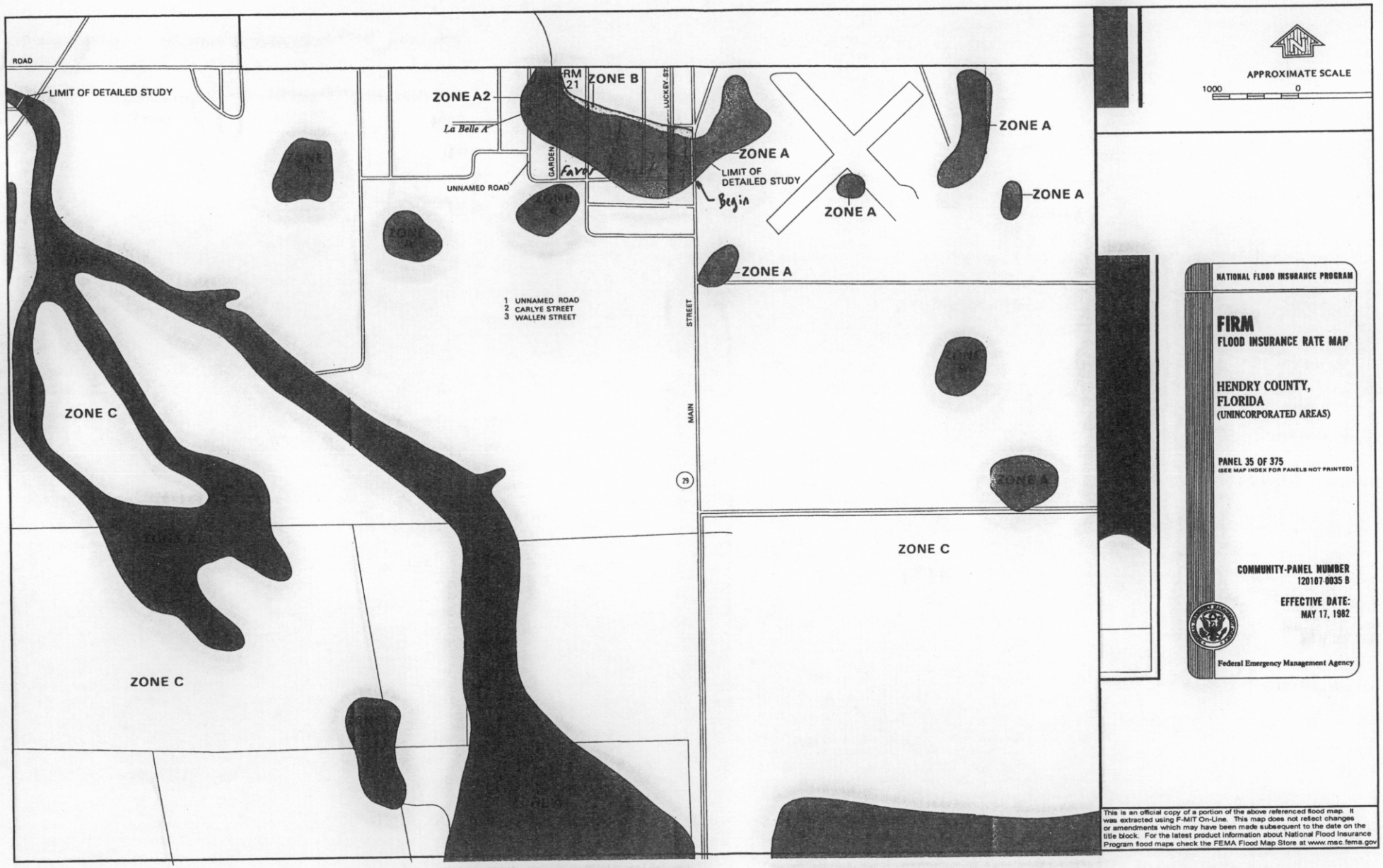
(ONLY PANEL PRINTED)

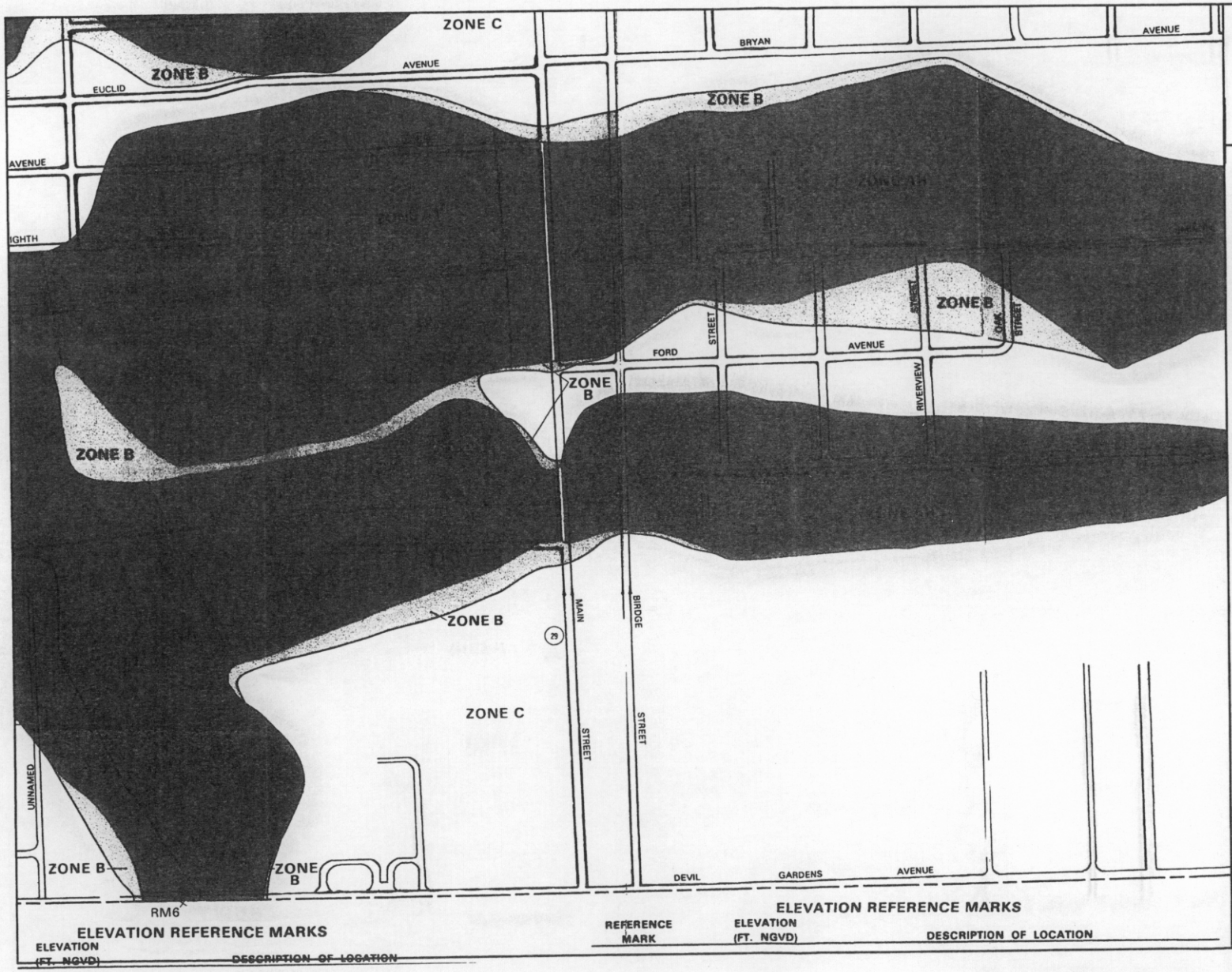
COMMUNITY-PANEL NUMBER
120109 0001 C

MAP REVISED:
MARCH 18, 1987

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov


ROAD
LIMIT OF DETAILED STUDY
ZONE A2
La Belle A
UNNAMED ROAD
RM 21
ZONE B
LUCKEY ST.
GARDEN
Farm
ZONE A
LIMIT OF DETAILED STUDY
Begin
ZONE A
ZONE A
ZONE A
ZONE A
1 UNNAMED ROAD
2 CARLYE STREET
3 WALLEN STREET
STREET
MAIN
29
ZONE C
ZONE C
ZONE C
APPROXIMATE SCALE
1000
0
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
HENDRY COUNTY, FLORIDA
(UNINCORPORATED AREAS)
PANEL 35 OF 375
(SEE MAP INDEX FOR PANELS NOT PRINTED)
COMMUNITY-PANEL NUMBER
120107 0035 B
EFFECTIVE DATE:
MAY 17, 1982
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



APPROXIMATE SCALE
400 0 400 FE

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
LA BELLE, FLORIDA
HENDRY COUNTY

(ONLY PANEL PRINTED)

COMMUNITY-PANEL NUMBER
120109 0001 C

MAP REVISED:
MARCH 18, 1987

Federal Emergency Management Agency

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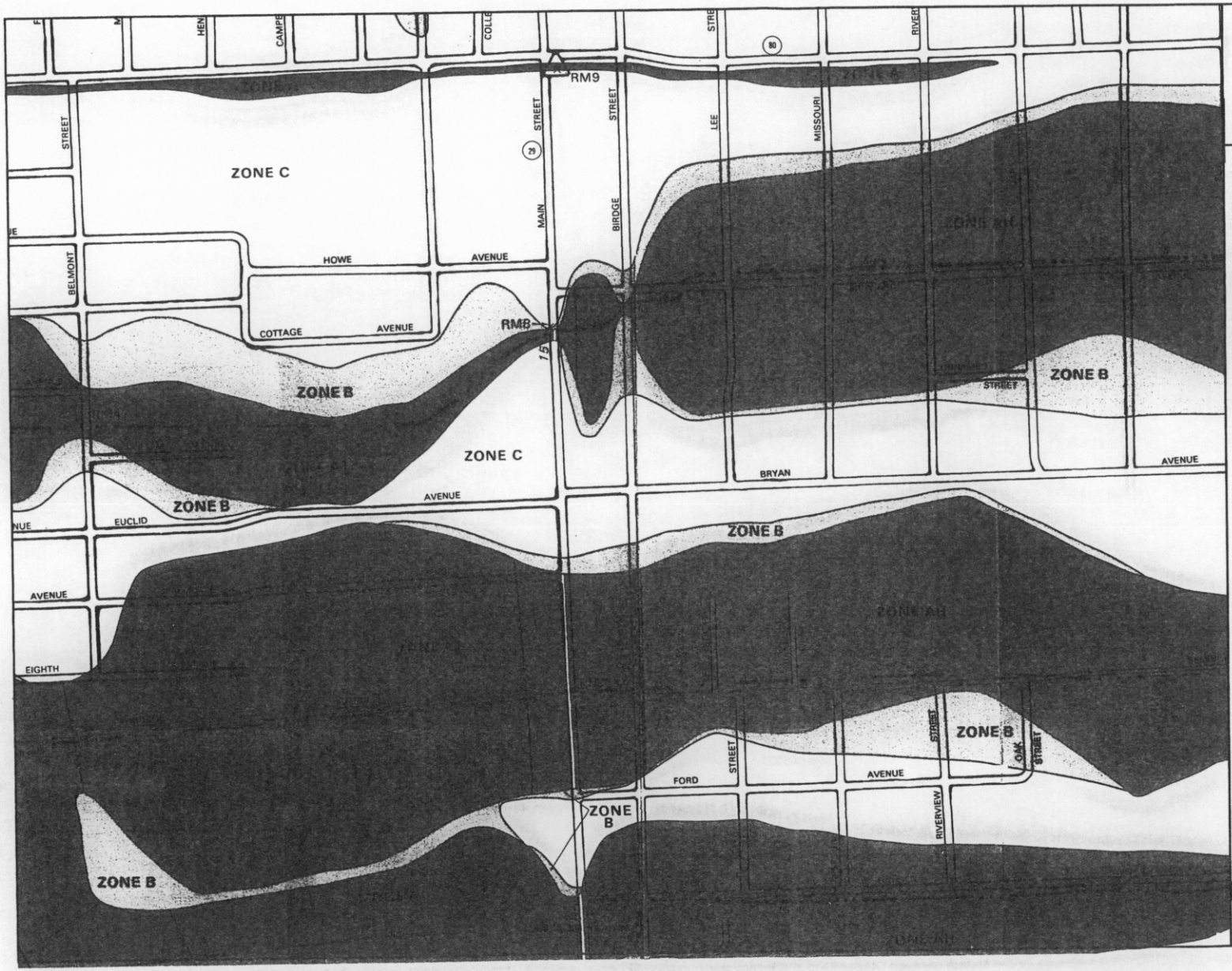
ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION
RM6		

ELEVATION REFERENCE MARKS

ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION



APPROXIMATE SCALE

400 0 400 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

CITY OF

LA BELLE, FLORIDA

HENDRY COUNTY

(ONLY PANEL PRINTED)

COMMUNITY-PANEL NUMBER

120109 0001 C

MAP REVISED:

MARCH 18, 1987

Federal Emergency Management Agency

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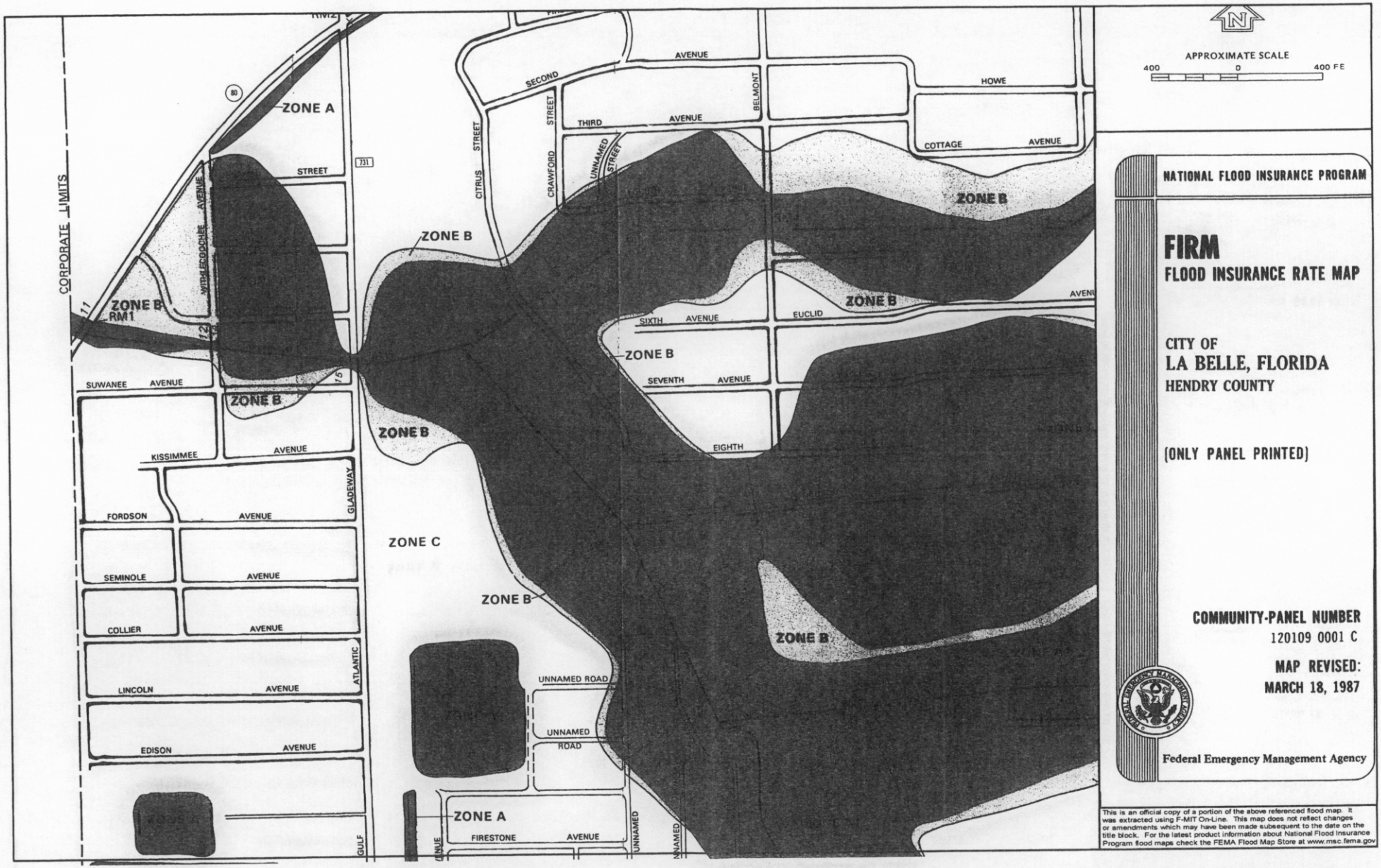
APPROXIMATE SCALE
400 0 400 FE
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
CITY OF
LA BELLE, FLORIDA
HENDRY COUNTY
(ONLY PANEL PRINTED)
COMMUNITY-PANEL NUMBER
120109 0001 C
MAP REVISED:
MARCH 18, 1987
Federal Emergency Management Agency
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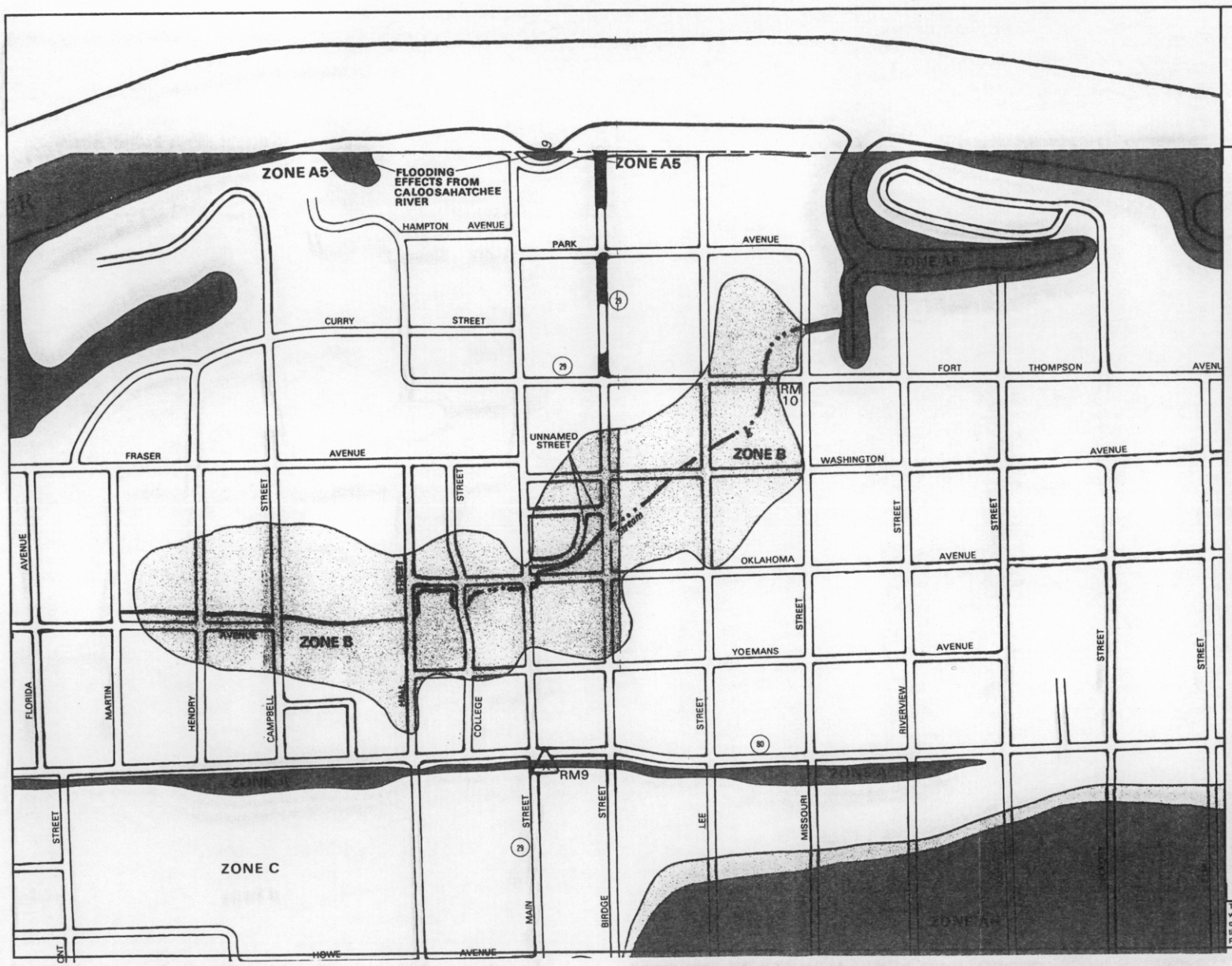
ZONE A
ZONE B
ZONE B RM1
ZONE C
CORPORATE LIMITS
STREET
AVENUE
SECOND
THIRD
HOWE
COTTAGE
BELMONT
CITRUS
CRAWFORD
UNNAMED STREET
SIXTH
EUCLID
SEVENTH
EIGHTH
SUWANEE
KISSIMMEE
FORDSON
SEMINOLE
COLLIER
LINCOLN
EDISON
GLADEWAY
ATLANTIC
GULF
UNNAMED ROAD
UNNAMED
ROAD
FIRESTONE
731
80
75



APPROXIMATE SCALE
400 0 400 FE

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
LA BELLE, FLORIDA
HENDRY COUNTY

(ONLY PANEL PRINTED)

COMMUNITY-PANEL NUMBER
120109 0001 C

MAP REVISED:
MARCH 18, 1987

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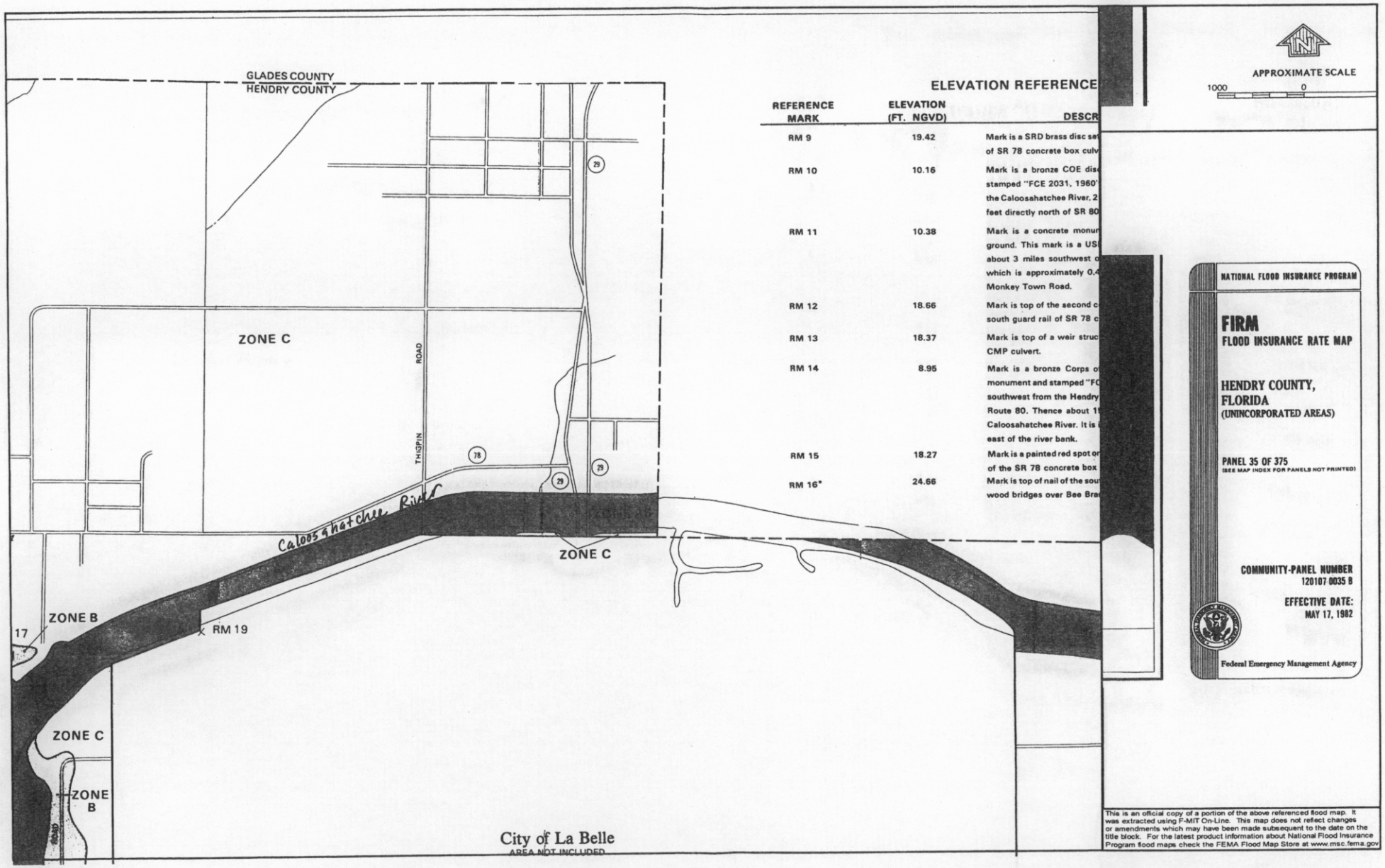

ELEVATION REFERENCE

REFERENCE MARK	ELEVATION (FT. NGVD)	DESCR
RM 9	19.42	Mark is a SRD brass disc se of SR 78 concrete box culv
RM 10	10.16	Mark is a bronze COE dis stamped "FCE 2031, 1960 the Caloosahatchee River, 2 feet directly north of SR 80
RM 11	10.38	Mark is a concrete monur ground. This mark is a US about 3 miles southwest o which is approximately 0.4 Monkey Town Road.
RM 12	18.66	Mark is top of the second c south guard rail of SR 78 c
RM 13	18.37	Mark is top of a weir struc CMP culvert.
RM 14	8.95	Mark is a bronze Corps o monument and stamped "FC southwest from the Hendry Route 80. Thence about 1 Caloosahatchee River. It is east of the river bank.
RM 15	18.27	Mark is a painted red spot or of the SR 78 concrete box
RM 16*	24.66	Mark is top of nail of the sou wood bridges over Bee Bra

APPROXIMATE SCALE
1000 0

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

HENDRY COUNTY, FLORIDA
(UNINCORPORATED AREAS)

PANEL 35 OF 375
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
120107 0035 B

EFFECTIVE DATE:
MAY 17, 1982

Federal Emergency Management Agency

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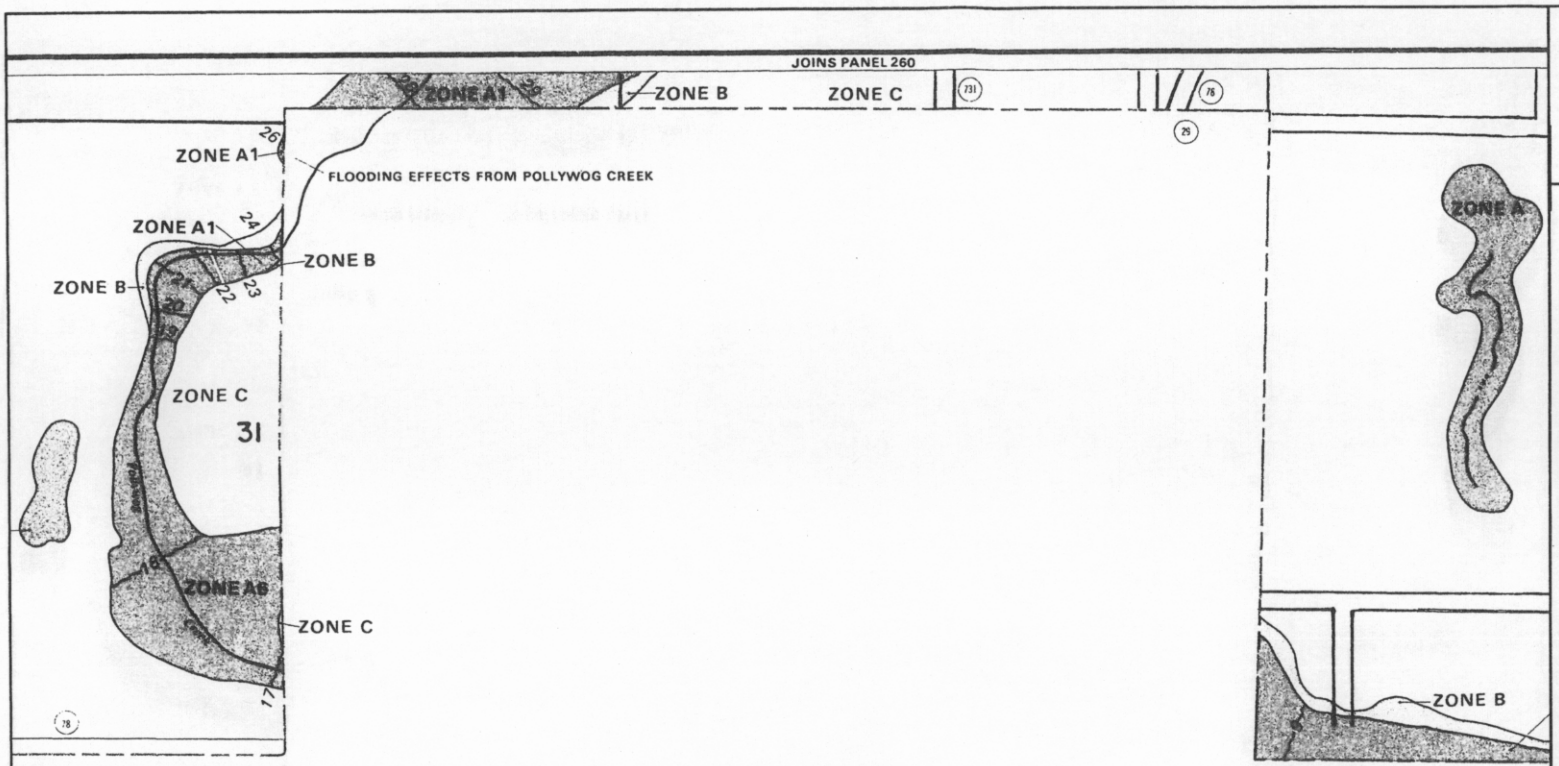

APPROXIMATE SCALE

1000 0 1000 FEE

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

GLADES COUNTY, FLORIDA

(UNINCORPORATED AREAS)

PANEL 270 OF 350

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
120095 0270 B

EFFECTIVE DATE:
MAY 17, 1982

Federal Emergency Management Agency

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION
RM 15	10.90	Mark is a Corps of Engineers bronze disc set in an 8 inch round concrete monument flush with the ground. The disc is stamped "37C-R, 1972". The mark is located 2.5 miles east of LaBelle, Florida on the north side of the Caloosahatchee River (C-43). It can be reached via a dirt road from State Road 29 beginning at a point 1,000 feet north of the State Road 29 bridge over the Caloosahatchee River. The dirt road leads east for 2.0 miles to a north-south fence line. The mark is located an additional 0.5 mile east and 45 feet north of the toe of a spoil area.
REFERENCE MARKS ARE LOCATED ON PANEL 120095 0310 B		
RM 38	34.52	Mark is a Corps of Engineers disc set in concrete flush with ground. The disc is stamped "FCE 2641, 1964". The mark is located in the vicinity of Moore Haven at the Moore Launch Lock Site on the east side of the lock on top of the levee 17 feet east-northeast from reservation fence and 23 feet northeast of flagpole on east side of lock chamber.
RM 39	15.11	Mark is a Corps of Engineers disc set in concrete flush with the le-

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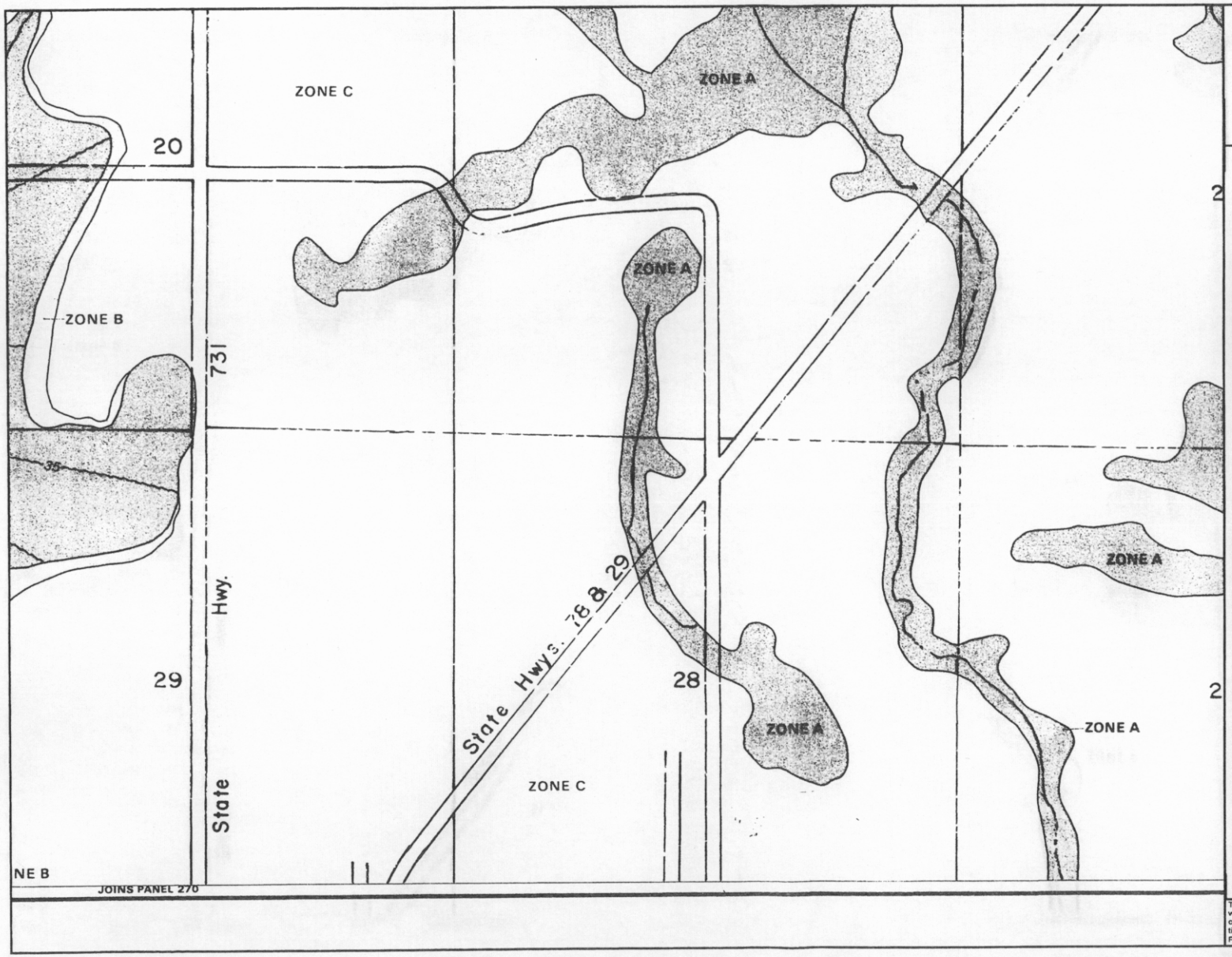

N

APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

GLADES COUNTY, FLORIDA (UNINCORPORATED AREAS)

PANEL 260 OF 350

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
120095 0260 B

EFFECTIVE DATE:
MAY 17, 1982

Federal Emergency Management Agency

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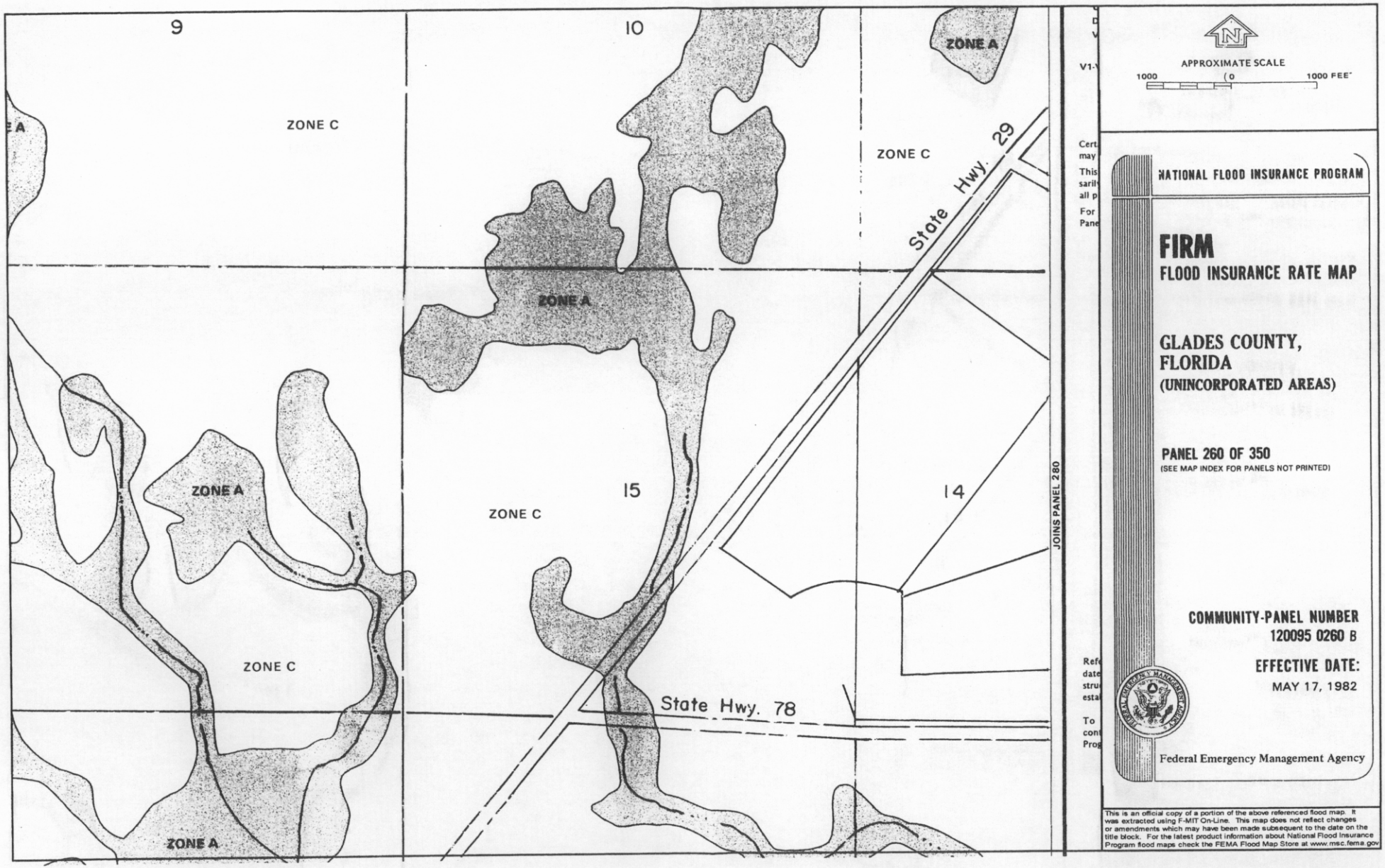

APPROXIMATE SCALE
1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

GLADES COUNTY, FLORIDA
(UNINCORPORATED AREAS)

PANEL 260 OF 350
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
120095 0260 B

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Federal Emergency Management Agency

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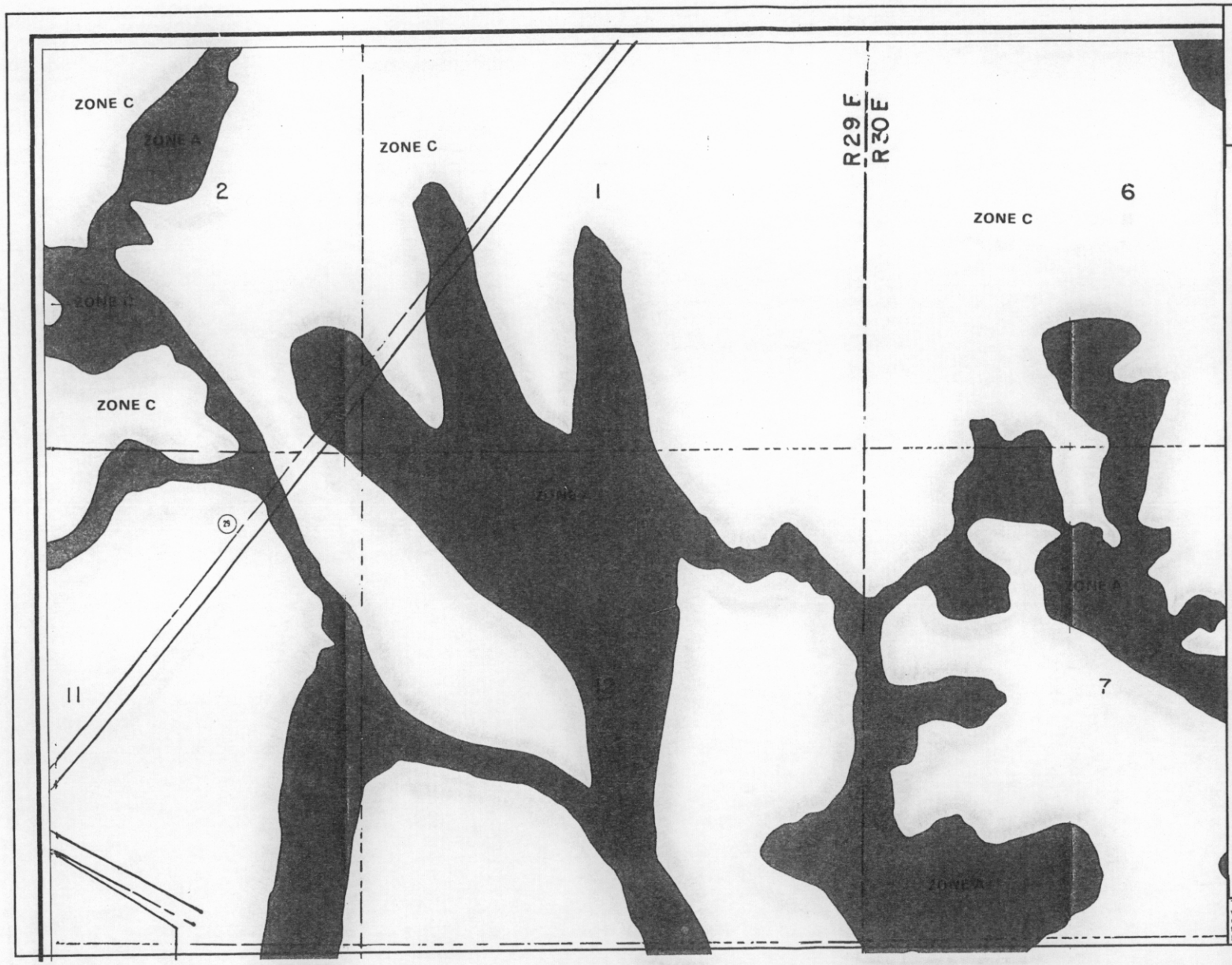


APPROXIMATE SCALE
1000 0 1000 FEI

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

GLADES COUNTY, FLORIDA
(UNINCORPORATED AREAS)

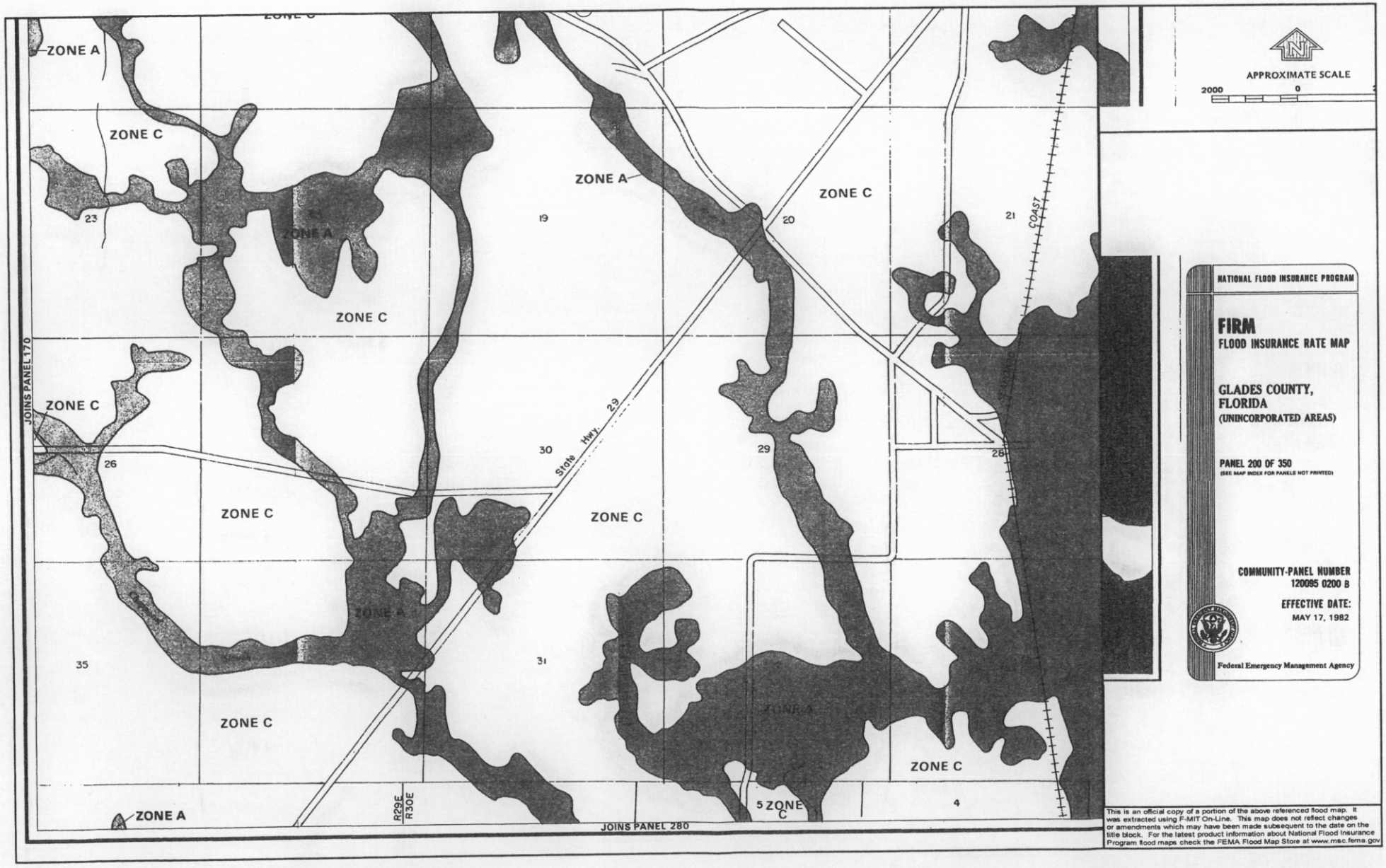
PANEL 280 OF 350
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
120095 0280 B

EFFECTIVE DATE:
MAY 17, 1982

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov


ZONE A
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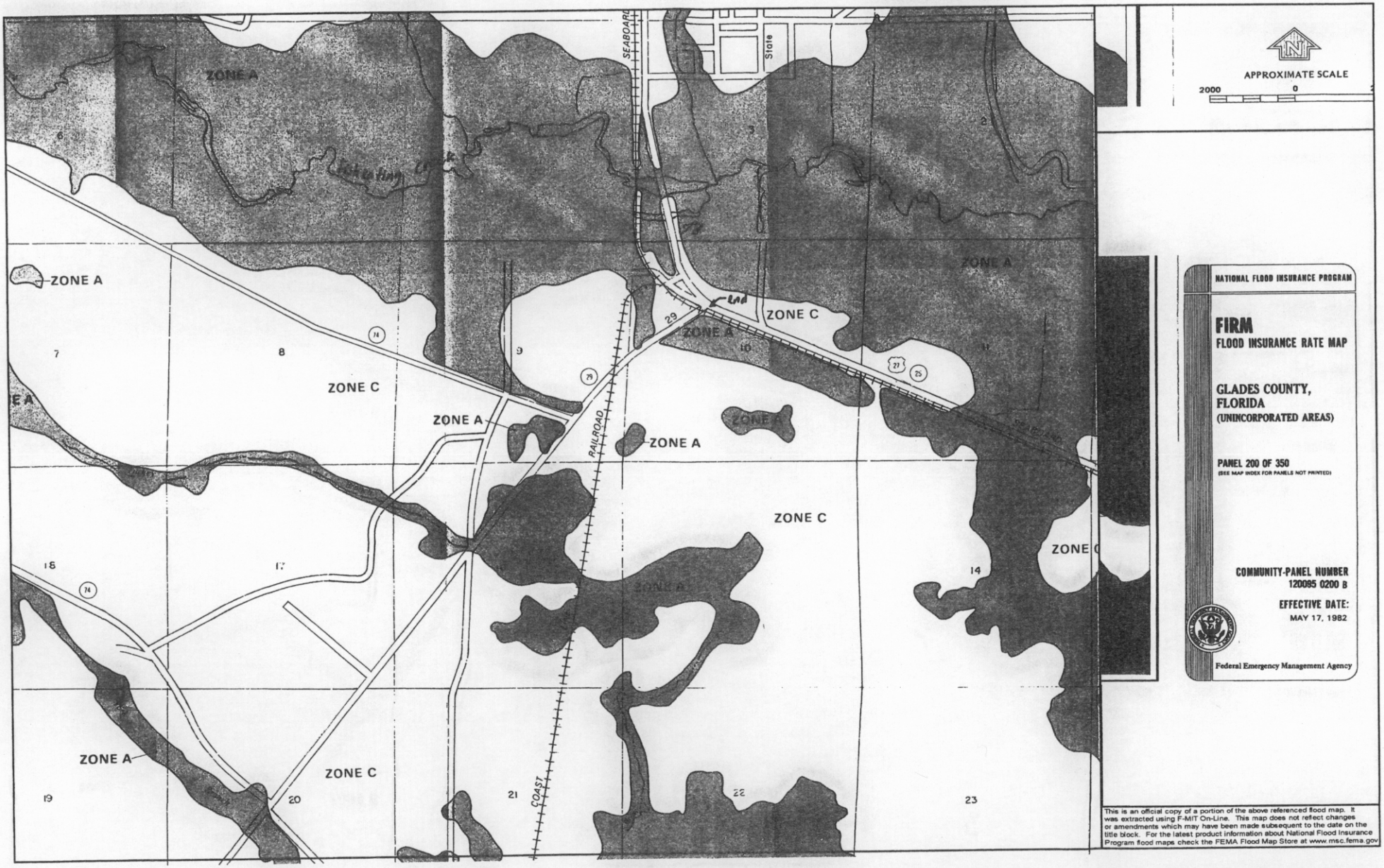
ZONE A
JOINS PANEL 170
State Hwy. 29
COAST
23
19
20
21
26
30
29
28
35
31
5
4
R29E
R30E
JOINS PANEL 280
APPROXIMATE SCALE
2000
0
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
GLADES COUNTY, FLORIDA
(UNINCORPORATED AREAS)
PANEL 200 OF 350
(SEE MAP INDEX FOR PANELS NOT PRINTED)
COMMUNITY-PANEL NUMBER
120095 0200 B
EFFECTIVE DATE:
MAY 17, 1982
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov


ZONE A
ZONE C
SEABOARD
State
RAILROAD
COAST
APPROXIMATE SCALE
2000
0
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
GLADES COUNTY, FLORIDA
(UNINCORPORATED AREAS)
PANEL 200 OF 350
(SEE MAP INDEX FOR PANELS NOT PRINTED)
COMMUNITY-PANEL NUMBER
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2.5 Impaired Water Body Maps

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

Fuller, Davis & Associates, Inc.
5525 W. CYPRESS ST. - SUITE 300
TAMPA, FLORIDA 33607-1708
CERTIFICATE OF AUTHORIZATION NO.: 5864
DEBORAH L. KNIGHTON, P.E. NO.: 43920

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	HENDRY/GLADES	417878-1-22-01

#USER# #DATE# #TIME# #FILE#

BASIN MAP NORTH OF CALOOSAHATCHEE RIVER

SHEET NO.

Appendix 3.0

Soils and High Water Information

Appendix 3.0

Soils and High Water Information

USDA United States Department of Agriculture Natural Resources Conservation Service

Web Soil Survey

Contact Us | Download Soils Data | Archived Soil Surveys | Soil Survey Status | Glossary | Preferences | Logout | Help

A | A | A

Area of Interest (AOI) | Soil Map | Soil Data Explorer | Shopping Cart (Free)

View Soil Information By Use: All Uses

Printable Version | Add to Shopping Cart

Intro to Soils | Suitabilities and Limitations for Use | Soil Properties and Qualities | Ecological Site Assessment | Soil Reports

Search

Properties and Qualities Ratings

Open All | Close All

Soil Chemical Properties

Soil Erosion Factors

Soil Physical Properties

Soil Qualities and Features

- AASHTO Group Classification (Surface)
- Depth to a Selected Soil Restrictive Layer
- Depth to Any Soil Restrictive Layer
- Drainage Class
- Frost Action
- Frost-Free Days
- Hydrologic Soil Group

View Description | View Rating

View Options

Map

Table

Description of Rating

Rating Options

Detailed Description

Advanced Options

Aggregation Method: Dominant Condition

Component Percent Cutoff

Tie-break Rule: Lower / Higher

View Description | View Rating

- Map Unit Name
- Parent Material Name
- Representative Slope
- Unified Soil Classification (Surface)

Water Features

Map — Hydrologic Soil Group

Tables — Hydrologic Soil Group — Summary By Map Unit

Summary by Map Unit — Glades County, Florida

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
5	Smyrna fine sand	A/D	96.8	1.1%
6	Malabar fine sand	A/D	618.9	7.1%
7	Pople fine sand	C/D	45.2	0.5%
8	Gator muck, depressional	C/D	111.7	1.3%
9	Sanibel muck, depressional	A/D	16.7	0.2%
10	Felda fine sand	A/D	51.7	0.6%
12	Chobee loamy fine sand, depressional	C/D	6.4	0.1%
14	Basinger fine sand	A/D	422.0	4.8%
15	Pineda fine sand	C/D	156.2	1.8%
16	Floridana fine sand, depressional	C/D	236.9	2.7%
17	Okeelanta muck, depressional	A/D	163.4	1.9%
20	EauGallie fine sand	B/D	212.6	2.4%
22	Astor fine sand, depressional	A/D	20.1	0.2%
23	Oldsmar sand	C/D	730.0	8.3%
26	Immokalee sand	B/D	1,819.5	20.8%
28	Pomello fine sand	A	207.0	2.4%
29	Myakka fine sand	B/D	1,056.4	12.1%
32	Floridana, Astor, and Felda soils, frequently flooded	A/D	357.3	4.1%
34	Basinger fine sand, depressional	A/D	73.5	0.8%
35	Arents, very steep	A	19.4	0.2%
36	Malabar fine sand, high	A/D	768.6	8.8%
42	Okeelanta and Dania soils, depressional	A/D	8.9	0.1%
99	Water		70.6	0.8%
Subtotals for Soil Survey Area			**7,269.7**	**82.9%**
Summary by Map Unit — Hendry County, Florida				
Totals for Area of Interest			**8,765.1**	**100.0%**

next page

Hendry

Summary by Map Unit — ~~Glades~~ County, Florida

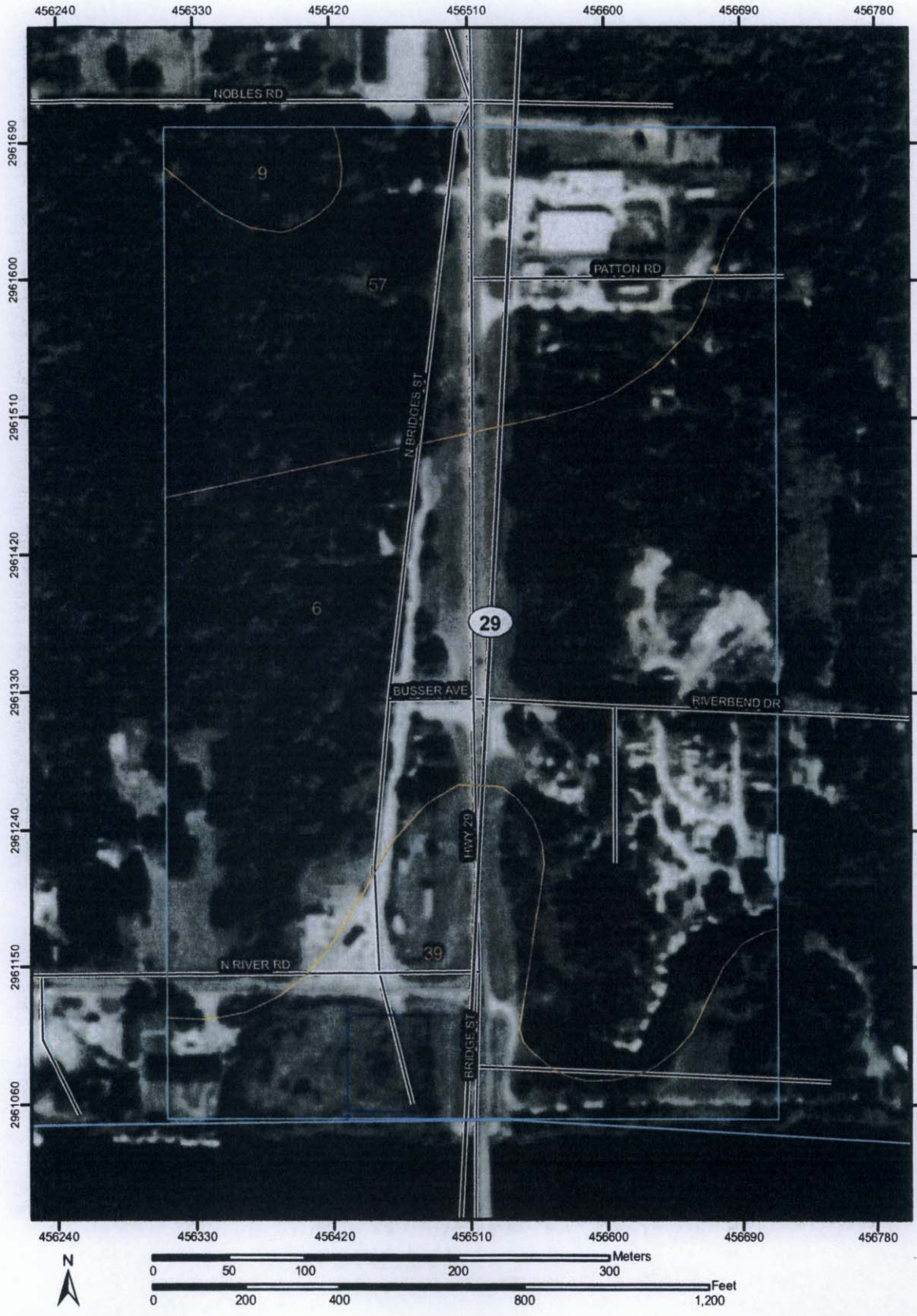
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Boca sand	A/D	115.7	1.3%
4	Oldsmar sand	A/D	184.7	2.1%
6	Wabasso sand	C/D	476.8	5.4%
7	Immokalee sand	A/D	39.3	0.4%
8	Malabar sand	A/D	1.9	0.0%
9	Riviera fine sand	C/D	58.2	0.7%
18	Pompano sand	A/D	178.7	2.0%
20	Okeelanta muck	A/D	13.3	0.2%
27	Riviera sand, limestone substratum	A/D	2.8	0.0%
39	Udifluvents		22.8	0.3%
47	Udorthents		17.1	0.2%
49	Aquents, organic substratum	A	6.8	0.1%
53	Adamsville fine sand	A	45.9	0.5%
57	Chobee fine sandy loam, depressional	C/D	288.2	3.3%
99	Water		42.0	0.5%
Subtotals for Soil Survey Area			**1,494.1**	**17.0%**
Totals for Area of Interest			**8,765.1**	**100.0%**

Description — Hydrologic Soil Group

Rating Options — Hydrologic Soil Group

Soil Map–Hendry County, Florida
(Sr 29)

Soil Map–Hendry County, Florida
(Sr 29)



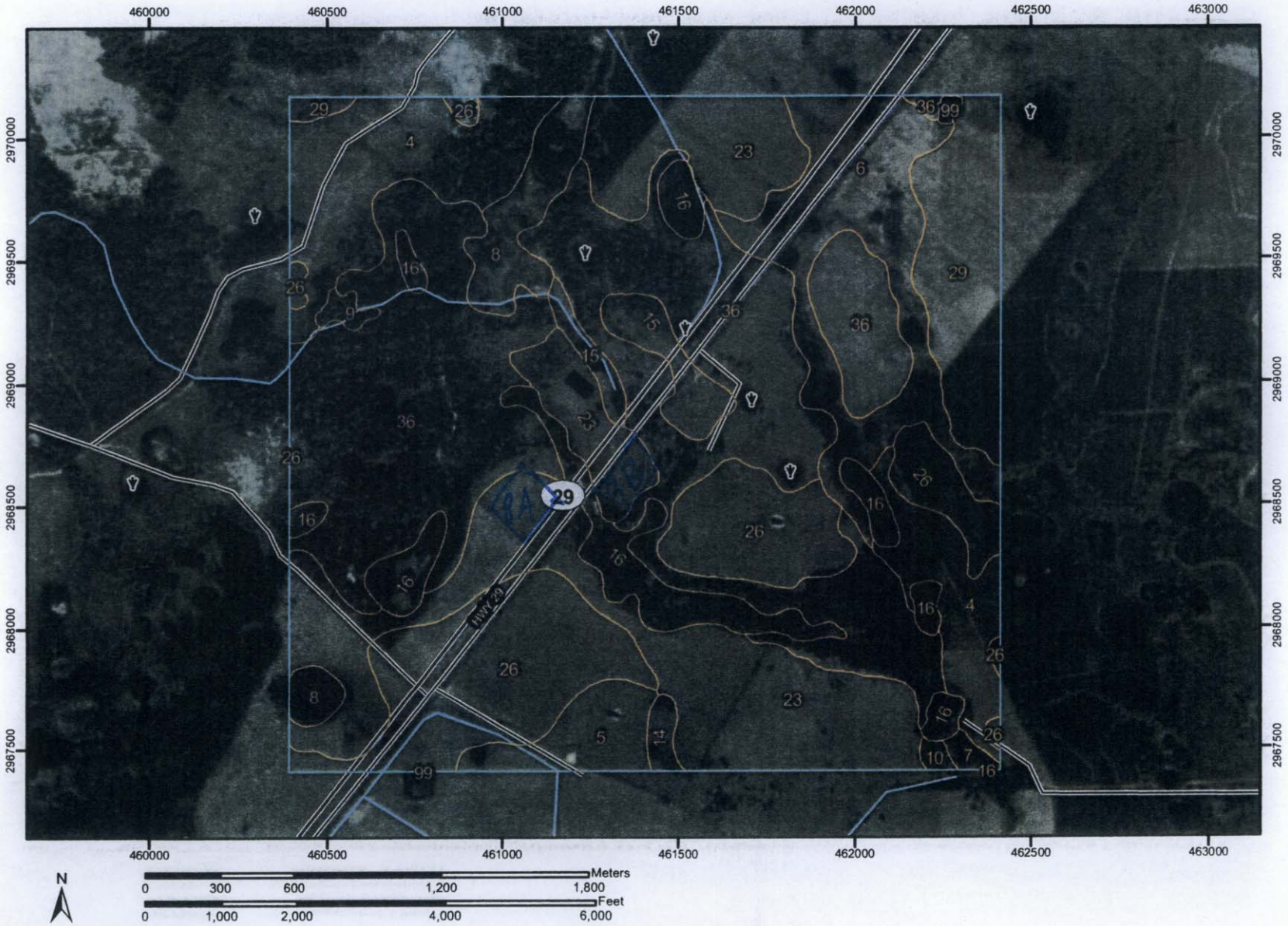
Soil Map–Hendry County, Florida
(Sr 29)

Soil Map–Glades County, Florida
(Sr 29)

Soil Map–Glades County, Florida
(Sr 29)

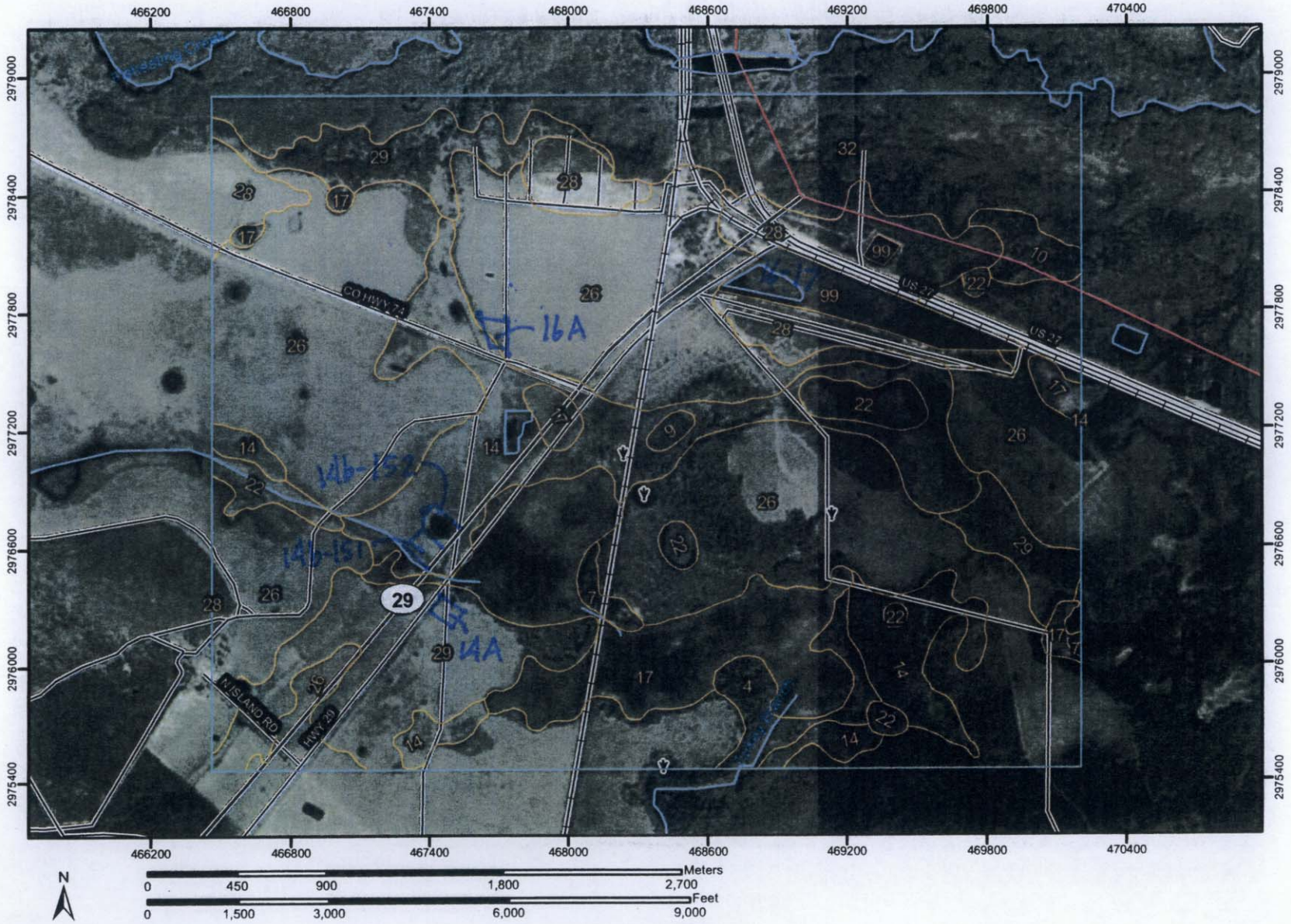
Soil Map–Glades County, Florida
(Sr 29)

Soil Map–Glades County, Florida
(Sr 29)



Soil Map–Glades County, Florida
(Sr 29)

Soil Map–Glades County, Florida
(Sr 29)



Appendix 4.0

Hydraulic Feasibility and Pond Sizing Calculations

Faller, Davis and Associates, Inc.

COMP. BY: DK
CK. BY:
DATE:
SHEET NO.:
JOB NO.:

SUBJECT: Control Elevations for Ponds

Pond A	Outfalls to 3-29"x45" CD @ Sta. 189+60 Stainline ≈ 1/2 way up barrel FL: 15.6 SL = 15.6 + 1/2 x 29/12 = 16.8 Avg. Site El = 18	use SL EL 16.8
Pond O	Outfalls directly to Caloosahatchee River FEMA 100yr Floodplain EL 9.0 Site El = 13+/-	use EL 9.0
Pond 1	Outfalls to 8'x7' CBC @ Sta 299+80 SL ≈ 1/2 way up barrel FL = 7.8 SL = 7.8 + 1/2 x 7' = 11.3 Site El = 12+/-	use EL 11.3
Pond 2	Outfalls to 24" CD @ Sta 312+30 SL 2/3's up barrel FL = 13.2 SL = 13.2 + 2/3 x 2 = 14.5 Site El = 15+/-	use EL 14.5
Pond 3	Outfalls to 3-42" at Sta 342+60 SL ≈ 1/2 way up barrel FL = 17.72 SL = 17.7 + 1/2 x 3.5 = 19.5 Site El = 21+/-	use EL 19.5
Pond 4	Outfalls to 2-42" @ Sta 380+45 SL ≈ 2/3's up barrel FL = 25.95 SL = 26 + 2/3 x 3.5 = 28.3 Site EL = 29.8+/-	use EL 28.3
Pond 5	Outfalls to Bridge at Sta 431+10 impoundment EL D/S ≈ 32.6 Site EL = < 33.6	use EL 32.6
Pond 6	Outfalls to 30" CD @ Sta 473+00 SHW appears to be at top of crown of FES crown el ≈ 33.4 Site EL 35.8+/-	use EL 33.4
Pond 7	Outfalls to Bridge at Sta 482+00 Impoundment EL D/S ≈ 34 SHW SL ≈ 33.9 Site EL < 35.2	use EL 33.9

Faller, Davis and Associates, Inc.

COMP. BY: DK
CK. BY:
DATE:
SHEET NO.:
JOB NO.:

SUBJECT:

Pond 8A Pond 8B	Outfalls to Bridge at Sta 582+60 Impoundment el D/S ≈ 31.8 SL ≈ 32.8 Site El ≈ 31.8 WL = 31.9 on 6/2/10 ≈ SHW	Use EL 31.9
Pond 9A	Outfalls to 3-30" CD at Sta 625+00, located on U/S side SL is at crown of pipe FL = 29.9 SL = 29.9 + 2.5 = 32.4 Site El < 32.2 (Site is wet prarie)	Use EL 32.4
Pond 9B Pond 9	Same outfall as 9A, located on D/S side Staked wetland drawn in Survey follows contour at elevation 30.8	Use EL 30.8
Pond 10	Outfalls to 3-36" CD at Sta 664+00 SL is ≈ 3/4' up pipe? or above HW? FL = 29.9 SL = 29.9 + 3/4 x 3 = 32.2 Site EL ≈ 33.2 (wet prarie)	Use EL. 33.2
Pond 11A Pond 11B	Outfalls to Bridge at Sta 696+00 Stainline ≈ el 35.0 WL = 34.0 ≈ SHW on 6/2/10	Use EL 34.0
Pond 12-13A	Outfalls to 4-15" CD at Sta 801+00 water above crown, conc. pitted to near top HW could be due to undersized CD, poorly defined Outfall Site ≈ 35.2, not wetland FL = 34.0	Use El 35.2
Pond 13B	Outfalls to Bridge at Sta 827+80 Stainline ≈ el. 38.1 WL = 37.5 ≈ SHW on 6/2/10	Use EL. 37.5
Pond 14A Pond 14B-15	Outfalls to Bridge at Sta 911+00 Stainline ≈ el 39.6 WL = 37.9 ≈ SHW on 6/2/10	Use EL 37.9
Pond 16A	No survey information available	

Faller, Davis and Associates, Inc.

COMP. BY: _____
CK. BY: _____
DATE: _____
SHEET NO.: _____
JOB NO.: _____

SUBJECT: Pond 9 ICPR Model

R/W exist = 150'
R/W prop = 127'
basin length = 5180 Lf
R/W area exist = 150 x 5180 ÷ 43560 = 17.8 ac
R/W area prop = 127 x 5180 ÷ 43560 = 15.1 ac
Pond Site Area = 3.4 ac

Existing typical is 2-12' lanes

$CN = (126' \times 80 + 24' \times 98) \div 150' = 82.9$

Calculate CN Post: (avg B & D for CN perv, 70) (61, 80)

$CN_{road} = (85' \times 98 + 192' \times 70) \div 277 = 78.6$

$CN_{pond} = (1.97 \times 100 + 1.43 \times 80) \div 3.4 = 91.6$

$CN_{post} = (78.6 \times 32.9 + 91.6 \times 3.4) \div 36.3 = 79.8$

From ICPR Pre R/W $Q_{25} = 65.7$ cfs
$Q_{100} = 90.3$ cfs

Allowable Q from Prop R/W = 30.1 CSM

convert Prop area to CSM:

$(32.9 + 3.4)\,ac \times 43560\,\frac{sf}{ac} \times \frac{SM}{5280^2\,sf} = 0.057\ SM$

Faller, Davis and Associates, Inc.

COMP. BY: _____
CK. BY: _____
DATE: _____
SHEET NO.: _____
JOB NO.: _____

SUBJECT: _____

Allowable Q from PROP R/W = 0.057 SM x 30.1 CSM = 1.7 cfs

Total Allowable Q_{25} = 65.7 + 1.7 = 67.4 cfs
Q_{100} = 90.3 + 1.7 = 92.0 cfs

A 25% contingency (see following pond sizing calcs for Pond 9) results in a 3.5 ac pond > 3.4 ac ✓ ok

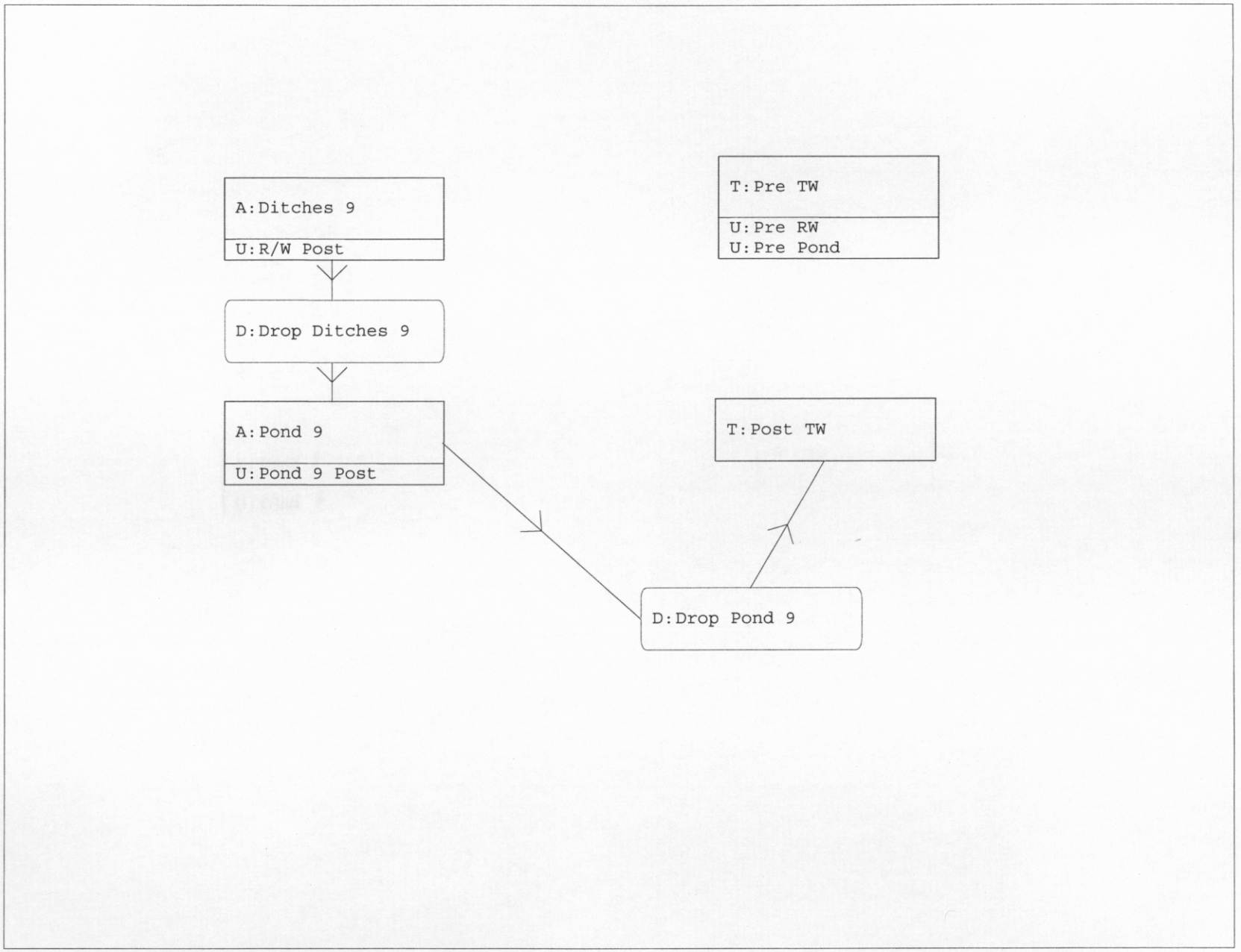
Use a 25% contingency to accomodate CSM criteria for proposed R/W areas

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
Ditches 9	BASE	FDOT 10y-8h	4.05	33.89	34.80	0.0050	88656	4.00	58.23	4.05	56.05
Ditches 9	BASE	SFWMD 100y-72h	60.30	34.92	34.80	0.0050	131169	60.00	161.41	60.18	84.07
Ditches 9	BASE	SFWMD 25y-72h	60.22	34.37	34.80	-0.0050	108415	60.00	115.57	60.08	74.05
Pond 9	BASE	FDOT 10y-8h	4.85	33.10	33.40	0.0050	117334	4.03	63.39	4.85	29.51
Pond 9	BASE	SFWMD 100y-72h	60.56	33.70	33.40	0.0050	127701	60.08	99.38	60.56	83.81
Pond 9	BASE	SFWMD 25y-72h	60.55	33.53	33.40	0.0050	122852	60.00	87.09	60.55	64.55
Post TW	BASE	FDOT 10y-8h	0.00	30.80	34.80	0.0000	0	4.85	29.51	0.00	0.00
Post TW	BASE	SFWMD 100y-72h	0.00	30.80	34.80	0.0000	0	60.56	83.81	0.00	0.00
Post TW	BASE	SFWMD 25y-72h	0.00	30.80	34.80	0.0000	0	60.55	64.55	0.00	0.00
Pre TW	BASE	FDOT 10y-8h	0.00	30.80	34.80	0.0000	0	4.00	40.85	0.00	0.00
Pre TW	BASE	SFWMD 100y-72h	0.00	30.80	34.80	0.0000	0	60.00	106.79	0.00	0.00
Pre TW	BASE	SFWMD 25y-72h	0.00	30.80	34.80	0.0000	0	60.00	77.51	0.00	0.00

Nodes
A Stage/Area
V Stage/Volume
T Time/Stage
M Manhole

Basins
O Overland Flow
U SCS Unit CN
S SBUH CN
Y SCS Unit GA
Z SBUH GA

Links
P Pipe
W Weir
C Channel
D Drop Structure
B Bridge
R Rating Curve
H Breach
E Percolation
F Filter
X Exfil Trench



==========
==== Basins ====
==========

Name: Pond 9 Post | Node: Pond 9 | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph	Uh256	Peaking Factor	256.0
Rainfall File	Sfwmd72	Storm Duration(hrs)	72.00
Rainfall Amount(in)	9.000	Time of Conc(min)	10.00
Area(ac)	3.400	Time Shift(hrs)	0.00
Curve Number	91.60	Max Allowable Q(cfs)	999999.000
DCIA(%)	0.00		

Name: Pre Pond | Node: Pre TW | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph	Uh256	Peaking Factor	256.0
Rainfall File	Sfwmd72	Storm Duration(hrs)	72.00
Rainfall Amount(in)	9.000	Time of Conc(min)	10.00
Area(ac)	3.400	Time Shift(hrs)	0.00
Curve Number	80.00	Max Allowable Q(cfs)	999999.000
DCIA(%)	0.00		

Name: Pre RW | Node: Pre TW | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph	Uh256	Peaking Factor	256.0
Rainfall File	Sfwmd72	Storm Duration(hrs)	72.00
Rainfall Amount(in)	9.000	Time of Conc(min)	10.00
Area(ac)	17.800	Time Shift(hrs)	0.00
Curve Number	82.90	Max Allowable Q(cfs)	999999.000
DCIA(%)	0.00		

Name: R/W Post | Node: Ditches 9 | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph	Uh256	Peaking Factor	256.0
Rainfall File	Sfwmd72	Storm Duration(hrs)	72.00
Rainfall Amount(in)	9.000	Time of Conc(min)	10.00
Area(ac)	32.900	Time Shift(hrs)	0.00
Curve Number	78.60	Max Allowable Q(cfs)	999999.000
DCIA(%)	0.00		

==========
==== Nodes ====
==========

Name: Ditches 9 | Base Flow(cfs): 0.000 | Init Stage(ft): 33.000
Group: BASE | Warn Stage(ft): 34.800
Type: Stage/Area

Stage(ft)	Area(ac)
33.000	1.1800
34.000	2.1400
34.800	2.9000

Name: Pond 9 | Base Flow(cfs): 0.000 | Init Stage(ft): 31.500
Group: BASE | Warn Stage(ft): 33.400
Type: Stage/Area

Stage(ft)	Area(ac)
30.800	2.4100
33.400	2.7300
34.400	3.4000

```
      Name: Post TW             Base Flow(cfs): 0.000          Init Stage(ft): 30.800
     Group: BASE                                              Warn Stage(ft): 34.800
      Type: Time/Stage


      Time(hrs)       Stage(ft)
--------------- ---------------
           0.00          30.800
          72.00          30.800

-------------------------------------------------------------------------------------------
      Name: Pre TW              Base Flow(cfs): 0.000          Init Stage(ft): 30.800
     Group: BASE                                              Warn Stage(ft): 34.800
      Type: Time/Stage


      Time(hrs)       Stage(ft)
--------------- ---------------
           0.00          30.800
          72.00          30.800

===========================================================================================
==== Drop Structures ======================================================================
===========================================================================================

        Name: Drop Ditches 9      From Node: Ditches 9          Length(ft): 50.00
       Group: BASE                  To Node: Pond 9                Count: 1

              UPSTREAM       DOWNSTREAM                Friction Equation: Automatic
    Geometry: Circular       Circular                 Solution Algorithm: Most Restrictive
    Span(in): 48.00          48.00                               Flow: Both
    Rise(in): 48.00          48.00                  Entrance Loss Coef: 0.500
   Invert(ft): 25.200        25.000                     Exit Loss Coef: 1.000
  Manning's N: 0.012000      0.012000                 Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000         0.000                     Inlet Ctrl Spec: Use dc
 Bot Clip(in): 0.000         0.000                      Solution Incs: 10

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall


*** Weir 1 of 1 for Drop Structure Drop Ditches 9 ***
                                                                              TABLE
                 Count: 5                      Bottom Clip(in): 0.000
                  Type: Horizontal                Top Clip(in): 0.000
                  Flow: Both                   Weir Disc Coef: 3.200
              Geometry: Rectangular           Orifice Disc Coef: 0.600

              Span(in): 49.00                        Invert(ft): 33.500
              Rise(in): 37.00                  Control Elev(ft): 33.500


-------------------------------------------------------------------------------------------
        Name: Drop Pond 9         From Node: Pond 9             Length(ft): 50.00
       Group: BASE                  To Node: Post TW               Count: 2

              UPSTREAM       DOWNSTREAM                Friction Equation: Automatic
    Geometry: Circular       Circular                 Solution Algorithm: Most Restrictive
    Span(in): 36.00          36.00                               Flow: Both
    Rise(in): 36.00          36.00                  Entrance Loss Coef: 0.500
   Invert(ft): 25.200        25.000                     Exit Loss Coef: 1.000
  Manning's N: 0.012000      0.012000                 Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000         0.000                     Inlet Ctrl Spec: Use dc
 Bot Clip(in): 0.000         0.000                      Solution Incs: 10

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall


*** Weir 1 of 3 for Drop Structure Drop Pond 9 ***
                                                                              TABLE
                 Count: 2                      Bottom Clip(in): 0.000
                  Type: Vertical: Mavis           Top Clip(in): 0.000
                  Flow: Both                   Weir Disc Coef: 3.200
              Geometry: Rectangular           Orifice Disc Coef: 0.600
```

```
              Span(in): 49.00                    Invert(ft): 32.000
              Rise(in): 11.20                 Control Elev(ft): 32.000

*** Weir 2 of 3 for Drop Structure Drop Pond 9 ***
                                                                        TABLE
                 Count: 2                     Bottom Clip(in): 0.000
                  Type: Horizontal               Top Clip(in): 0.000
                  Flow: Both                  Weir Disc Coef: 3.200
              Geometry: Rectangular          Orifice Disc Coef: 0.600

              Span(in): 49.00                    Invert(ft): 33.100
              Rise(in): 37.00                 Control Elev(ft): 33.100

*** Weir 3 of 3 for Drop Structure Drop Pond 9 ***
                                                                        TABLE
                 Count: 1                     Bottom Clip(in): 0.000
                  Type: Vertical: Mavis          Top Clip(in): 0.000
                  Flow: Both                  Weir Disc Coef: 3.200
              Geometry: Circular             Orifice Disc Coef: 0.600

              Span(in): 3.00                     Invert(ft): 30.800
              Rise(in): 3.00                  Control Elev(ft): 30.800


================================================================================
==== Hydrology Simulations ====================================================
================================================================================

         Name: FDOT 10y-8h
     Filename: H:\14929\ICPR\FDOT 10y-8h.R32

      Override Defaults: Yes
    Storm Duration(hrs): 8.00
          Rainfall File: Fdot-8
    Rainfall Amount(in): 5.60

Time(hrs)       Print Inc(min)
--------------- ---------------
72.000          5.00

--------------------------------------------------------------------------------------------------------------
         Name: SFWMD 100y-72h
     Filename: H:\14929\ICPR\SFWMD 100y-72h.R32

      Override Defaults: Yes
    Storm Duration(hrs): 72.00
          Rainfall File: Sfwmd72
    Rainfall Amount(in): 12.00

Time(hrs)       Print Inc(min)
--------------- ---------------
72.000          5.00

--------------------------------------------------------------------------------------------------------------
         Name: SFWMD 25y-72h
     Filename: H:\14929\ICPR\SFWMD 25y-72h.R32

      Override Defaults: Yes
    Storm Duration(hrs): 72.00
          Rainfall File: Sfwmd72
    Rainfall Amount(in): 9.00

Time(hrs)       Print Inc(min)
--------------- ---------------
72.000          5.00

================================================================================
==== Routing Simulations ======================================================
================================================================================

         Name: FDOT 10y-8h         Hydrology Sim: FDOT 10y-8h
     Filename: H:\14929\ICPR\FDOT 10y-8h.I32

      Execute: Yes         Restart: No           Patch: No
  Alternative: No

        Max Delta Z(ft): 1.00                   Delta Z Factor: 0.00500
    Time Step Optimizer: 10.000
       Start Time(hrs): 0.000                    End Time(hrs): 8.00
     Min Calc Time(sec): 0.5000               Max Calc Time(sec): 60.0000
        Boundary Stages:                        Boundary Flows:


Time(hrs)       Print Inc(min)
--------------- ---------------
```

999.000	15.000

Group	Run
BASE	Yes

Name: SFWMD 100y-72h Hydrology Sim: SFWMD 100y-72h
Filename: H:\14929\ICPR\SFWMD 100y-72h.I32

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 72.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
999.000	15.000

Group	Run
BASE	Yes

Name: SFWMD 25y-72h Hydrology Sim: SFWMD 25y-72h
Filename: H:\14929\ICPR\SFWMD 25y-72h.I32

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 72.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
999.000	15.000

Group	Run
BASE	Yes

Faller, Davis & Associates, Inc.
CONSULTING ENGINEERS

POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: R. Endrzejewski
Checked By: D. Knighton

Date: 27-May-10
Date: 24-Mar-11

Project Data	
Basin #	A
Pond #	A
Basin Limits:	
From Station (APPROX)	188+50
To Station	200+00
Pond Station	192+50
Distance from Roadway (ft)	50
Control EL	16.80
Source	SL on CD HW
Lowest Critical Elevation	19
Description	Exist. EOP RT.
Station	200+00
Typical Section (Imperivous width in R/W):	
Existing (ft)	46
Proposed (ft)	90
R/W width (ft)	150

Typical Sections

Existing is 3-12' Lanes, 2-5' Shldr.

Proposed is 4-12' Lanes, 2-4' shldr, 2-6' shldr., 2-5' S/W, 1 - 12' turn lane

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
21.59	10.80	
Side Slope,		4
Maint. Berm (ft)		20
Wet/Dry?		Wet
Basin Length (ft)		1150
Treat. Vol. (CF)		24829
Treat. Vol. (Ac-ft)		0.57
Atten. Depth (ft)		0.19
Treat. Depth (ft)		0.5
L at Control (ft)		223
L at TOB (ft)		228
L Berm (ft)		268
Est. Site Acre		1.653

POND SITE SIZE REQUIRED
2.1 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	85.5
CN post	90.8
S pre	1.69
S post	1.01
R pre 100-yr	9.20
R post 100-yr	9.87
Increase in runoff 100-yr, 24-hr	0.67
Estimated Attenuation Volume (ac-ft)	0.221
Estimated Attenuation Depth (ft)	0.19

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	750
Farthest Point (AH/BK?)	AH
EOP EL @ Furthest Point	19.00
DHW @ Pond (SHW + trt. & attn. depths)	17.49
HGL at Furthest Point (DHW+distancex0.0005)	17.89
Feasible?	YES
HGL at Lowest Critical Elevation	17.89
Feasible?	YES

Faller, Davis & Associates, Inc.
CONSULTING ENGINEERS

SFWMD POND SIZING CALCULATIONS

Project: SR 29 **Designed By:** R. Endrzejewski **Date:** 17-Sep-10
FPID No. 417878-1-22-01 **Checked By:** DK **Date:** 24-Mar-11
FDA No.: 149.29

BASIN A (South of River)

TOTAL ROADWAY IMPERVIOUS =	**2.38 AC**
TOTAL PROJECT AREA =	**6.03 AC**
TOTAL POND AREA=	**2.07 AC**
WATER SURFACE AREA:	**1.37 AC**

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= **4.66 AC**

% IMPERVIOUS= **39.4%**

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= **0.38 AC-FT**

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= **0.57 Ac-ft**

Faller, Davis & Associates, Inc.
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POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: R. Endrzejewski
Checked By: D. Knighton

Date: 27-May-10
Date: 24-Mar-11

Project Data	
Basin #	0
Pond #	0
Basin Limits:	
From Station (APPROX)	282+00
To Station	293+30
Pond Station	283+50
Distance from Roadway (ft)	80
Control EL	9.00
Source	Cal. Riv. 100-yr
Lowest Critical Elevation	15.4
Description	Exist. EOP RT.
Station	293+30
Typical Section (Imperivous width in R/W):	
Existing (ft)	46
Proposed (ft)	83
R/W width (ft)	155

Typical Sections

Existing is 3-12' Lanes, 2-5' Shldr.

Proposed is 4-12' Lanes, 2-4' shldr, 2-5' shldr., 1-12' S/W, 1-5' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
18.12	9.06	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Dry	
Basin Length (ft)	1130	
Treat. Vol. (CF)	20473	
Treat. Vol. (Ac-ft)	0.47	
Atten. Depth (ft)	1.93	
Treat. Depth (ft)	1.5	
L at Control (ft)	117	
L at TOB (ft)	144	
L Berm (ft)	184	
Est. Site Acre	0.780	

POND SITE SIZE REQUIRED
1.0 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group A (CN=39)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	56.5
CN post	70.6
S pre	7.70
S post	4.17
R pre 100-yr	5.22
R post 100-yr	7.21
Increase in runoff 100-yr, 24-hr	2.00
Estimated Attenuation Volume (ac-ft)	0.668
Estimated Attenuation Depth (ft)	1.93

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	980
Farthest Point (AH/BK?)	AH
EOP EL @ Furthest Point	15.40
DHW @ Pond (SHW + trt. & attn. depths)	12.43
HGL at Furthest Point (DHW+distancex0.0005)	12.96
Feasible?	YES
HGL at Lowest Critical Elevation	12.96
Feasible?	YES

Fallen, Davis & Associates, Inc.
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SFWMD POND SIZING CALCULATIONS

Project: SR 29 **Designed By:** R. Endrzejewski **Date:** 17-Sep-10
FPID No. 417878-1-22-01 **Checked By:** DK **Date:** 24-Mar-11
FDA No.: 149.29

BASIN 0

TOTAL ROADWAY IMPERVIOUS =	**2.15 AC**
TOTAL PROJECT AREA =	**5.00 AC**
TOTAL POND AREA=	**0.97 AC**
WATER SURFACE AREA:	**0.38 AC**

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= **4.62 AC**

% IMPERVIOUS= **43.1%**

TREATMENT REQUIRED: (Dry Pond)

0.75 x 2.5" x % IMPERV. x SITE AREA= **0.31 AC-FT**

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= **0.47 Ac-ft**

Faller, Davis & Associates, Inc.
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POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: R. Endrzejewski
Checked By: D. Knighton

Date: 27-May-10
Date: 24-Mar-11

Project Data	
Basin #	1
Pond #	1
Basin Limits:	
From Station (APPROX)	293+30
To Station	311+10
Pond Station	298+30
Distance from Roadway (ft)	50
Control EL	11.30
Source	SL inside 8'x7' CD
Lowest Critical Elevation	15.4
Description	Exist. EOP RT.
Station	293+30
Typical Section (Imperivous width in R/W):	
Existing (ft)	46
Proposed (ft)	95
R/W width (ft)	155

Typical Sections

Existing is 3-12' Lanes, 2-5' Shldr.

Proposed is 4-12' Lanes, 12' Turnlane
2-4' shldr., 2-5' shldr., 1-12' S/W, 1-5' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
26.43	13.21	
Side Slope,		4
Maint. Berm (ft)		20
Wet/Dry?		Wet
Basin Length (ft)		1780
Treat. Vol. (CF)		47045
Treat. Vol. (Ac-ft)		1.08
Atten. Depth (ft)		0.50
Treat. Depth (ft)		1.5
L at Control (ft)		177
L at TOB (ft)		193
L Berm (ft)		233
Est. Site Acre		1.247

POND SITE SIZE REQUIRED
1.6 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	85.3
CN post	91.0
S pre	1.72
S post	0.99
R pre 100-yr	9.18
R post 100-yr	9.90
Increase in runoff 100-yr, 24-hr	0.72
Estimated Attenuation Volume (ac-ft)	0.382
Estimated Attenuation Depth (ft)	0.50

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	1280
Farthest Point (AH/BK?)	AH
EOP EL @ Furthest Point	18.20
DHW @ Pond (SHW + trt. & attn. depths)	13.30
HGL at Furthest Point (DHW+distancex0.0005)	13.96
Feasible?	YES
HGL at Lowest Critical Elevation	13.57
Feasible?	YES

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SFWMD POND SIZING CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: R. Endrzejewski
Checked By: DK

Date: 17-Sep-10
Date: 24-Mar-11

BASIN 1

TOTAL ROADWAY IMPERVIOUS =	**3.88 AC**
TOTAL PROJECT AREA =	**7.89 AC**
TOTAL POND AREA=	**1.56 AC**
WATER SURFACE AREA:	**0.86 AC**

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA=	**7.03 AC**
% IMPERVIOUS=	**49.2%**

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= 0.72 AC-FT

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= 1.08 Ac-ft

Faller, Davis & Associates, Inc.
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POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: R. Endrzejewski
Checked By: D. Knighton

Date: 27-May-10
Date: 24-Mar-11

Project Data	
Basin #	2
Pond #	2
Basin Limits:	
From Station (APPROX)	311+10
To Station	333+20
Pond Station	314+50
Distance from Roadway (ft)	50
Control EL	14.50
Source	SL on 24" CD
Lowest Critical Elevation	18.2
Description	Exist. EOP RT.
Station	311+10
Typical Section (Imperivous width in R/W):	
Existing (ft)	34
Proposed (ft)	95
R/W width (ft)	155

Typical Sections

Existing is 2-12' Lanes, 2-5' Shldr.

Proposed is 4-12' Lanes, 12' Turnlane
2-4' shldr., 2-5' shldr., 1-12' S/W, 1-5' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
26.41	13.21	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Wet	
Basin Length (ft)	2210	
Treat. Vol. (CF)	58370	
Treat. Vol. (Ac-ft)	1.34	
Atten. Depth (ft)	0.62	
Treat. Depth (ft)	1.5	
L at Control (ft)	197	
L at TOB (ft)	214	
L Berm (ft)	254	
Est. Site Acre	1.484	

POND SITE SIZE REQUIRED
1.9 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	83.9
CN post	91.0
S pre	1.91
S post	0.99
R pre 100-yr	9.00
R post 100-yr	9.90
Increase in runoff 100-yr, 24-hr	0.90
Estimated Attenuation Volume (ac-ft)	0.592
Estimated Attenuation Depth (ft)	0.62

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	1870
Farthest Point (AH/BK?)	AH
EOP EL @ Furthest Point	23.00
DHW @ Pond (SHW + trt. & attn. depths)	16.62
HGL at Furthest Point (DHW+distancex0.0005)	17.58
Feasible?	YES
HGL at Lowest Critical Elevation	16.82
Feasible?	YES

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SFWMD POND SIZING CALCULATIONS

Project: SR 29 **Designed By:** R. Endrzejewski **Date:** 17-Sep-10
FPID No. 417878-1-22-01 **Checked By:** DK **Date:** 24-Mar-11
FDA No.: 149.29

BASIN 2

TOTAL ROADWAY IMPERVIOUS =	**4.82 AC**
TOTAL PROJECT AREA =	**9.72 AC**
TOTAL POND AREA=	**1.86 AC**
WATER SURFACE AREA:	**1.07 AC**

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= **8.65 AC**

% IMPERVIOUS= **49.6%**

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= **0.89 AC-FT**

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= **1.34 Ac-ft**

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POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: R. Endrzejewski
Checked By: D. Knighton

Date: 27-May-10
Date: 24-Mar-11

Project Data	
Basin #	3
Pond #	3
Basin Limits:	
From Station	333+20
To Station	374+50
Pond Station	348+50
Distance from Roadway (ft)	50
Control EL	19.50
Source	SL on 3-42" CD
Lowest Critical Elevation	23.0
Description	Exist. EOP RT.
Station	333+20
Typical Section (Imperivous width in R/W):	
Existing (ft)	34
Proposed (ft)	95
R/W width (ft)	155

Typical Sections
Existing is 2-12' Lanes, 2-5' Shldr.
Proposed is 4-12' Lanes, 12' Turnlane 2-4' shldr., 2-5' shldr., 1-12' S/W, 1-5' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
25.42	12.71	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Wet	
Basin Length (ft)	4130	
Treat. Vol. (CF)	104980	
Treat. Vol. (Ac-ft)	2.41	
Atten. Depth (ft)	0.49	
Treat. Depth (ft)	1.1	
L at Control (ft)	309	
L at TOB (ft)	322	
L Berm (ft)	362	
Est. Site Acre	3.003	

POND SITE SIZE REQUIRED
3.8 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	83.9
CN post	91.0
S pre	1.91
S post	0.99
R pre 100-yr	9.00
R post 100-yr	9.90
Increase in runoff 100-yr, 24-hr	0.90
Estimated Attenuation Volume (ac-ft)	1.106
Estimated Attenuation Depth (ft)	0.49

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	2600
Farthest Point (AH/BK?)	AH
EOP EL @ Furthest Point	31.60
DHW @ Pond (SHW + trt. & attn. depths)	21.09
HGL at Furthest Point (DHW+distancex0.0005)	22.42
Feasible?	YES
HGL at Lowest Critical Elevation	21.88
Feasible?	YES

Faller, Davis & Associates, Inc.
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SFWMD POND SIZING CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: R. Endrzejewski
Checked By: DK

Date: 17-Sep-10
Date: 24-Mar-11

BASIN 3

TOTAL ROADWAY IMPERVIOUS =	9.01 AC
TOTAL PROJECT AREA =	18.45 AC
TOTAL POND AREA=	3.75 AC
WATER SURFACE AREA:	2.63 AC

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= 15.82 AC

% IMPERVIOUS= 48.8%

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= 1.61 AC-FT

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= 2.41 Ac-ft

Faller, Davis & Associates, Inc.
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POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: R. Endrzejewski
Checked By: D. Knighton

Date: 27-May-10
Date: 24-Mar-11

Project Data	
Basin #	4
Pond #	4
Basin Limits:	
From Station	374+50
To Station	413+00
Pond Station	384+00
Distance from Roadway (ft)	50
Control EL	28.30
Source	SL on 2-42" CD
Lowest Critical Elevation	31.6
Description	Exist. EOP LT.
Station	374+50
Typical Section (Imperivous width in R/W):	
Existing (ft)	34
Proposed (ft)	95
R/W width (ft)	155

Typical Sections

Existing is 2-12' Lanes, 2-5' Shldr.

Proposed is 4-12' Lanes, 12' Turnlane
2-4' shldr., 2-5' shldr., 1-12' S/W, 1-5' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
25.68	12.84	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Wet	
Basin Length (ft)	3850	
Treat. Vol. (CF)	98881	
Treat. Vol. (Ac-ft)	2.27	
Atten. Depth (ft)	0.53	
Treat. Depth (ft)	1.2	
L at Control (ft)	287	
L at TOB (ft)	301	
L Berm (ft)	341	
Est. Site Acre	2.667	

POND SITE SIZE REQUIRED
3.3 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	83.9
CN post	91.0
S pre	1.91
S post	0.99
R pre 100-yr	9.00
R post 100-yr	9.90
Increase in runoff 100-yr, 24-hr	0.90
Estimated Attenuation Volume (ac-ft)	1.031
Estimated Attenuation Depth (ft)	0.53

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	2900
Farthest Point (AH/BK?)	AH
EOP EL @ Furthest Point	36.70
DHW @ Pond (SHW + trt. & attn. depths)	30.03
HGL at Furthest Point (DHW+distancex0.0005)	31.50
Feasible?	YES
HGL at Lowest Critical Elevation	30.53
Feasible?	YES

Fallen, Davis & Associates, Inc.
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SFWMD POND SIZING CALCULATIONS

Project: SR 29 **Designed By:** R. Endrzejewski **Date:** 17-Sep-10
FPID No. 417878-1-22-01 **Checked By:** DK **Date:** 24-Mar-11
FDA No.: 149.29

BASIN 4

TOTAL ROADWAY IMPERVIOUS =	**8.40 AC**
TOTAL PROJECT AREA =	**17.03 AC**
TOTAL POND AREA=	**3.33 AC**
WATER SURFACE AREA:	**2.27 AC**

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= **14.76 AC**

% IMPERVIOUS= **49.3%**

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= **1.52 AC-FT**

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= **2.27 Ac-ft**

Faller, Davis & Associates, Inc.
CONSULTING ENGINEERS

POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: R. Endrzejewski
Checked By:

Date: 16-Sep-10
Date:

Project Data	
Basin #	5
Pond #	5
Basin Limits:	
From Station	413+00
To Station	457+20
Pond Station	428+50
Distance from Roadway (ft)	50
Control EL	32.60
Source	D/S Impoundment
Lowest Critical Elevation	36
Description	Exist. EOP RT.
Station	431+10
Typical Section (Imperivous width in R/W):	
Existing (ft)	34
Proposed (ft)	95
R/W width (ft)	210

Typical Sections

Existing is 2-12' Lanes, 2-5' Shldr.

Proposed is 4-12' Lanes, 12' Turnlane
2-4' shldr., 2-5' shldr., 1-12' S/W, 1-5' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
26.51	13.26	
Side Slope,		4
Maint. Berm (ft)		20
Wet/Dry?		Wet
Basin Length (ft)		4420
Treat. Vol. (CF)		117176
Treat. Vol. (Ac-ft)		2.69
Atten. Depth (ft)		0.52
Treat. Depth (ft)		1.2
L at Control (ft)		312
L at TOB (ft)		326
L Berm (ft)		366
Est. Site Acre		3.079

POND SITE SIZE REQUIRED
3.8 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	82.9
CN post	88.1
S pre	2.06
S post	1.35
R pre 100-yr	8.86
R post 100-yr	9.54
Increase in runoff 100-yr, 24-hr	0.67
Estimated Attenuation Volume (ac-ft)	1.194
Estimated Attenuation Depth (ft)	0.52

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	2870
Farthest Point (AH/BK?)	AH
EOP EL @ Furthest Point	36.80
DHW @ Pond (SHW + trt. & attn. depths)	34.32
HGL at Furthest Point (DHW+distancex0.0005)	35.78
Feasible?	YES
HGL at Lowest Critical Elevation	34.47
Feasible?	YES

Faller, Davis & Associates, Inc.
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SFWMD POND SIZING CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: DK

Date: 27-May-10
Date: 24-Mar-11

BASIN 5

TOTAL ROADWAY IMPERVIOUS =	**9.64 AC**
TOTAL PROJECT AREA =	**25.16 AC**
TOTAL POND AREA=	**3.85 AC**
WATER SURFACE AREA:	**2.69 AC**

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= **22.47 AC**

% IMPERVIOUS= **38.3%**

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= **1.79 AC-FT**

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= **2.69 Ac-ft**

Faller, Davis & Associates, Inc.
CONSULTING ENGINEERS

POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: R. Endrzejewski
Checked By: D. Knighton

Date: 16-Sep-10
Date: 24-Mar-11

Project Data	
Basin #	6
Pond #	6-1
Basin Limits:	
From Station	457+20
To Station	482+00
Pond Station	477+30
Distance from Roadway (ft)	50
Control EL	33.40
Source	Crown 30" CD
Lowest Critical Elevation	36.1
Description	Exist. EOP RT.
Station	465+20
Typical Section (Imperivous width in R/W):	
Existing (ft)	34
Proposed (ft)	85
R/W width (ft)	277

Typical Sections

Existing is 2-12' Lanes, 2-5' Shldr.

Proposed is 4-12' Lanes, 12' Turnlane
2-5' shldr., 1-15' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
23.36	11.68	
Side Slope,		4
Maint. Berm (ft)		20
Wet/Dry?		Wet
Basin Length (ft)		2480
Treat. Vol. (CF)		57935
Treat. Vol. (Ac-ft)		1.33
Atten. Depth (ft)		0.29
Treat. Depth (ft)		0.7
L at Control (ft)		288
L at TOB (ft)		296
L Berm (ft)		336
Est. Site Acre		2.586

POND SITE SIZE REQUIRED
3.2 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	82.2
CN post	85.5
S pre	2.16
S post	1.69
R pre 100-yr	8.77
R post 100-yr	9.20
Increase in runoff 100-yr, 24-hr	0.43
Estimated Attenuation Volume (ac-ft)	0.565
Estimated Attenuation Depth (ft)	0.29

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	2010
Farthest Point (AH/BK?)	BK
EOP EL @ Furthest Point	36.80
DHW @ Pond (SHW + trt. & attn. depths)	34.39
HGL at Furthest Point (DHW+distancex0.0005)	35.42
Feasible?	YES
HGL at Lowest Critical Elevation	35.02
Feasible?	YES

Faller, Davis & Associates, Inc.
CONSULTING ENGINEERS

SFWMD POND SIZING CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: DK

Date: 27-May-10
Date: 24-Mar-11

BASIN 6

TOTAL ROADWAY IMPERVIOUS =	4.84 AC
TOTAL PROJECT AREA =	19.00 AC
TOTAL POND AREA=	3.23 AC
WATER SURFACE AREA:	2.28 AC

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= 16.72 AC

% IMPERVIOUS= 25.5%

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= 0.89 AC-FT

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= 1.33 Ac-ft

Faller, Davis & Associates, Inc.
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POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: D. Knighton

Date: 27-May-10
Date: 24-Mar-11

Project Data	
Basin #	7
Pond #	7A
Basin Limits:	
From Station	482+00
To Station	527+00
Pond Station	491+00
Distance from Roadway (ft)	50
Control EL	33.90
Source	D/S Impoundment
Lowest Critical Elevation	36.4
Description	Exist. EOP RT.
Station	484+00
Typical Section (Imperivous width in R/W):	
Existing (ft)	24
Proposed (ft)	85
R/W width (ft)	277

Typical Sections

Existing is 2-12' Lanes

Proposed is 4-12' Lanes, 12' Turnlane
2-5' shldr., 1-15' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
23.33	11.66	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Wet	
Basin Length (ft)	4500	
Treat. Vol. (CF)	104980	
Treat. Vol. (Ac-ft)	2.41	
Atten. Depth (ft)	0.35	
Treat. Depth (ft)	0.7	
L at Control (ft)	387	
L at TOB (ft)	396	
L Berm (ft)	436	
Est. Site Acre	4.357	

POND SITE SIZE REQUIRED
5.4 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	81.6
CN post	85.5
S pre	2.26
S post	1.69
Rpre 100-yr	8.69
Rpost 100-yr	9.20
Increase in runoff 100-yr, 24-hr	0.51
Estimated Attenuation Volume (ac-ft)	1.228
Estimated Attenuation Depth (ft)	0.35

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	3600
Farthest Point (AH/BK?)	AH
EOP EL @ Furthest Point	40.00
DHW @ Pond (SHW + trt. & attn. depths)	34.95
HGL at Furthest Point (DHW+distancex0.0005)	36.78
Feasible?	YES
HGL at Lowest Critical Elevation	35.33
Feasible?	YES

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SFWMD POND SIZING CALCULATIONS

Project: SR 29 **Designed By:** RE **Date:** 27-May-10
FPID No. 417878-1-22-01 **Checked By:** DK **Date:** 24-Mar-11
FDA No.: 149.29

BASIN 7

TOTAL ROADWAY IMPERVIOUS =	8.78 AC
TOTAL PROJECT AREA =	34.06 AC
TOTAL POND AREA=	5.45 AC
WATER SURFACE AREA:	4.13 AC

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= 29.93 AC

% IMPERVIOUS= 25.8%

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= 1.61 AC-FT

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= 2.41 Ac-ft

Faller, Davis & Associates, Inc.
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POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: DK

Date: 27-May-10
Date: 24-Mar-11

Project Data	
Basin #	8
Pond #	8A
Basin Limits:	
From Station	527+00
To Station	582+60
Pond Station	576+00
Distance from Roadway (ft)	50
Control EL	31.90
Source	D/S Impoundment
Lowest Critical Elevation	35
Description	Exist. EOP RT.
Station	579+10
Typical Section (Imperivous width in R/W):	
Existing (ft)	24
Proposed (ft)	85
R/W width (ft)	277

Typical Sections

Existing is 2-12' Lanes

Proposed is 4-12' Lanes, 12' Turnlane
2-5' shldr., 1-15' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
24.60	12.30	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Wet	
Basin Length (ft)	5560	
Treat. Vol. (CF)	136778	
Treat. Vol. (Ac-ft)	3.14	
Atten. Depth (ft)	0.61	
Treat. Depth (ft)	1.3	
L at Control (ft)	324	
L at TOB (ft)	340	
L Berm (ft)	380	
Est. Site Acre	3.309	

POND SITE SIZE REQUIRED
4.1 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	81.6
CN post	85.5
S pre	2.26
S post	1.69
Rpre 100-yr	8.69
Rpost 100-yr	9.20
Increase in runoff 100-yr, 24-hr	0.51
Estimated Attenuation Volume (ac-ft)	1.517
Estimated Attenuation Depth (ft)	0.61

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	4900
Farthest Point (AH/BK?)	BK
EOP EL @ Furthest Point	40.00
DHW @ Pond (SHW + trt. & attn. depths)	33.81
HGL at Furthest Point (DHW+distancex0.0005)	36.28
Feasible?	YES
HGL at Lowest Critical Elevation	33.99
Feasible?	YES

Faller, Davis & Associates, Inc.
CONSULTING ENGINEERS

SFWMD POND SIZING CALCULATIONS

Project: SR 29 **Designed By:** RE **Date:** 27-May-10
FPID No. 417878-1-22-01 **Checked By:** DK **Date:** 24-Mar-11
FDA No.: 149.29

BASIN 8A

TOTAL ROADWAY IMPERVIOUS =	10.85 AC
TOTAL PROJECT AREA =	39.49 AC
TOTAL POND AREA=	4.14 AC
WATER SURFACE AREA:	2.90 AC

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= 36.59 AC

% IMPERVIOUS= 27.5%

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= 2.09 AC-FT

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= 3.14 Ac-ft

Faller, Davis & Associates, Inc.
CONSULTING ENGINEERS

POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: D. Knighton

Date: 27-May-10
Date: 24-Mar-11

Project Data	
Basin #	8
Pond #	8B
Basin Limits:	
From Station	582+60
To Station	604+60
Pond Station	587+50
Distance from Roadway (ft)	50
Control EL	31.90
Source	WL 6/2/10
Lowest Critical Elevation	35
Description	Exist. EOP RT.
Station	585+00
Typical Section (Imperivous width in R/W):	
Existing (ft)	24
Proposed (ft)	85
R/W width (ft)	277

Typical Sections

Existing is 2-12' Lanes

Proposed is 4-12' Lanes, 12' Turnlane
2-5' shldr., 1-15' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
23.08	11.54	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Wet	
Basin Length (ft)	2200	
Treat. Vol. (CF)	52708	
Treat. Vol. (Ac-ft)	1.21	
Atten. Depth (ft)	0.43	
Treat. Depth (ft)	0.9	
L at Control (ft)	242	
L at TOB (ft)	253	
L Berm (ft)	293	
Est. Site Acre	1.966	

POND SITE SIZE REQUIRED
2.5 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	81.6
CN post	85.5
S pre	2.26
S post	1.69
Rpre 100-yr	8.69
Rpost 100-yr	9.20
Increase in runoff 100-yr, 24-hr	0.51
Estimated Attenuation Volume (ac-ft)	0.600
Estimated Attenuation Depth (ft)	0.43

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	1710
Farthest Point (AH/BK?)	AH
EOP EL @ Furthest Point	35.20
DHW @ Pond (SHW + trt. & attn. depths)	33.23
HGL at Furthest Point (DHW+distancex0.0005)	34.11
Feasible?	YES
HGL at Lowest Critical Elevation	33.38
Feasible?	YES

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CONSULTING ENGINEERS

SFWMD POND SIZING CALCULATIONS

Project: SR 29 **Designed By:** RE **Date:** 27-May-10
FPID No. 417878-1-22-01 **Checked By:** DK **Date:** 24-Mar-11
FDA No.: 149.29

BASIN 8B

TOTAL ROADWAY IMPERVIOUS =	**4.29 AC**
TOTAL PROJECT AREA =	**16.45 AC**
TOTAL POND AREA=	**2.46 AC**
WATER SURFACE AREA:	**1.61 AC**

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= **14.83 AC**

% IMPERVIOUS= **26.1%**

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= **0.81 AC-FT**

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= **1.21 Ac-ft**

POND SIZING AND FEASIBILITY CALCULATIONS

Faller, Davis & Associates, Inc.
CONSULTING ENGINEERS

Project: SR 29
FPID No. 417878-1-22-01
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Designed By: RE
Checked By: D. Knighton

Date: 27-May-10
Date: 25-Mar-11

Project Data	
Basin #	9
Pond #	9
Basin Limits:	
From Station	604+60
To Station	656+60
Pond Station	628+50
Distance from Roadway (ft)	50
Control EL	30.80
Source	Wetland Contour
Lowest Critical Elevation	34.8
Description	Exist. EOP RT.
Station	625+00
Typical Section (Imperivous width in R/W):	
Existing (ft)	24
Proposed (ft)	85
R/W width (ft)	277

Typical Sections

Existing is 2-12' Lanes

Proposed is 4-12' Lanes, 12' Turnlane
2-5' shldr., 1-15' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
24.88	12.44	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Wet	
Basin Length (ft)	5200	
Treat. Vol. (CF)	129373	
Treat. Vol. (Ac-ft)	2.97	
Atten. Depth (ft)	0.69	
Treat. Depth (ft)	1.5	
L at Control (ft)	294	
L at TOB (ft)	311	
L Berm (ft)	351	
Est. Site Acre	2.831	

POND SITE SIZE REQUIRED
3.5 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	81.6
CN post	85.5
S pre	2.26
S post	1.69
Rpre 100-yr	8.69
Rpost 100-yr	9.20
Increase in runoff 100-yr, 24-hr	0.51
Estimated Attenuation Volume (ac-ft)	1.418
Estimated Attenuation Depth (ft)	0.69

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	2810
Farthest Point (AH/BK?)	AH
EOP EL @ Furthest Point	35.70
DHW @ Pond (SHW + trt. & attn. depths)	32.99
HGL at Furthest Point (DHW+distancex0.0005)	34.42
Feasible?	YES
HGL at Lowest Critical Elevation	33.19
Feasible?	YES

Faller, Davis & Associates, Inc.
CONSULTING ENGINEERS

SFWMD POND SIZING CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: DK

Date: 27-May-10
Date: 25-Mar-11

BASIN 9

TOTAL ROADWAY IMPERVIOUS =	10.15 AC
TOTAL PROJECT AREA =	36.61 AC
TOTAL POND AREA=	3.54 AC
WATER SURFACE AREA:	2.38 AC

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= 34.23 AC

% IMPERVIOUS= 27.7%

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= 1.98 AC-FT

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= 2.97 Ac-ft

Faller, Davis & Associates, Inc.
CONSULTING ENGINEERS

POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: D. Knighton

Date: 27-May-10
Date: 25-Mar-11

Project Data	
Basin #	10
Pond #	10
Basin Limits:	
From Station	656+60
To Station	675+00
Pond Station	668+50
Distance from Roadway (ft)	50
Control EL	33.20
Source	Contour
Lowest Critical Elevation	35.7
Description	Exist. EOP RT.
Station	656+60
Typical Section (Imperivous width in R/W):	
Existing (ft)	24
Proposed (ft)	85
R/W width (ft)	277

Typical Sections

Existing is 2-12' Lanes

Proposed is 4-12' Lanes, 12' Turnlane
2-5' shldr., 1-15' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
22.49	11.25	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Wet	
Basin Length (ft)	1840	
Treat. Vol. (CF)	41382	
Treat. Vol. (Ac-ft)	0.95	
Atten. Depth (ft)	0.26	
Treat. Depth (ft)	0.5	
L at Control (ft)	288	
L at TOB (ft)	294	
L Berm (ft)	334	
Est. Site Acre	2.557	

POND SITE SIZE REQUIRED
3.2 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	81.6
CN post	85.5
S pre	2.26
S post	1.69
Rpre 100-yr	8.69
Rpost 100-yr	9.20
Increase in runoff 100-yr, 24-hr	0.51
Estimated Attenuation Volume (ac-ft)	0.502
Estimated Attenuation Depth (ft)	0.26

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	1190
Farthest Point (AH/BK?)	BK
EOP EL @ Furthest Point	36.00
DHW @ Pond (SHW + trt. & attn. depths)	33.96
HGL at Furthest Point (DHW+distancex0.0005)	34.58
Feasible?	YES
HGL at Lowest Critical Elevation	34.58
Feasible?	YES

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SFWMD POND SIZING CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: DK

Date: 27-May-10
Date: 25-Mar-11

BASIN 10

TOTAL ROADWAY IMPERVIOUS =	3.59 AC
TOTAL PROJECT AREA =	14.90 AC
TOTAL POND AREA=	3.20 AC
WATER SURFACE AREA:	2.28 AC

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= 12.62 AC

% IMPERVIOUS= 24.1%

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= 0.63 AC-FT

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= 0.95 Ac-ft

Faller, Davis & Associates, Inc.
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POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: D. Knighton

Date: 27-May-10
Date: 25-Mar-11

Project Data	
Basin #	11
Pond #	11A
Basin Limits:	
From Station	675+00
To Station	696+00
Pond Station	690+00
Distance from Roadway (ft)	50
Control EL	34.00
Source	WL 6/2/10
Lowest Critical Elevation	36
Description	Exist. EOP RT.
Station	675+00
Typical Section (Imperivous width in R/W):	
Existing (ft)	24
Proposed (ft)	85
R/W width (ft)	277

Typical Sections

Existing is 2-12' Lanes

Proposed is 4-12' Lanes, 12' Turnlane
2-5' shldr., 1-15' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
16.39	8.19	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Wet	
Basin Length (ft)	2100	
Treat. Vol. (CF)	34412	
Treat. Vol. (Ac-ft)	0.79	
Atten. Depth (ft)	0.07	
Treat. Depth (ft)	0.1	
L at Control (ft)	587	
L at TOB (ft)	588	
L Berm (ft)	628	
Est. Site Acre	9.054	

POND SITE SIZE REQUIRED
11.3 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	81.6
CN post	85.5
S pre	2.26
S post	1.69
Rpre 100-yr	8.69
Rpost 100-yr	9.20
Increase in runoff 100-yr, 24-hr	0.51
Estimated Attenuation Volume (ac-ft)	0.573
Estimated Attenuation Depth (ft)	0.07

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	1500
Farthest Point (AH/BK?)	BK
EOP EL @ Furthest Point	36.00
DHW @ Pond (SHW + trt. & attn. depths)	34.17
HGL at Furthest Point (DHW+distancex0.0005)	34.95
Feasible?	YES
HGL at Lowest Critical Elevation	34.95
Feasible?	YES

Faller, Davis & Associates, Inc.
CONSULTING ENGINEERS

SFWMD POND SIZING CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: DK

Date: 27-May-10
Date: 25-Mar-11

BASIN 11A

TOTAL ROADWAY IMPERVIOUS =	4.10 AC
TOTAL PROJECT AREA =	24.67 AC
TOTAL POND AREA=	11.32 AC
WATER SURFACE AREA:	9.48 AC

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= 15.19 AC

% IMPERVIOUS= 16.6%

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= 0.53 AC-FT

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= 0.79 Ac-ft

POND SIZING AND FEASIBILITY CALCULATIONS

Faller, Davis & Associates, Inc.
CONSULTING ENGINEERS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: D. Knighton

Date: 27-May-10
Date: 25-Mar-11

Project Data	
Basin #	11
Pond #	11A
Basin Limits:	
From Station	675+00
To Station	696+00
Pond Station	690+00
Distance from Roadway (ft)	50
Control EL	34.00
Source	WL 6/2/10
Lowest Critical Elevation	37
Description	Exist. EOP RT.
Station	675+00
Typical Section (Imperivous width in R/W):	
Existing (ft)	24
Proposed (ft)	85
R/W width (ft)	277

Typical Sections

Existing is 2-12' Lanes

Proposed is 4-12' Lanes, 12' Turnlane
2-5' shldr., 1-15' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
23.65	11.82	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Wet	
Basin Length (ft)	2100	
Treat. Vol. (CF)	49658	
Treat. Vol. (Ac-ft)	1.14	
Atten. Depth (ft)	0.39	
Treat. Depth (ft)	0.8	
L at Control (ft)	249	
L at TOB (ft)	259	
L Berm (ft)	299	
Est. Site Acre	2.048	

Raised Road 1'

POND SITE SIZE REQUIRED
2.6 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	81.6
CN post	85.5
S pre	2.26
S post	1.69
Rpre 100-yr	8.69
Rpost 100-yr	9.20
Increase in runoff 100-yr, 24-hr	0.51
Estimated Attenuation Volume (ac-ft)	0.573
Estimated Attenuation Depth (ft)	0.39

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	1500
Farthest Point (AH/BK?)	BK
EOP EL @ Furthest Point	37.00
DHW @ Pond (SHW + trt. & attn. depths)	35.19
HGL at Furthest Point (DHW+distancex0.0005)	35.97
Feasible?	YES
HGL at Lowest Critical Elevation	35.97
Feasible?	YES

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CONSULTING ENGINEERS

SFWMD POND SIZING CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: DK

Date: 27-May-10
Date: 25-Mar-11

BASIN 11A - Road Raised 1'

TOTAL ROADWAY IMPERVIOUS =	4.10 AC
TOTAL PROJECT AREA =	15.91 AC
TOTAL POND AREA=	2.56 AC
WATER SURFACE AREA:	1.71 AC

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= 14.20 AC

% IMPERVIOUS= 25.7%

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= 0.76 AC-FT

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= 1.14 Ac-ft

Faller, Davis & Associates, Inc.
CONSULTING ENGINEERS

POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: D. Knighton

Date: 27-May-10
Date: 25-Mar-11

Project Data	
Basin #	11
Pond #	11B
Basin Limits:	
From Station	696+00
To Station	764+60
Pond Station	702+50
Distance from Roadway (ft)	50
Control EL	34.00
Source	WL 6/2/10
Lowest Critical Elevation	36.4
Description	Exist. EOP LT.
Station	699+00
Typical Section (Imperivous width in R/W):	
Existing (ft)	24
Proposed (ft)	85
R/W width (ft)	277

Typical Sections
Existing is 2-12' Lanes
Proposed is 4-12' Lanes, 12' Turnlane 2-5' shldr., 1-15' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
23.30	11.65	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Wet	
Basin Length (ft)	6860	
Treat. Vol. (CF)	159865	
Treat. Vol. (Ac-ft)	3.670	
Atten. Depth (ft)	0.35	
Treat. Depth (ft)	0.7	
L at Control (ft)	478	
L at TOB (ft)	486	
L Berm (ft)	526	
Est. Site Acre	6.359	

POND SITE SIZE REQUIRED
7.9 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	81.6
CN post	85.5
S pre	2.26
S post	1.69
Rpre 100-yr	8.69
Rpost 100-yr	9.20
Increase in runoff 100-yr, 24-hr	0.51
Estimated Attenuation Volume (ac-ft)	1.871
Estimated Attenuation Depth (ft)	0.35

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	6210
Farthest Point (AH/BK?)	AH
EOP EL @ Furthest Point	41.30
DHW @ Pond (SHW + trt. & attn. depths)	35.05
HGL at Furthest Point (DHW+distancex0.0005)	38.18
Feasible?	YES
HGL at Lowest Critical Elevation	35.25
Feasible?	YES

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SFWMD POND SIZING CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: DK

Date: 27-May-10
Date: 25-Mar-11

BASIN 11B

TOTAL ROADWAY IMPERVIOUS =	13.39 AC
TOTAL PROJECT AREA =	51.57 AC
TOTAL POND AREA=	7.95 AC
WATER SURFACE AREA:	6.29 AC

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= 45.28 AC

% IMPERVIOUS= 26.0%

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= 2.45 AC-FT

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= 3.67 Ac-ft

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POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: D. Knighton

Date: 27-May-10
Date: 26-Mar-11

Project Data	
Basin #	11
Pond #	11B
Basin Limits:	
From Station	696+00
To Station	764+60
Pond Station	702+50
Distance from Roadway (ft)	50
Control EL	34.00
Source	WL 6/2/10
Lowest Critical Elevation	37.4
Description	Exist. EOP LT.
Station	699+00
Typical Section (Imperivous width in R/W):	
Existing (ft)	24
Proposed (ft)	85
R/W width (ft)	277

Typical Sections

Existing is 2-12' Lanes

Proposed is 4-12' Lanes, 12' Turnlane
2-5' shldr., 1-15' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
24.70	12.35	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Wet	
Basin Length (ft)	6860	
Treat. Vol. (CF)	169448	
Treat. Vol. (Ac-ft)	3.890	
Atten. Depth (ft)	0.65	
Treat. Depth (ft)	1.4	
L at Control (ft)	348	
L at TOB (ft)	364	
L Berm (ft)	404	
Est. Site Acre	3.753	

Raised Road 1'

POND SITE SIZE REQUIRED
4.7 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	81.6
CN post	85.5
S pre	2.26
S post	1.69
Rpre 100-yr	8.69
Rpost 100-yr	9.20
Increase in runoff 100-yr, 24-hr	0.51
Estimated Attenuation Volume (ac-ft)	1.871
Estimated Attenuation Depth (ft)	0.65

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	6210
Farthest Point (AH/BK?)	AH
EOP EL @ Furthest Point	41.30
DHW @ Pond (SHW + trt. & attn. depths)	36.05
HGL at Furthest Point (DHW+distancex0.0005)	39.18
Feasible?	YES
HGL at Lowest Critical Elevation	36.25
Feasible?	YES

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SFWMD POND SIZING CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: DK

Date: 27-May-10
Date: 26-Mar-11

BASIN 11B - Road Raised 1' at Critical Low Area

TOTAL ROADWAY IMPERVIOUS =	13.39 AC
TOTAL PROJECT AREA =	48.31 AC
TOTAL POND AREA=	4.69 AC
WATER SURFACE AREA:	3.33 AC

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= 44.98 AC

% IMPERVIOUS= 27.7%

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= 2.60 AC-FT

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= 3.89 Ac-ft

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POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: D. Knighton

Date: 27-May-10
Date: 26-Mar-11

Project Data	
Basin #	12
Pond #	12-13A
Basin Limits:	
From Station	764+60
To Station	827+80
Pond Station	795+50
Distance from Roadway (ft)	50
Control EL	35.20
Source	Site Elevation
Lowest Critical Elevation	40.1
Description	Exist. EOP RT.
Station	779+00
Typical Section (Imperivous width in R/W):	
Existing (ft)	24
Proposed (ft)	85
R/W width (ft)	277

Typical Sections
Existing is 2-12' Lanes
Proposed is 4-12' Lanes, 12' Turnlane 2-5' shldr., 1-15' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
24.81	12.41	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Wet	
Basin Length (ft)	6320	
Treat. Vol. (CF)	156816	
Treat. Vol. (Ac-ft)	3.6	
Atten. Depth (ft)	0.69	
Treat. Depth (ft)	1.5	
L at Control (ft)	323	
L at TOB (ft)	341	
L Berm (ft)	381	
Est. Site Acre	3.330	

POND SITE SIZE REQUIRED
4.2 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	81.6
CN post	85.5
S pre	2.26
S post	1.69
Rpre 100-yr	8.69
Rpost 100-yr	9.20
Increase in runoff 100-yr, 24-hr	0.51
Estimated Attenuation Volume (ac-ft)	1.724
Estimated Attenuation Depth (ft)	0.69

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	3230
Farthest Point (AH/BK?)	AH
EOP EL @ Furthest Point	41.00
DHW @ Pond (SHW + trt. & attn. depths)	37.39
HGL at Furthest Point (DHW+distancex0.0005)	39.03
Feasible?	YES
HGL at Lowest Critical Elevation	38.24
Feasible?	YES

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CONSULTING ENGINEERS

SFWMD POND SIZING CALCULATIONS

Project: SR 29 **Designed By:** RE **Date:** 27-May-10
FPID No. 417878-1-22-01 **Checked By:** DK **Date:** 26-Mar-11
FDA No.: 149.29

BASIN 12-13A

TOTAL ROADWAY IMPERVIOUS =	12.33 AC
TOTAL PROJECT AREA =	44.35 AC
TOTAL POND AREA=	4.16 AC
WATER SURFACE AREA:	2.88 AC

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= 41.47 AC

% IMPERVIOUS= 27.8%

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= 2.40 AC-FT

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= 3.60 Ac-ft

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POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: D. Knighton

Date: 27-May-10
Date: 26-Mar-11

Project Data	
Basin #	13
Pond #	13B
Basin Limits:	
From Station	827+80
To Station	870+70
Pond Station	835+50
Distance from Roadway (ft)	50
Control EL	37.50
Source	WL 6/2/10
Lowest Critical Elevation	40.7
Description	Exist. EOP RT.
Station	830+00
Typical Section (Imperivous width in R/W):	
Existing (ft)	24
Proposed (ft)	85
R/W width (ft)	277

Typical Sections
Existing is 2-12' Lanes
Proposed is 4-12' Lanes, 12' Turnlane 2-5' shldr., 1-15' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
24.47	12.24	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Wet	
Basin Length (ft)	4290	
Treat. Vol. (CF)	104980	
Treat. Vol. (Ac-ft)	2.41	
Atten. Depth (ft)	0.56	
Treat. Depth (ft)	1.2	
L at Control (ft)	296	
L at TOB (ft)	310	
L Berm (ft)	350	
Est. Site Acre	2.810	

POND SITE SIZE REQUIRED
3.5 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	81.6
CN post	85.5
S pre	2.26
S post	1.69
Rpre 100-yr	8.69
Rpost 100-yr	9.20
Increase in runoff 100-yr, 24-hr	0.51
Estimated Attenuation Volume (ac-ft)	1.170
Estimated Attenuation Depth (ft)	0.56

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	3520
Farthest Point (AH/BK?)	AH
EOP EL @ Furthest Point	42.20
DHW @ Pond (SHW + trt. & attn. depths)	39.26
HGL at Furthest Point (DHW+distancex0.0005)	41.05
Feasible?	YES
HGL at Lowest Critical Elevation	39.56
Feasible?	YES

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CONSULTING ENGINEERS

SFWMD POND SIZING CALCULATIONS

Project: SR 29 **Designed By:** RE **Date:** 27-May-10
FPID No. 417878-1-22-01 **Checked By:** DK **Date:** 26-Mar-11
FDA No.: 149.29

BASIN 13B

TOTAL ROADWAY IMPERVIOUS =	**8.37 AC**
TOTAL PROJECT AREA =	**30.79 AC**
TOTAL POND AREA=	**3.51 AC**
WATER SURFACE AREA:	**2.41 AC**

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= **28.38 AC**

% IMPERVIOUS= **27.2%**

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= **1.61 AC-FT**

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= **2.41** **Ac-ft**

Faller, Davis & Associates, Inc.
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POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: RE
Checked By: D. Knighton

Date: 27-May-10
Date: 26-Mar-11

Project Data	
Basin #	14
Pond #	14A
Basin Limits:	
From Station	870+70
To Station	911+00
Pond Station	905+00
Distance from Roadway (ft)	50
Control EL	37.90
Source	WL 6/2/10
Lowest Critical Elevation	41.3
Description	Exist. EOP RT.
Station	894+80
Typical Section (Imperivous width in R/W):	
Existing (ft)	24
Proposed (ft)	85
R/W width (ft)	277

Typical Sections
Existing is 2-12' Lanes
Proposed is 4-12' Lanes, 12' Turnlane 2-5' shldr., 1-15' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
24.21	12.11	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Wet	
Basin Length (ft)	4030	
Treat. Vol. (CF)	97574	
Treat. Vol. (Ac-ft)	2.24	
Atten. Depth (ft)	0.48	
Treat. Depth (ft)	1	
L at Control (ft)	312	
L at TOB (ft)	324	
L Berm (ft)	364	
Est. Site Acre	3.045	

POND SITE SIZE REQUIRED
3.8 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	81.6
CN post	85.5
S pre	2.26
S post	1.69
Rpre 100-yr	8.69
Rpost 100-yr	9.20
Increase in runoff 100-yr, 24-hr	0.51
Estimated Attenuation Volume (ac-ft)	1.099
Estimated Attenuation Depth (ft)	0.48

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	3430
Farthest Point (AH/BK?)	BK
EOP EL @ Furthest Point	42.20
DHW @ Pond (SHW + trt. & attn. depths)	39.38
HGL at Furthest Point (DHW+distancex0.0005)	41.12
Feasible?	YES
HGL at Lowest Critical Elevation	39.91
Feasible?	YES

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CONSULTING ENGINEERS

SFWMD POND SIZING CALCULATIONS

Project: SR 29 **Designed By:** RE **Date:** 27-May-10
FPID No. 417878-1-22-01 **Checked By:** DK **Date:** 26-Mar-11
FDA No.: 149.29

BASIN 14A

TOTAL ROADWAY IMPERVIOUS =	7.86 AC
TOTAL PROJECT AREA =	29.43 AC
TOTAL POND AREA=	3.81 AC
WATER SURFACE AREA:	2.69 AC

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= 26.75 AC

% IMPERVIOUS= 26.7%

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= 1.49 AC-FT

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= 2.23 Ac-ft

Faller, Davis & Associates, Inc.
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POND SIZING AND FEASIBILITY CALCULATIONS

Project: SR 29
FPID No. 417878-1-22-01
FDA No.: 149.29

Designed By: R. Endrzejewski
Checked By: D. Knighton

Date: 16-Sep-10
Date: 26-Mar-11

Project Data	
Basin #	14b-15
Pond #	14b-15
Basin Limits:	
From Station	911+00
To Station	950+20
Pond Station	919+00
Distance from Roadway (ft)	50
Control EL	37.90
Source	WL 6/2/10
Lowest Critical Elevation	41.25
Description	Exist. EOP Rt.
Station	948+60
Typical Section (Imperivous width in R/W):	
Existing (ft)	24
Proposed (ft)	85
R/W width (ft)	277

Typical Sections
Existing is 2-12' Lanes
Proposed is 4-12' Lanes, 12' Turnlane 2-5' shldr., 1-15' S/W

Note: Input Data Fields

Sizing Per Treatment Volume		
Note: Assume a Square Pond		
Calculate Treat. Volume Required:		
Wet Pond Vol/LF	Dry Pond Vol./LF	
22.45	11.22	
Side Slope,	4	
Maint. Berm (ft)	20	
Wet/Dry?	Wet	
Basin Length (ft)	3920	
Treat. Vol. (CF)	87991	
Treat. Vol. (Ac-ft)	2.02	
Atten. Depth (ft)	0.26	
Treat. Depth (ft)	0.5	
L at Control (ft)	420	
L at TOB (ft)	426	
L Berm (ft)	466	
Est. Site Acre	4.977	

POND SITE SIZE REQUIRED
6.2 ACRES

(Includes 25% Contingency)

Attenuation Volume Calculations	
Note: Comparison is within R/W area only	
Assume Offsite area same pre vs. post	
Assume Grass is Hydrological Group D (CN=80)	
Use NRCS Equation for Runoff:	
P= (100-yr, 24-hr) (inches)	11
CN pre	81.6
CN post	85.5
S pre	2.26
S post	1.69
Rpre 100-yr	8.69
Rpost 100-yr	9.20
Increase in runoff 100-yr, 24-hr	0.51
Estimated Attenuation Volume (ac-ft)	1.069
Estimated Attenuation Depth (ft)	0.26

Feasibility	
Note: Assume 0.05/100 ft HGL Slope Average	
Farthest Distance to Easement (ft)	3120
Farthest Point (AH/BK?)	AH
EOP EL @ Furthest Point	41.40
DHW @ Pond (SHW + trt. & attn. depths)	38.66
HGL at Furthest Point (DHW+distancex0.0005)	40.25
Feasible?	YES
HGL at Lowest Critical Elevation	40.17
Feasible?	YES

Fuller, Davis & Associates, Inc.
CONSULTING ENGINEERS

SFWMD POND SIZING CALCULATIONS

Project: SR 29 **Designed By:** re **Date:** 27-May-10
FPID No. 417878-1-22-01 **Checked By:** dk **Date:** 26-Mar-11
FDA No.: 149.29

BASIN 14b-15

TOTAL ROADWAY IMPERVIOUS =	7.65 AC
TOTAL PROJECT AREA =	31.15 AC
TOTAL POND AREA=	6.22 AC
WATER SURFACE AREA:	4.85 AC

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= 26.30 AC

% IMPERVIOUS= 24.6%

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= 1.35 AC-FT

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= 2.02 Ac-ft

Fuller, Davis & Associates, Inc.
CONSULTING ENGINEERS

SFWMD POND SIZING CALCULATIONS

Project: SR 29 **Designed By:** RE **Date:** 27-May-10
FPID No. 417878-1-22-01 **Checked By:** dk **Date:**
FDA No.: 149.29

BASIN 16A

TOTAL ROADWAY IMPERVIOUS =	5.62 AC
TOTAL PROJECT AREA =	24.86 AC
TOTAL POND AREA=	3.80 AC
WATER SURFACE AREA:	2.76 AC

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL AREA-WATER SURFACE AREA= 22.10 AC

% IMPERVIOUS= 22.6%

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= 1.04 AC-FT

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= 1.56 Ac-ft

Fallen, Davis & Associates, Inc.
CONSULTING ENGINEERS

SFWMD POND SIZING CALCULATIONS

Project: SR 29 **Designed By:** D. Knighton **Date:** 27-May-10
FPID No. 417878-1-22-01 **Checked By:** **Date:**
FDA No.: 149.29

BASIN 16-17

TOTAL ROADWAY IMPERVIOUS =	**19.30 AC**
TOTAL R/W AREA =	**115.11 AC**
TOTAL POND AREA=	**64.45 AC**
TOTAL PROJECT AREA =	**179.56 AC**
WATER SURFACE AREA:	**64.45 AC**

TOTAL PERCENT IMPERVIOUS:

(SITE AREA=TOTAL PROJECT AREA-WATER SURFACE AREA= **115.11 AC**

% IMPERVIOUS= **10.7%**

TREATMENT REQUIRED:

2.5" x % IMPERV. x SITE AREA= **2.58 AC-FT**

Impaired Waterbody, provide 150% of required treatment

TREATMENT REQUIRED= **3.87 Ac-ft**

BORROW PIT SIZE	64.45 AC.
Depth of Treatment	0.06 ft.

Appendix 5.0

Trash and Sediment Removal Devices

Faller, Davis and Associates, Inc.

COMP. BY: DK
CK. BY:
DATE: 4-12-11
SHEET NO.:
JOB NO.:

SUBJECT: New Bridge over Caloosahatchee (Main Street)

Bridge length from high point South to La Belle
$\approx$ 650'

Bridge width = 41' 0.5" = 41.04'

Contributing Area = $650 \times 41.04 \div 43560 = 0.61$ ac

Use rational Method: $Q = C \cdot A$

Zone 8, assume TC = 10 minutes, C = 0.95

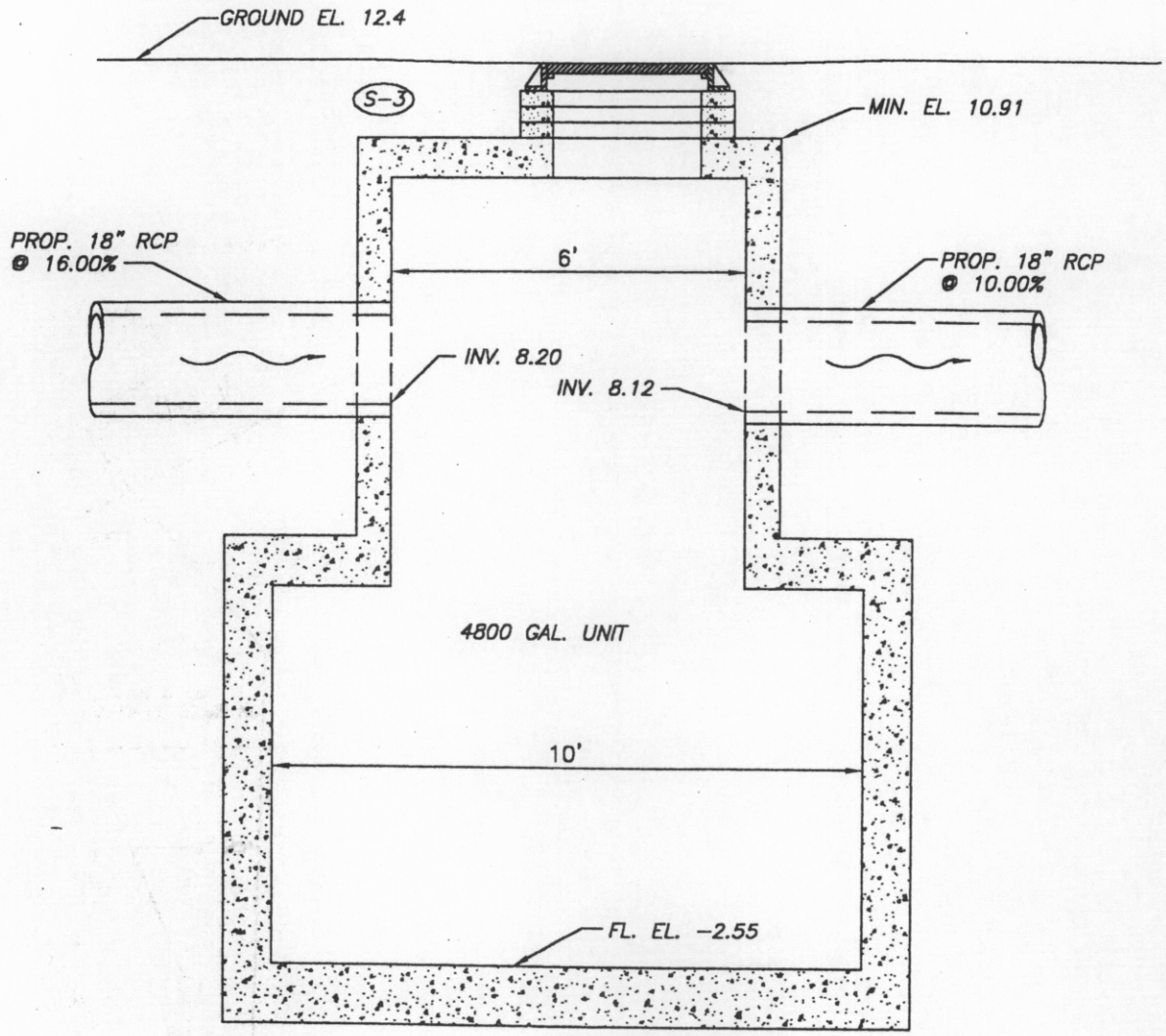
$i_{2yr} = 6.2$ $i_{10yr} = 7.5$ $i_{100yr} = 10.0$

$Q_{2yr} = 0.95 \times 6.2 \times 0.61 = 3.6$ cfs

$Q_{10yr} = 0.95 \times 7.5 \times 0.61 = 4.3$ cfs

$Q_{100yr} = 0.95 \times 10.0 \times 0.61 = 5.8$ cfs

SW

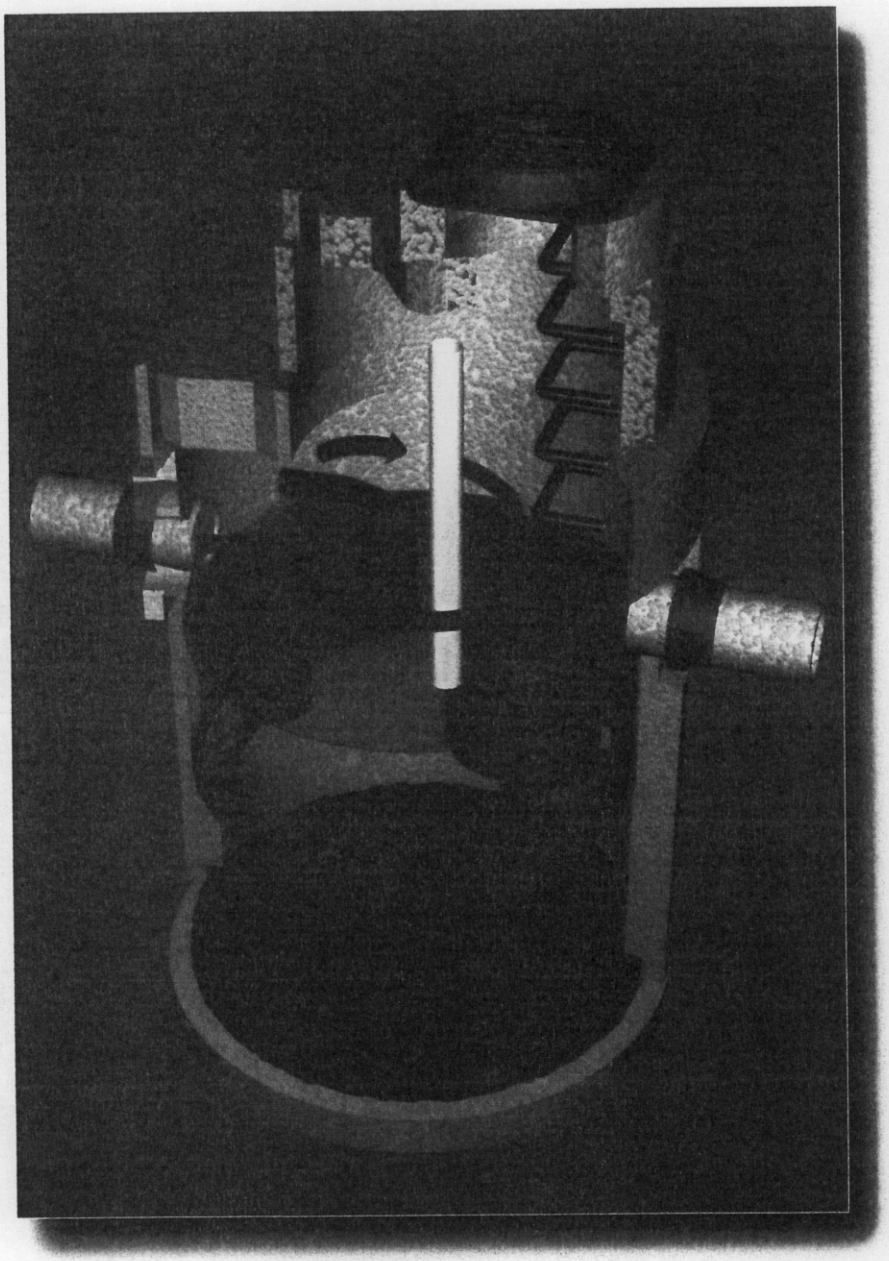


NORTH ST. OUTFALL
LOCATION #3 - JEAN ST.
N.T.S.

Structure designed to utilize Stormceptor insert

CITY of TAMPA DEPARTMENT OF SANITARY SEWERS STORMWATER DIVISION	STORMWATER SEDIMENT REMOVAL PILOT PROJECT: NORTH ST. OUTFALL LOCATION # 3 (JEAN ST.)	W.O. 5423 SHEET 15 OF 21

CSR™

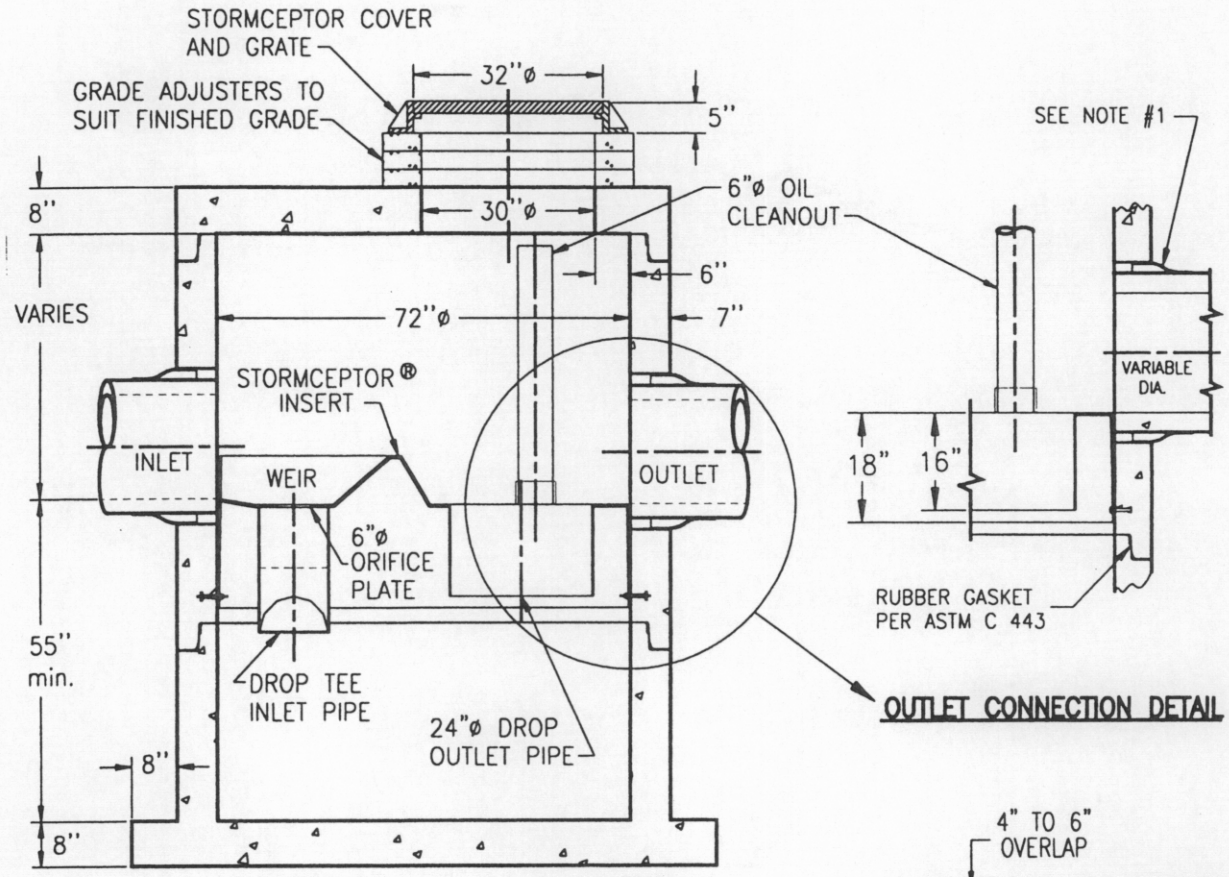


THE STORMCEPTOR® SYSTEM

Technical Manual

Appendix A

STC 900 Precast Concrete Stormceptor®
(900 US Gallon Capacity)

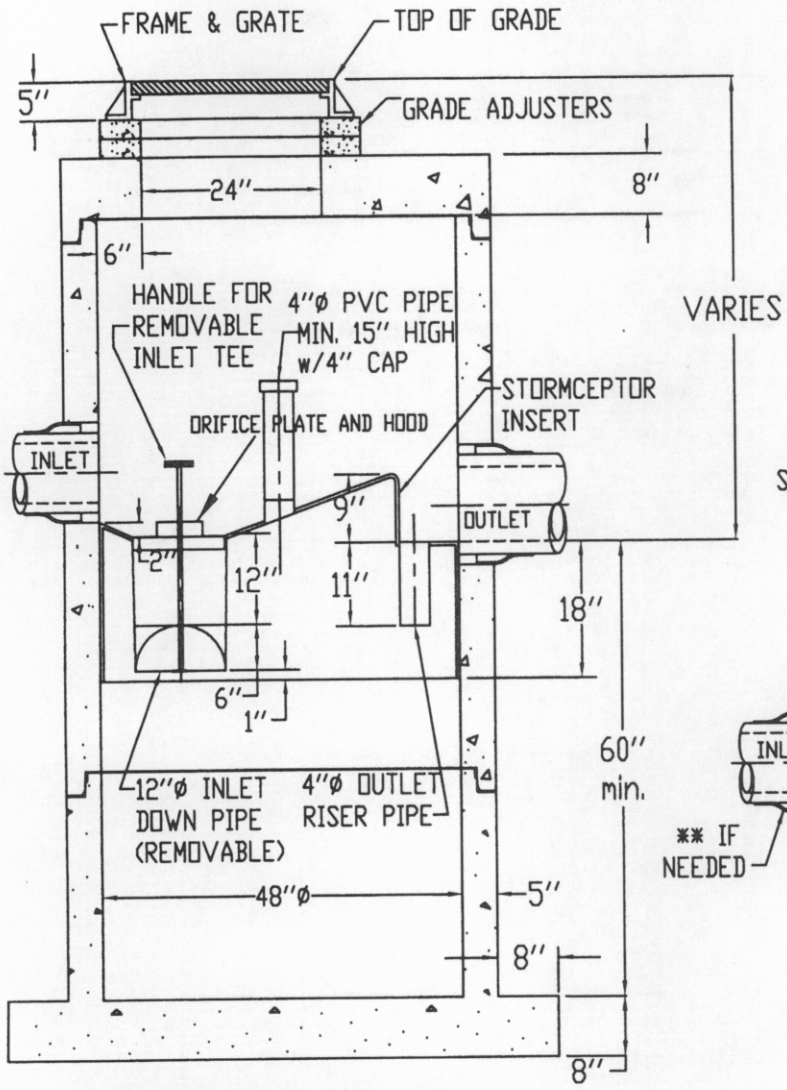


NOTE :

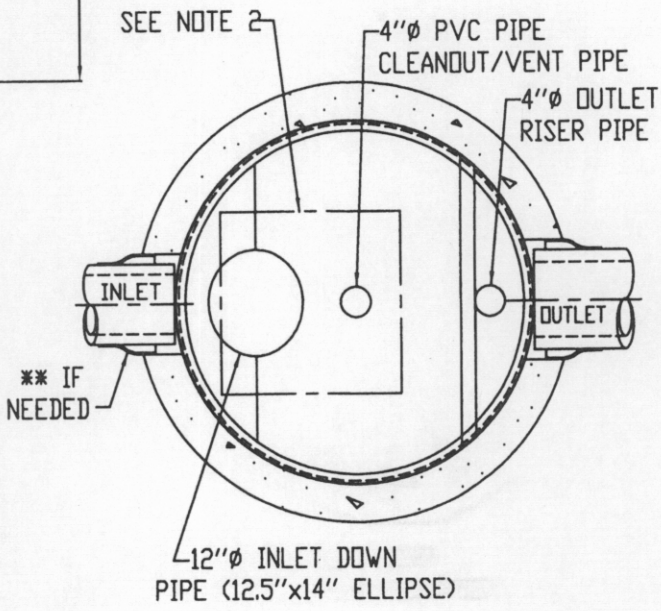
1. THE USE OF FLEXIBLE CONNECTIONS IS RECOMMENDED AT THE INLET AND OUTLET WHERE APPLICABLE.
2. THE COVER SHOULD BE POSITIONED OVER THE OUTLET DROP PIPE AND THE OIL CLEANOUT PIPE.
3. THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: #4985148, #5498331, #5725760, #5753115, #5849181.

Appendix A

STC 450*i* Precast Concrete Stormceptor®
(450 US Gallon Capacity)



SECTION THRU CHAMBER



SECTION THRU PLAN VIEW

NOTE :

1. THE USE OF FLEXIBLE CONNECTIONS IS RECOMMENDED AT THE OUTLET WHERE APPLICABLE.
2. THE COVER SHOULD BE POSITIONED OVER THE 4"ø CLEANOUT/VENT PIPE.
3. THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OFF THE FOLLOWING U.S. PATENTS: #4985148, #5498331, #5725760, #5753115, #5849181.
4. CONTRACTOR TO PROVIDE CRANE TO SET UNIT (HEAVIEST SECTION WEIGHS 5000 LB)

This size unit can handle 5.8 cfs 100yr storm event

The different flow rates are achieved by manipulating the down pipe orifice diameter. The weir directing the flow through the lower treatment chamber is manufactured at a constant height of 8" for all of the units. Since the outlet is 1" lower than the inlet, a total potential head of 9" is available to convey flow through the lower treatment chamber before overflow conditions occur. The down pipe diameter for each size of Stormceptor is shown in Table 3.

The by-pass flow rate is simply a function of head over the overflow weir.

Table 4. By-Pass Flow Rate

Head (in)	STC 450*i* (cfs)	STC 900-7200 (cfs)	STC 11000*s*-16000*s* (cfs)
1	0.20	0.36	0.56
2	0.55	1.01	1.56
4	1.54	2.87	4.45
6	2.85	5.35	8.31
8	4.44	8.37	13.05
10	6.27	11.90	18.60
12	8.33	15.91	24.94
15	11.82	22.79	35.87
18	15.74	30.67	48.47
21	20.06	39.53	62.73

Digital AutoCad drawings for all of the Stormceptor models are available from the CSR Stormceptor office at (800) 909-7763 or at www.csrstormceptor.com.

2.4 Design Parameters

There are some standard design parameters that must be provided in any storm drain design with a Stormceptor installation.

Inlet / Outlet Elevation Difference

Inlet Stormceptor
There is a three inch difference in elevation between the inlet invert and outlet invert in the Inlet Stormceptor (450i).

In-Line Stormceptor:
There is a one inch difference in elevation between the inlet invert and the outlet invert in an In-Line Stormceptor designed for one inlet. There is a three inch difference in elevation between the inlet invert and the outlet invert in an In-Line Stormceptor designed for multiple inlets. Storm drain designs must accommodate this elevation difference.

Series Stormceptor
The STCs Series Stormceptor consists of two treatment chambers connected by piping. Each circular chamber has a one inch difference in elevation between the inlet invert and the outlet invert. Additionally, there is a one inch drop between each structure, for a total drop of three inches.

New Residential Subdivisions

Stormceptor is not intended to replace natural storm water management system solutions (wet ponds, wetlands) for large residential subdivisions. However, Stormceptor is effective as part of the treatment train approach in these developments. The use of Stormceptor for street drainage can help to offset long-term maintenance costs if catch-basin sumps are eliminated.

In these situations, maintenance is centralized at Stormceptor locations reducing the time and cost of storm drain maintenance.

1.2 Stormceptor System Operation

The Stormceptor consists of a lower treatment chamber, which is always full of water, and a by-pass chamber. Storm water flows into the by-pass chamber via the storm drain or grated inlet (Inlet Stormceptor). Normal flows are diverted by a weir and drop pipe arrangement into a treatment chamber. Water flows up through the submerged outlet pipe based on the head at the inlet weir and is discharged back into the by-pass chamber downstream of the weir. The downstream section of the pipe is connected to the outlet storm drain pipe.

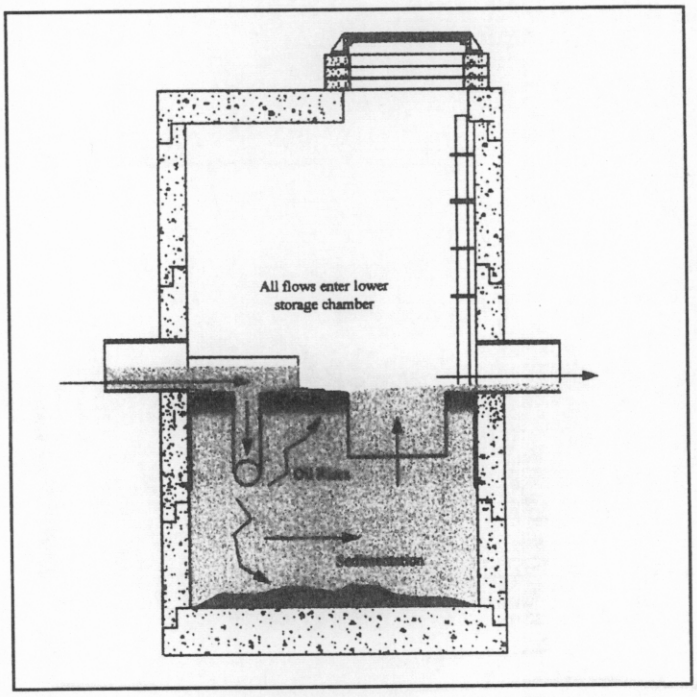


Figure 1. Stormceptor Operation During Normal Flow Conditions

Oil and other liquids with a specific gravity less than water will rise in the treatment chamber and become trapped under the fiberglass weir, since the outlet pipe is submerged. Sediment will settle to the bottom of the chamber by gravity. The circular design of the treatment chamber helps to prevent turbulent eddy currents and to promote settling.

During infrequent high flow conditions, storm water will by-pass the weir and be conveyed to the outlet storm drain directly (Figure 2). Water, which overflows the weir, creates a backwater effect on the outlet pipe (head stabilization between the inlet drop pipe and outlet riser pipe) ensuring that excessive flow will not be forced into the treatment chamber which could scour or resuspend the settled material. The by-pass is an integral part of the Stormceptor since other oil/grit separators have been noted to scour during high flow conditions (Schueler and Shepp, 1993).

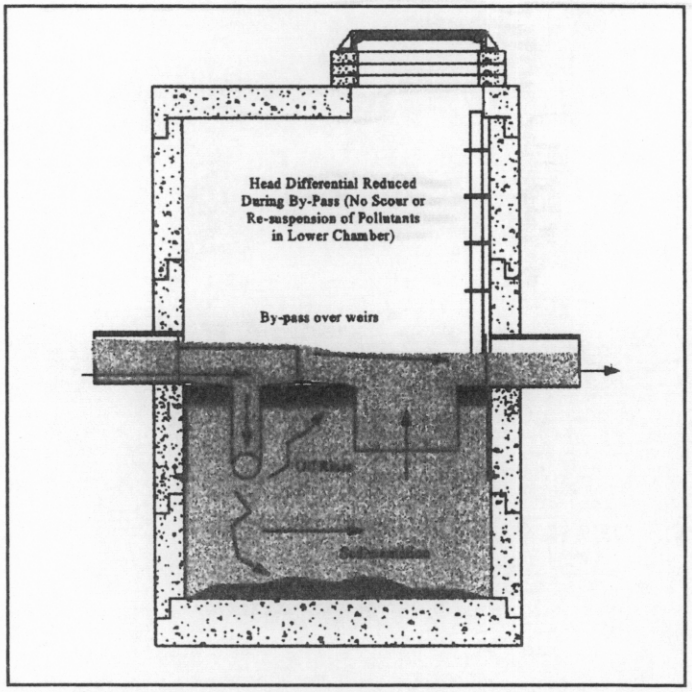


Figure 2. Stormceptor Operation During High Flow Conditions

Stormceptor comes complete to the job site with its own frame and cover. The cover (excluding the inlet design) has the name STORMCEPTOR clearly embossed on it to allow easy identification of the unit in the field for maintenance.

Down Pipe and Riser Pipe

Once the by-pass section has been attached to the lower treatment chamber, the inlet down pipe, and outlet riser pipe must be attached. Pipe installation instructions and required materials are provided with the insert.

Inlet and Outlet Pipes

Inlet and outlet pipes should be securely set into the by-pass chamber using grout, boots, or approved pipe seals so that the structure is watertight. Boots are normally used and installed at the precast concrete plant prior to shipping. Boots are applicable for pipes with an outside diameter up to 44". Installation of the boots should follow the manufacturer's recommendations. The following procedure should be followed to attach the inlet and outlet pipes at the Stormceptor:

1. Center the pipe in the boot opening
2. Lubricate the outside of the pipe and/or inside of the boot if the pipe outside diameter is the same as the inside diameter of the boot
3. Position the pipe clamp in the groove of the boot with the screw at the top
4. Tighten the pipe clamp screw per manufacturers requirement
5. On minimum outside diameter installations lift the boot such that it contacts the bottom of the pipe while tightening the pipe clamp to ensure even contraction of the rubber.
6. Move the pipe horizontally and/or vertically to bring it to grade

Frame and Cover Installation

Precast concrete adjustment units should be installed to set the frame and cover at the required elevation. The adjustment units should be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover should be set in a full bed of mortar at the elevation specified. Orientation of the frame and cover must allow access to the 24" oulet riser pipe as well as the oil inspection port.

4.0 Stormceptor Maintenance Guidelines

The performance of all storm water quality measures decrease as they fill with sediment. Although the maintenance frequency will be site specific, CSR generally recommends annual maintenance be performed or when the sediment volume in the unit reaches 15% of the total storage. This recommendation is based on several factors:

- Minimal performance degradation due to sediment build-up.
- Sediment removal is easier when removed on a regular basis (as sediment builds up it compacts and solidifies making maintenance more difficult).
- Development of a routine maintenance interval helps ensure a regular maintenance schedule is followed. Although the frequency of maintenance will depend on site conditions, it is estimated that annual maintenance will be required for most applications; annual maintenance is a routine occurrence which is easy to plan for and remember.

Hydrocarbon Spills

In the event of any hazardous material spill, CSR recommends maintenance be performed immediately. Maintenance should be performed by a licensed liquid waste hauler. You should also notify the appropriate regulatory agencies as required.

4.1 Recommended Maintenance Procedure

Oil is removed through the 6" inspection/cleanout pipe and sediment is removed through the 24" diameter outlet riser pipe. Alternatively, oil could be removed from the 24" opening if water is removed from the treatment chamber, lowering the oil level below the drop pipes.

The depth of sediment can be measured from the surface of the Stormceptor with a dipstick tube equipped with a ball valve (Sludge Judge®). CSR recommends maintenance be performed once the sediment depth exceeds the guideline values provided in Table 8.

Table 8. Sediment Depths Indicating Required Maintenance*

Model	Sediment Depth
450*i*	8" (200 mm)
900	8" (200 mm)
1200	10" (250 mm)
1800	15" (375 mm)
2400	12" (300 mm)
3600	17" (425 mm)
4800	15" (375 mm)
6000	18" (450 mm)
7200	15" (375 mm)
11000*s*	15" (375 mm)**
13000*s*	18" (375 mm)**
16000*s*	15" (375 mm)**

* *Depths are approximate*

** *Depths in each structure*

No entry into the unit is required for routine maintenance of the Inlet Stormceptor or the smaller disc insert models of the In-Line Stormceptor. Entry to the level of the by-pass may be required for servicing the larger in-line models. Any potential obstructions at the inlet can be observed from the surface. The by-pass chamber has been designed as a platform for authorized maintenance personnel, in the event that an obstruction needs to be removed, drain flushing needs to be performed, or camera surveys are required.

Typically, maintenance is performed by the Vacuum Service Industry, a well established sector of the service industry that cleans underground tanks, sewers, and catch-basins. Costs to clean a Stormceptor will vary based on the size of the unit and transportation distances. If you need assistance for cleaning a Stormceptor unit, contact your local CSR representative, or the CSR Stormceptor Information Line at (800) 909-7763.

PRODUCTS >>
- Bridges and Structures
- Erosion Control
- Pipe
- Retaining Walls
- Roadway & Earth Stabilization
- Stormwater Management

APPLICATIONS >>
- Low Impact Development
- Water Quality Protection
- Stormwater Detention
- Stormwater Infiltration
- Inlet and Outfall Protection
- Industrial Stormwater

CDS®

Product Description | Docs & Tools | Applications | LEED | Project Profiles | Photos

Superior Trash Removal from Urban Runoff

The CDS system uses continuous deflective separation – a combination of swirl concentration and patented indirect screening – to provide you with a uniquely capable product. It effectively screens, separates and traps debris, sediment and oil from stormwater runoff and is an ideal system to meet trash Total Maximum Daily Load (TMDL) requirements.

With the CDS system you'll get:

One-of-a-Kind Screening Technology

- Captures and retains 100% of floatables
- Self-cleaning screen – only non-blocking screening technology available
- Water velocities within the swirl chamber continually shear debris off the screen to keep it clean
- Various screening apertures available

Proven Performance

- Performance verified by NJ CAT and WA DOE

Excellent Pollutant Retention

- Isolated Storage Sump eliminates washout potential
- Oil Baffle improves hydrocarbon removal

Multiple Options to Meet Site-Specific Needs

- Inline, offline, grate inlet and drop inlet
- Multiple pipe inlets – eliminate the need for junction manholes and offset pipe orientations
- Internal and external bypass available
- High treatment flow capacity – up to 300 cfs

connect with CONTECH

Your local contact Quick Find.
Enter your project's zip code below.

Your role: contractor

Zip code: Go

start a PROJECT

request a QUOTE

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Resource Links

HDS Overview

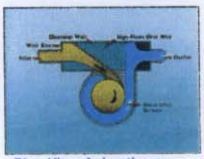
Operation/Design/Performance

CDS Animations

To save an animation to your computer, right-click the title and Save as.

Adobe Flash is required to view this file. Click here for free download.

Modified Inline Animation



Plan View Animation

Offline Animation

CDS is the most effective system for the sustainable removal and retention of suspended solids and floatables from storm water.

REMOVES POLLUTANTS

The Continuous Deflective Separation (CDS) technology utilizes a non-blocking, non-mechanical screening process to remove pollutants from storm water flow and combined sewer overflows (CSO). CDS units capture fine sands and solids and are capable of removing more than 80% of annual total suspended solids from storm water. Additionally, CDS units remove 100% of floatables and 100% of all particles in the storm water which are equal to or greater than one-half the size of the screen opening. Studies show the units remove 93% of all particles which are one-third the size of the screen opening, and 53% of all particles one-fifth the size of the screen opening.

A conventional oil baffle within a CDS unit effectively controls oil and grease in storm water. With the addition of sorbents, the permanent capture efficiency of oil and grease is increased to 80–90%. The combination of a conventional oil baffle and particulate sorbents is a unique feature of a CDS storm water treatment unit. Once pollutants are captured in a CDS unit, they cannot escape.

PROVEN TECHNOLOGY

The CDS technology has been proven by extensive independent laboratory studies and over a thousand actual installations in the United States and Australia. Copies of these performance reports are available at our web site, or by contacting our offices.

APPROVED BEST MANAGEMENT PRACTICE

The CDS technology has achieved approval as a Best Management Practice (BMP) by municipalities and state DOTs throughout the United States. The USEPA lists CDS as a structural BMP.

(1) Raw storm water enters the CDS unit's diversion chamber.

(2) A diversion weir guides the flow into the unit's separation chamber where a vortex is formed.

(3) The vortex spins all floatables and most suspended solids to the center of the separation chamber.

(4) The separation screen will not become blocked due to the washing vortex, but it will allow liquid to move through.

(5) The screened liquid which passes through the process quickly moves toward the outlet.

(6) Suspended solids gently settle into a sump where they remain until they are removed.

(7) The sump can be equipped with an optional basket to facilitate emptying the unit, or simply clean with a vactor or clam bucket.

(8) The cleaned storm water moves out of the separation chamber and into the diversion chamber downstream from the diversion weir.

(9) The cleaned water then moves freely to the receiving water.

(10) The by-pass arch is designed to bypass incoming flows without affecting the proper operation of the CDS unit or storm drain system. Bypass flows will not wash out any of the captured pollutants.

Standard CDS Unit Capacities and Physical Features

	Model Designation	Approximate Impervious Catchment Area (Acres)	Treatment Capacity $Q_{water\ quality}$ cfs	Treatment Capacity $Q_{water\ quality}$ MGD	Screen Diameter / Height (ft)	Sump Capacity (yd^3)	Depth Below Pipe Invert (ft)	Foot Print Diameter (ft)
Precast Concrete	PMSU 20_15	1-4	0.7	0.5	2.0 / 1.5	1.1	5.1	6.0
	PMSU 20_20	2-6	1.1	0.7	2.0 / 2.0	1.1	5.7	6.0
	PMSU 20_25	3-9	1.6	1.0	2.0 / 2.5	1.1	6.2	6.0
	PSW & PMSU 30_30	6-17	3.0	1.9	3.0 / 2.8	1.4 - 2.1	6.9	6.0 - 6.5
	PSWC & PMSU 40_40	12-33	6.0	3.9	4.0 / 4.0	1.9	9.7	8.3
	PSWC 56_40 & 50_40 & 50_50	18-61	9 & 11	5.8 & 7.1	5.6 / 4.0 & 5.0 / 5.0	1.9	9.7	9.5
	PSWC 56_53	28-78	14	9	5.6 / 5.3	1.9	10.8	9.5
	PSWC 56_68	38-106	19	12	5.6 / 6.8	1.9	12.5	9.5
	PSWC 56_78 & PSW 70_70	50-144	25 & 26	16 & 17	5.6 / 7.8 & 7.0 / 7.0	1.9 - 3.9	13.5	9.5
	PSW 100_60	60-167	30	19	10.0 / 6.0	6.9 - 14.1	12.0	17.5
	PSW 100_80	100-278	50	32	10.0 / 8.0	6.9 - 14.1	14.0	17.5
	PSW 100_100	128-356	64	41	10.0 / 10.0	6.9 - 14.1	16.0	17.5
Cast-In-Place Concrete	CDS cast-in-place reinforced concrete units can be designed to treat flows up to 300 cfs							

EXTREMELY LOW MAINTENANCE

CDS units are self-operating. They have no moving parts and they are entirely gravity driven, requiring only the hydraulic energy available within the storm water flow. The screens and supporting hardware are stainless steel and will resist corrosion.

CDS units have very large sump capacities relative to their design flows, and only need to be cleaned out with a standard vactor truck approximately one to four times per year. This operation eliminates workers' exposure to the materials captured in the units.

KEY FEATURES and BENEFITS

Uses
- Storm Water Treatment
- Combined Sewer Overflow Treatment
- Dry Weather Flow Diversion

Applications
- Capture and retention of suspended solids, sand, floatables, oil and grease, and other gross pollutants from:
  - Commercial Service and Parking Areas
  - Industrial Areas
  - Public Property and Parkland
  - Residential Streets and Private Property
- Pretreatment for:
  - Wetlands, Ponds, and Swales
  - Media and Sand Filters
  - Oil/Water Separators
  - Pump Stations

Efficient
- Highly effective (up to 90%) in capturing and retaining sediment as small as one-third the screen aperture.
- Captures and retains 100% of floatables and all other material greater than the screen aperture.

Cost-Effective
- CDS provides the lowest cost per CFS (Cubic Feet per Second) processed when compared to other structural BMPs.

Large Treatment Flow Range
- From 0.7 to 300 CFS.

Non-Blocking and Non-Mechanical
- Standard CDS units have no moving parts. They require no power or supporting infrastructure, and they will not clog.

Unobtrusive and Easy to Install
- CDS units are compact and are installed below ground, so space requirements are modest. They are ideal for new construction as well as retrofit applications.

Low-Cost, Safe and Easy Pollutant Removal
- Maintenance is easy using standard vactor, clam, or basket equipment which minimizes maintenance personnel exposure to hazardous material.

Improves Discharge Water Quality
- Removes floatables and suspended solids from storm water runoff.
- Removes free oil and grease with the use of an oil baffle, and/or sorbents.

CDS OFFERS BOTH OFFLINE AND INLINE TREATMENT CONFIGURATIONS TO MEET THE HYDRAULIC & WATER QUALITY NEEDS OF LARGE & SMALL PROJECTS

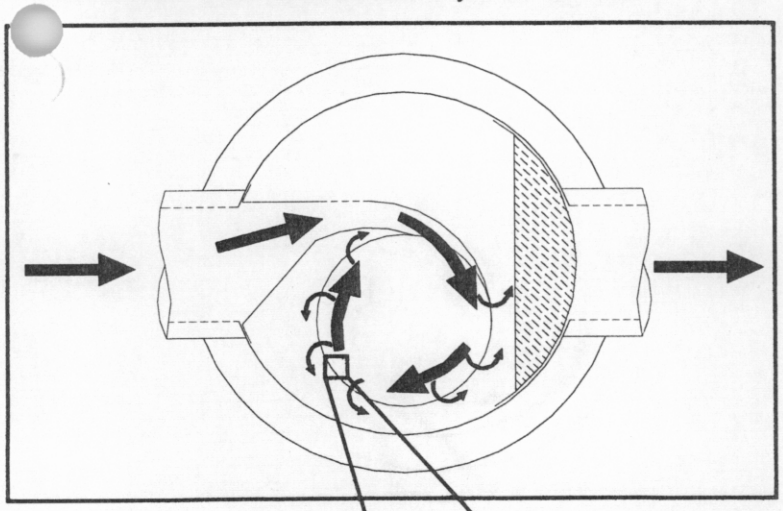
CDS Technologies® is an innovative best manage practice (BMP) that is well suited to treat a large range of storm water flows and conditions to include discharges from combined sewer overflows (CSOs). CDS Technologies® offers a solid separation unit to treat storm water runoff, the runoff from vehicle parking and other areas subject to the buildup of oil, grease, sediment, trash and debris as well as CSOs. CDS® units are also well-suited to treat the effluent from wash racks or as a pretreatment for oil/water separators or pump stations.

HOW CDS SYSTEM WORKS

CDS technology uses the available energy of the storm flow to create a balanced hydraulic system to cause a natural separation of solids from fluids. In addition to its internal swirl concentrating process, the continuous circulating flow over the perforated separation screen keeps it from blocking. Pollutants are captured inside the separation chamber while the water passes through the separation screen. CDS provides a unique, non-blocking screening system with no moving parts.

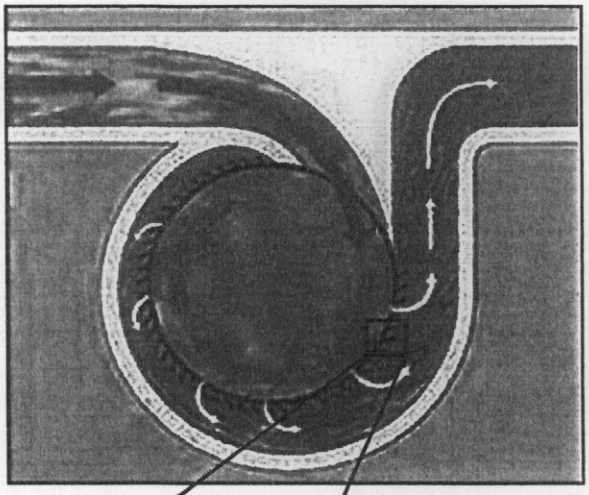
Inline Small CDS Systems

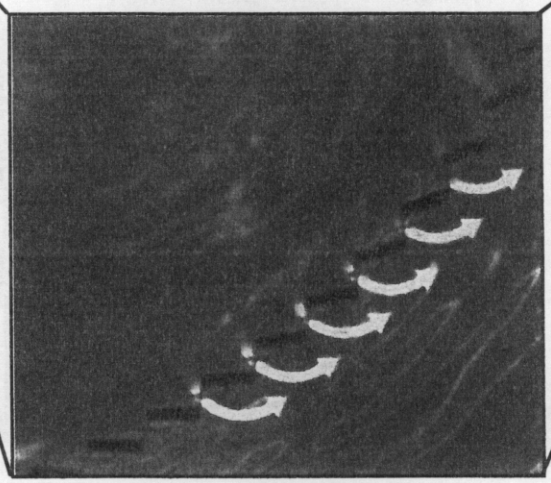
Inline PMSU models are very cost effective



Offline Small and CDS Large Systems

Offline PSW models allow for highflow bypass



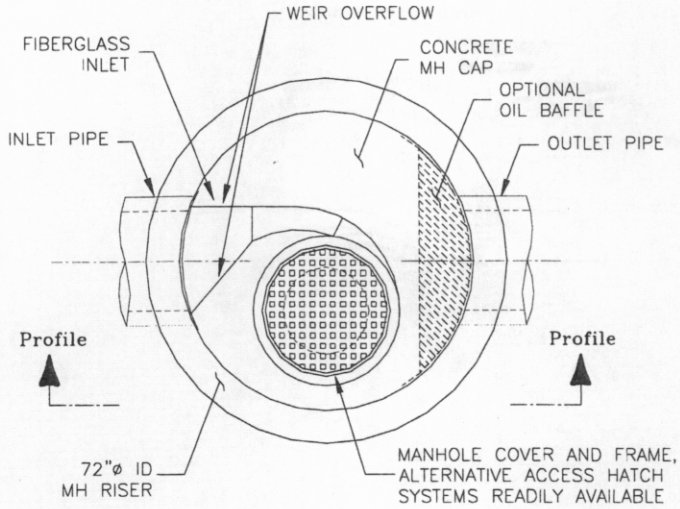


Balanced Hydraulics: *Strong rotational velocities ensure that the screen is continually washed.*

Typical Installation Drawings - Inline PMSU Model

The CDS unit can be placed within new or retro-fitted into existing storm water collection systems. Its remarkably small footprint takes little space and requires no supporting infrastructure.

Plan



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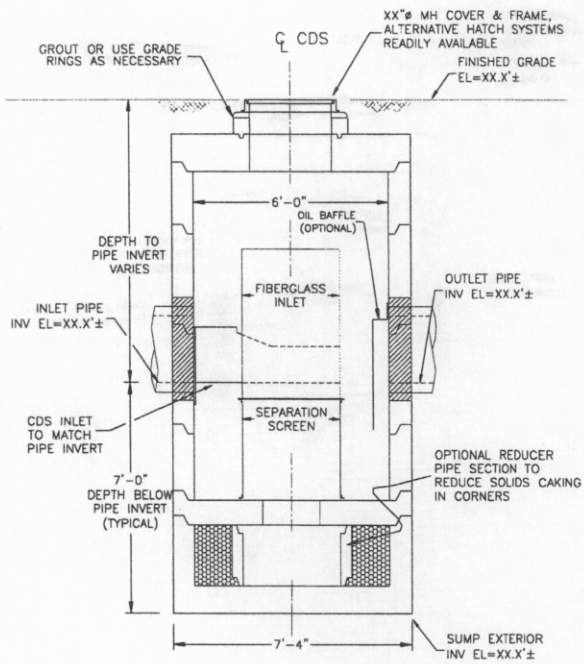
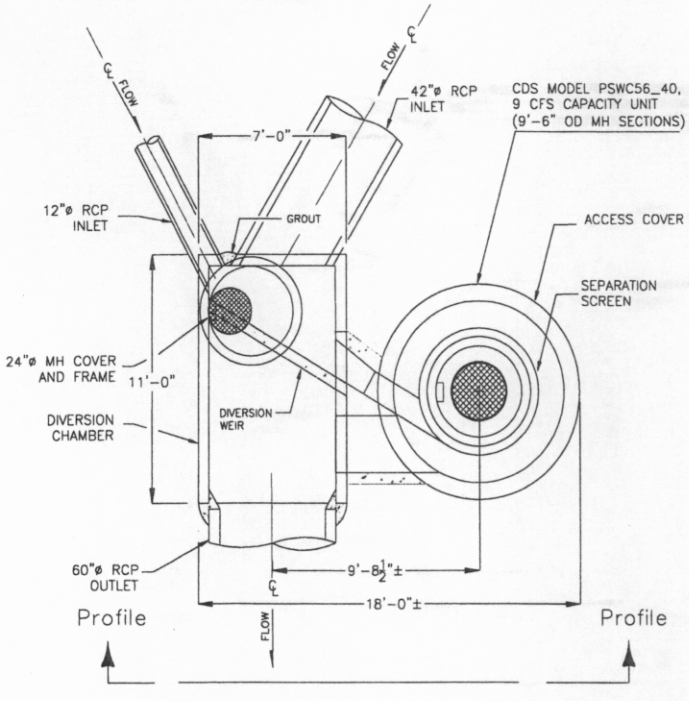


Typical Installation Drawings - Offline PSWC Model

Diversion weir box structure can be designed to accommodate multiple inlet pipes and bypass very large flood flows.

Plan



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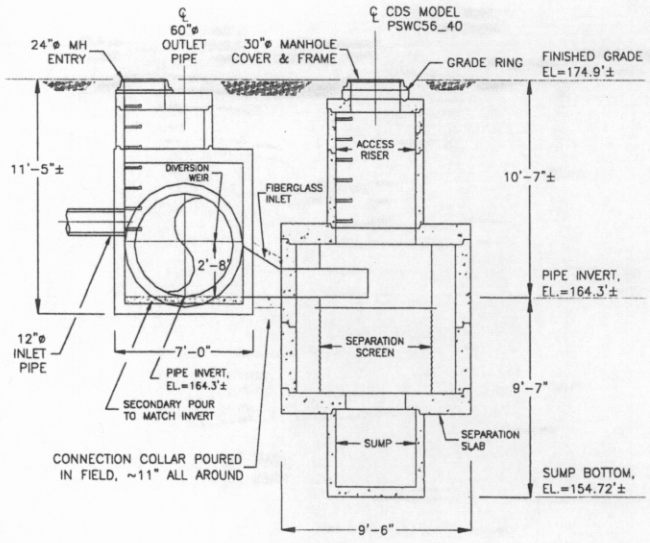
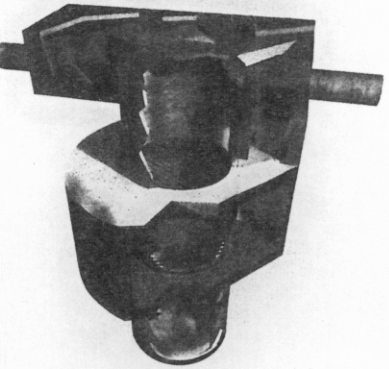




OFFLINE UNIT

Untreated storm water is a recognized concern, both locally and nationally. As the sources of storm water pollution grow, so do the ways and requirements for treating and managing storm water. Storm water runoff contains sediments, carcinogenic metals, pathogens, herbicides, pesticides, nutrients, debris, oils, trash – everything washed off of urbanized watersheds.

With patented continuous deflective separation (CDS) technology, the Offline Unit uses the hydraulic energy of water to concentrate, screen and trap many of these storm water pollutants. The Offline Unit removes 80% of total suspended solids (TSS) as well as 100% of floatables and neutrally buoyant material, plus oil and grease.

Process

Offline Units from CDS Technologies are designed to treat storm water flow ranges from 1 to 300 cubic feet per second (cfs) and higher. Treatment flow is diverted from a storm channel or pipeline into the Offline Unit.

1. Storm water enters the Offline Unit's diversion chamber.
2. A diversion weir guides the flow into the unit's separation chamber where a vortex is formed.
3. The vortex separates most suspended solids in the separation chamber.
4. Suspended solids settle into a sump where they remain until they are removed.
5. Floatable and neutrally buoyant debris are retained in the separation chamber.
6. The stationary separation screen of the separation chamber doesn't become blocked because of the washing vortex, so liquid moves through the stationary screen cylinder.
7. Cleaned storm water moves out of the separation chamber and passes beneath an oil baffle.
8. Treated flow exits the unit into the diversion chamber downstream from the diversion weir, re-entering the storm water drain system.

Advantages

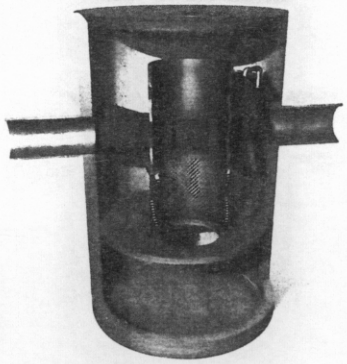
- The Offline Units are self-operating. Since they have no moving parts and are entirely gravity driven, maintenance is low. The screens and hardware are stainless steel, and resist corrosion.
- These units have large sump storage capacities ranging from 424-1,396 gallons, depending upon the model used.
- The diversion weir is designed to bypass excessive flows without affecting the operation of the unit or storm drain system. Bypass flows don't wash out any of the captured pollutants.
- The unit's oil retention baffle effectively controls oil and grease. When sorbents are added, the permanent capture efficiency increases to 80-90 percent.
- Capable of treating peak storm flows up to 300-cfs, the Offline Unit removes 100 percent of floatables.
- This type of storm water treatment can be placed offline anywhere on the network with minimum retrofitting costs.
- Since the units are compact and easy to place in confined areas, space requirements are minimal.

Precast and Cast-in-place Offline Units

To meet different site requirements, the units are available in a variety of models, and configured either precast or cast-in-place. Fifteen precast models are readily available to treat flows from as little as 0.7-cfs up to flows of 64-cfs. Cast-in-place reinforced concrete units, using conventional construction techniques, can be built to treat flows up to 300-cfs. CDS units can also be placed in parallel or series to treat larger flows.

Maintenance

Depending on the site's pollutant loading characteristics, seasonal sump cleanout and annual inspection of the screen surface are the only requirements necessary to promote successful and efficient operation of the CDS Offline Unit. Since the units have large sump capacities, the sump can be cleaned out with a standard vactor truck, sump basket or clamshell one to four times per year. The CDS screen and sump can be visually inspected for any remaining debris. There is no need for manned entry into the unit, which prevents any direct contact with captured pollutants.



INLINE UNIT

Polluted storm water runoff comes under control with the CDS Inline Unit. Placed on the main storm drain within one manhole, its unique configuration meets multiple engineering objectives by combining both treatment and bypass capabilities in one structure. By utilizing CDS' patented non-blocking screening technology, the Inline Unit ensures removal of both fine and suspended solids along with oil, grease, trash and debris.

Offering a remarkably small footprint, the Inline Unit can be incorporated into new development projects or retro-fitted into existing storm water collection systems. The unit is totally underground, has no moving parts and requires no supporting infrastructure.

Process

Developed to complement CDS' offline storm water treatment systems, the Inline Unit also uses continuous deflective separation (CDS) technology.

1. A channeling weir collects the flow for entrance into the separation chamber.
2. Storm water enters the diversion chamber.
3. The natural vortex in the separation chamber separates suspended and fine sediments to the center of the chamber for eventual settling in the sump.
4. Because of the washing vortex, the patented separation screen will not become blocked and screened liquid passes through.
5. After flowing beneath the oil baffle, screened flow discharges from the unit.

Advantages

- One structure meets multiple engineering objectives.
- The sump is an important design feature of all CDS units. Sumps prevent scour because deposited material is not stored within the treatment flow path.
- Handles treatment flows greater than 20-cfs.
- Capable of bypassing flows in excess of 50-cfs.
- CDS can customize design for larger treatment and bypass flow events.
- The Inline Unit removes 80% of total suspending solids (TSS) as well as 100% of floatables and neutrally buoyant material, plus oil and grease.
- Due to its non-blocking screen and non-mechanical function, the Inline Unit is a low maintenance treatment option.

Maintenance

As a general rule, CDS recommends removing solids with a standard vactor truck once a year. Depending on each site's pollutant loading characteristics, more cleanouts may be necessary. Seasonal sump cleanout and annual inspection of the screen surface are typically the only requirements necessary to promote successful and efficient operation of the CDS Inline Unit.

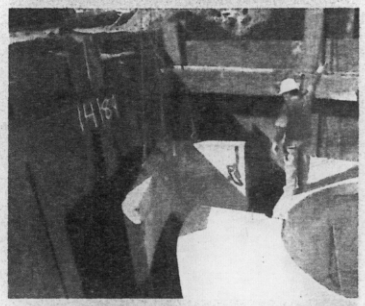
Once the access hatch into the CDS unit is opened, the maintenance crew will remove the contents of the sump and separation chamber using a vactor truck as the best cleaning method.

The CDS screen and sump can then be visually inspected for any remaining debris. At this point the procedure is complete. There is no need for manned entry into the unit, which prevents any direct contact with captured materials.

CASE NO 01 STUDY

Nation's largest CDS unit trusted to treat 175-cfs of California highway runoff

In California, expected runoff from a six-mile stretch of Interstate 210 - an eight lane freeway bounding northern Los Angeles - was a major worry for the California Department of Transportation (Caltrans). The sunken concrete roadway runs through an area of many homes and space was tight for installation of storm water units. This did not favor installing runoff catch units that hold large volumes of water, in which pollutants separate over time. By contrast, the CDS technology was chosen for its ability to quickly and effectively separate pollutants and debris from storm water runoff. Five separate CDS units were installed for this project, including the nation's largest Offline Unit, built to filter a water quality runoff event of 175-cfs.



CDS screening technology prevents pollutants from California's I-210 from entering the Pacific Ocean.

Continuous Deflective Separation Unit (Models 20–15)

The CDS unit has a filter screen that can be sized by the vendor to accommodate a range of particle sizes.

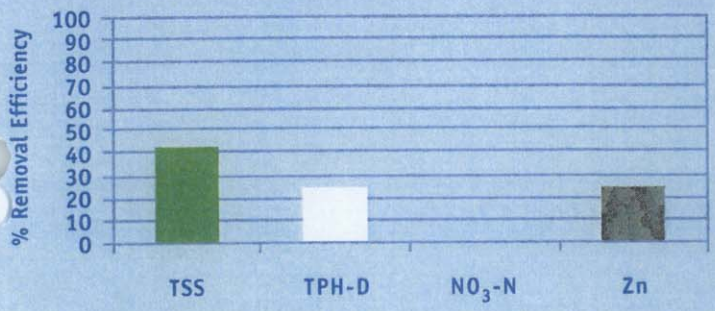
The Continuous Deflective Separation (CDS) units are mainly used to manage stormwater, but they also have wastewater, water supply, and industrial applications. The compact design is well suited for space constrained and urban sites, where the installation of a larger stormwater treatment is impractical. Depending on state regulations, these devices are either used by themselves, or as a pretreatment system in conjunction with other stormwater treatments.

The CDS unit is a hydrodynamic separator that uses vortex settling to remove sediment, trap debris and trash, and separate floatables such as oil and grease.

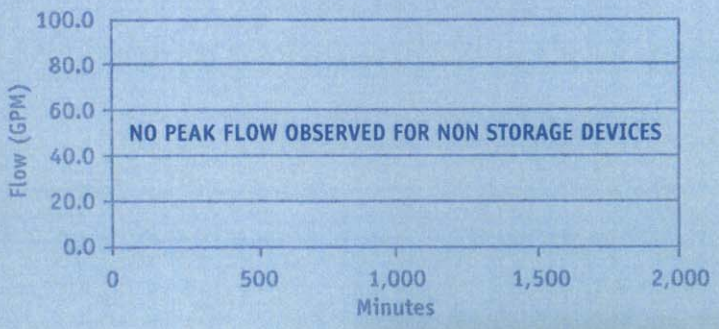
A CDS unit can be made from precast or *in situ* cast concrete, stainless steel, or fiberglass. It is composed of a sophisticated insert with a filter screen with openings that can be sized during manufacture. The insert is mounted internally in a four-foot diameter concrete manhole. This prefabricated system is on-line with an internal bypass.

This treatment's insert can obstruct cleaning. Maintenance requirements are similar to other hydrodynamic separators, and include periodic removal of solids by a vacuum truck.

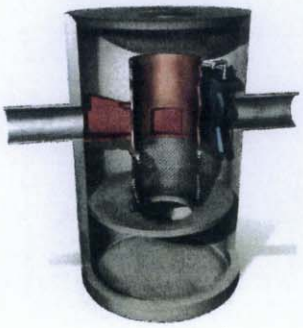
WATER QUALITY PERFORMANCE



PEAK FLOW REDUCTION



Water Quality Treatment Process



The CDS unit has a cylindrical fine screen that separates solids by indirect filtration. Strong tangential velocity around the screen keeps it free of debris, while a small secondary hydraulic head across the screen surface promotes a weak flow through it. Buoyant solids float to the surface. Suspended particles deflect from the screen, move to the stagnant core of the screen chamber, and settle into the sump. The sump has a narrow opening to separate trapped solids from flow and prevent re-suspension. The baffle captures oil and grease in a storage chamber between the inlet invert and baffle bottom.

The primary contaminant addressed by hydrodynamic separators is sediment. However, comparable reductions are observed for zinc and total petroleum hydrocarbons-diesel, presumably as a result of binding to trapped sediments. This treatment does not have a storage volume and therefore no peak flow or volume reduction. Influent and effluent hydrographs are the same. These devices need frequent inspection and cleaning to maintain effectiveness.

Category Type
Manhole Retrofit and Filtration

BMP Type
Manufactured Device

Design Source
CDS Technologies

Basic Dimensions
Diameter: 6 ft, Height: 9 ft

Specifications
Catchment Area: 1/3 acre
Peak Flow: 1/3 cfs
Volume: 327 cf

Treatment Function
Physical: Settling and Filtration

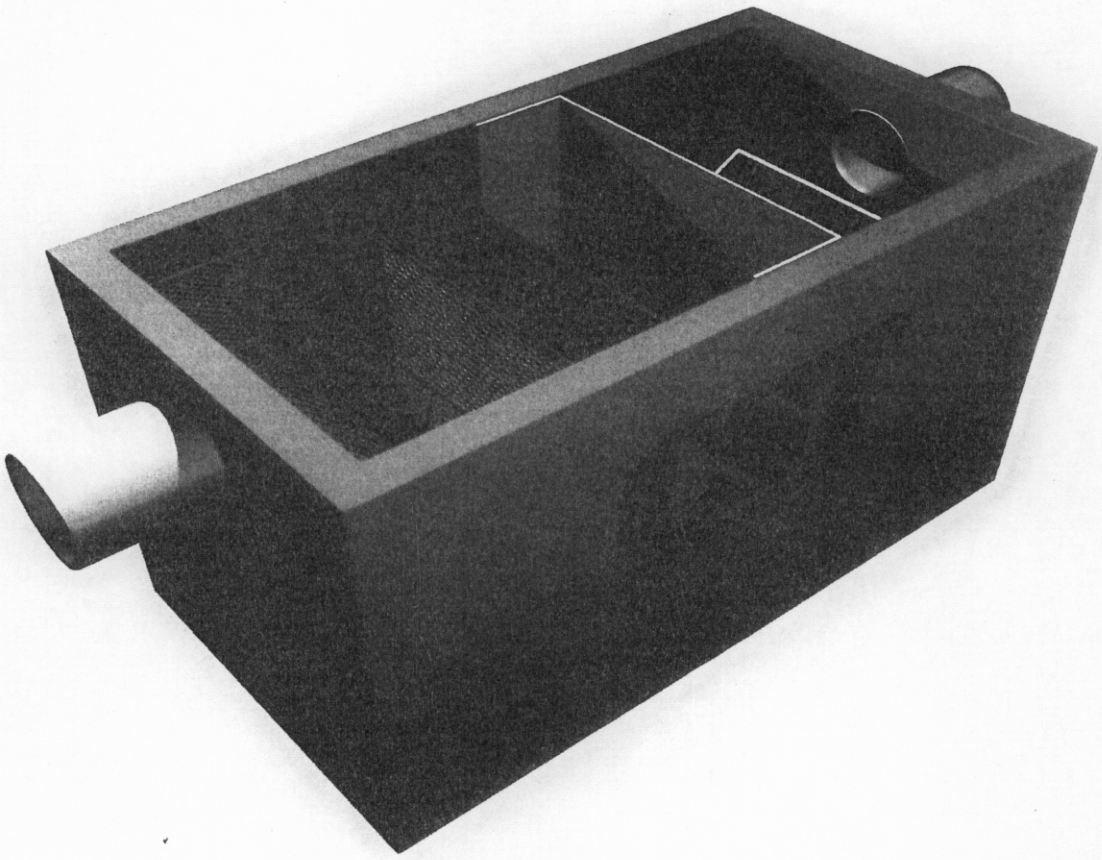
Cost Per Acre
$20,000

Maintenance Data
Maintenance Sensitivity: High
Inspections: High
Sediment Removal: High

The UNH Stormwater Center is supported by the Cooperative Institute for Coastal and Estuarine Environmental Technology, a partnership of UNH and the National Oceanic and Atmospheric Administration. The center is housed in the University's Environmental Research Group.

CST

CrystalStream Technologies



Clear Solutions...

for Storm Water Pollution Control

Founded in 1998, CrystalStream™ Technologies is dedicated to providing effective, affordable, easy to maintain storm water treatment solutions. We are committed to the highest level of customer service in the industry. From site specific product design, to on-going maintenance, we will be there with you.

Integrated Site Design - The individual nature of every site demands that we take a site specific approach when designing our product. Although most designs fall within common parameters, it is the evaluation of flow volumes, flow velocities, pollutants, particle size, off-site conditions and goals of the drainage system that allow us to provide the best possible "integrated" solution with our treatment device.

Installation Support - The effectiveness of any structural pollution control system is directly related to proper installation. We provide a representative at all installations to assist the field professional. The CrystalStream™ unit is put in the ground by our team and is ready to function immediately. If access is provided and the site is level, we can install the unit in under one hour.

Maintenance - The concept of pollution removal requires that the pollution captured be disposed of properly. CrystalStream™ is leading the industry by providing in-house maintenance at the customers request. End-users and owners can provide for their own maintenance but due to our economies and experience, most users ask us provide our low-cost maintenance plan for their devices.

CrystalStream ™ commitment to customer service is represented in our installation support and expertise in maintenance. These services insure that the product is delivered and installed properly and operates as specified for the life of the system. Our local representatives providing these services form partnerships with all of our customers including engineers, contractors, government officials, and owners to insure the goals of all stakeholders are achieved.

Installation - The installation of the CrystalStream™ Unit consists of three easy steps:

1. The contractor prepares the site with truck access and a level excavation
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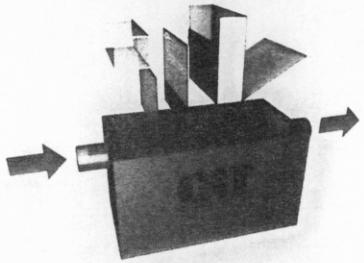

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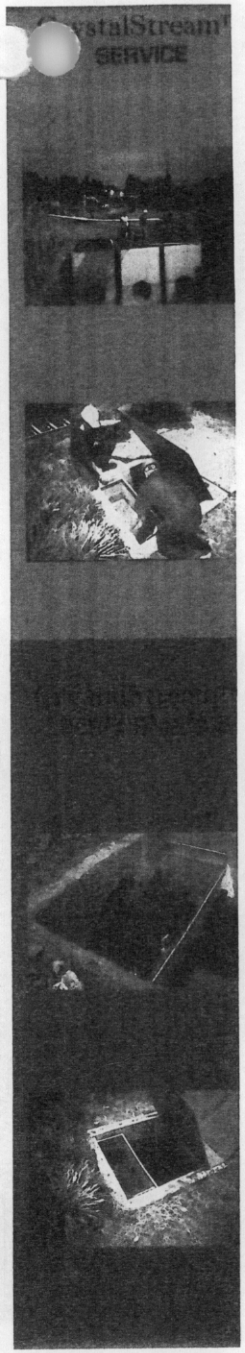
CrystalStream™ Technologies knows maintenance...we do it everyday



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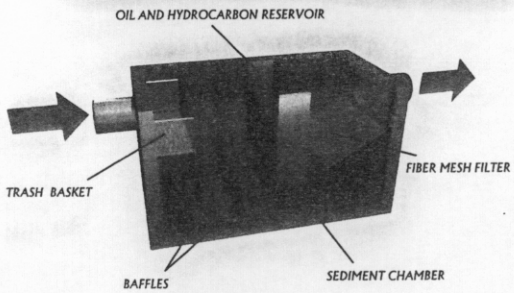

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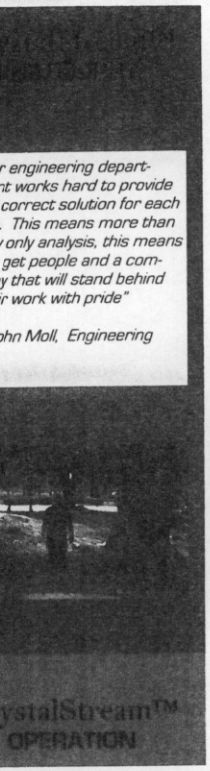
TARGETED POLLUTANTS

Sediment & Grit
The CrystalStream unit is a proven sediment trap and the flexibility in design allows our engineers to increase or decrease the removal/retention rate based on flow velocities.

Vegetative Material (excess nutrients)
The trash basket will intercept and hold above the water line all leaves, grass clippings, and other vegetative material carried to the device. The fiber mesh filter removes the neutrally buoyant, decaying material reducing the total nitrogen and phosphorus potential of the flows. Segregating this material in a **dry** fashion is important due to the propensity for this material to decompose.

Trash & Debris
Trash & Debris are also intercepted by the trash basket and kept dry to prevent the breakdown of paper products and the leaching of chemicals contained in trapped material.

Oil & Other Hydrocarbons
Hydrocarbons are initially floated in the front chamber and the internal weir height is established to capture this material in the reservoir based on the 90 day storm event. The reservoir's primary function is to provide spill protection on upstream basins.



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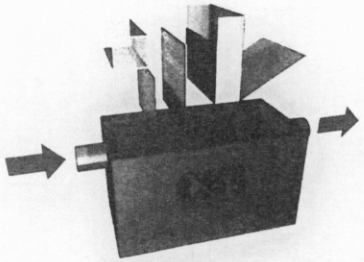

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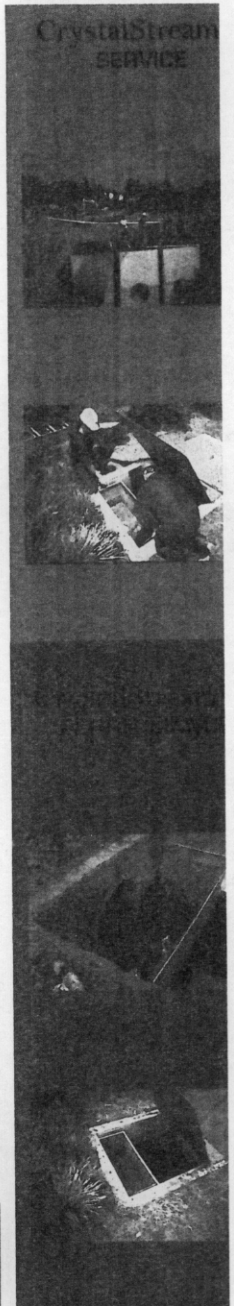

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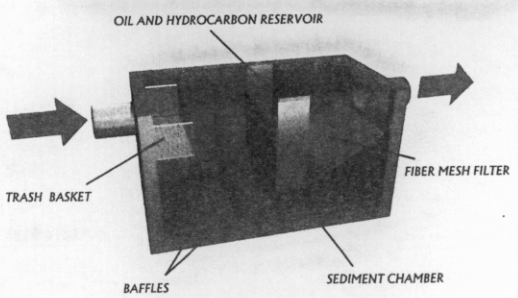

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Trash & Debris are also intercepted by the trash basket and kept dry to prevent the breakdown of paper products and the leaching of chemicals contained in trapped material.

Oil & Other Hydrocarbons
Hydrocarbons are initially floated in the front chamber and the internal weir height is established to capture this material in the reservoir based on the 90 day storm event. The reservoir's primary function is to provide spill protection on upstream basins.

INNOVATIVE DRAINAGE AND WATER CONSERVATION SOLUTIONS

OFFICIAL PARTNER

DUCKS UNLIMITED

Hancor

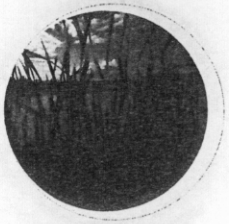
Technology · Innovation · Solutions

STORM WATER QUALITY UNIT

THE SUPERIOR WATER QUALITY SYSTEM

FEATURING BAFFLE 55™

THE IMPORTANCE OF PROTECTING OUR COUNTRY'S WATER RESOURCES



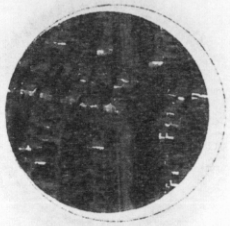
Managing the quality and quantity of storm water runoff has become an essential part of protecting the country's water resources, as regulated by the Federal Water Pollution Control Act (Clean Water Act).

Under EPA Phase II requirements, municipalities must develop and implement Best Management Practices (BMPs) to reduce pollutant discharge, protect water quality and satisfy other Clean Water Act requirements. Pollutants include: trash, lawn clippings, sediment, petroleum products, heavy metals, toxic chemicals, and other contaminants.

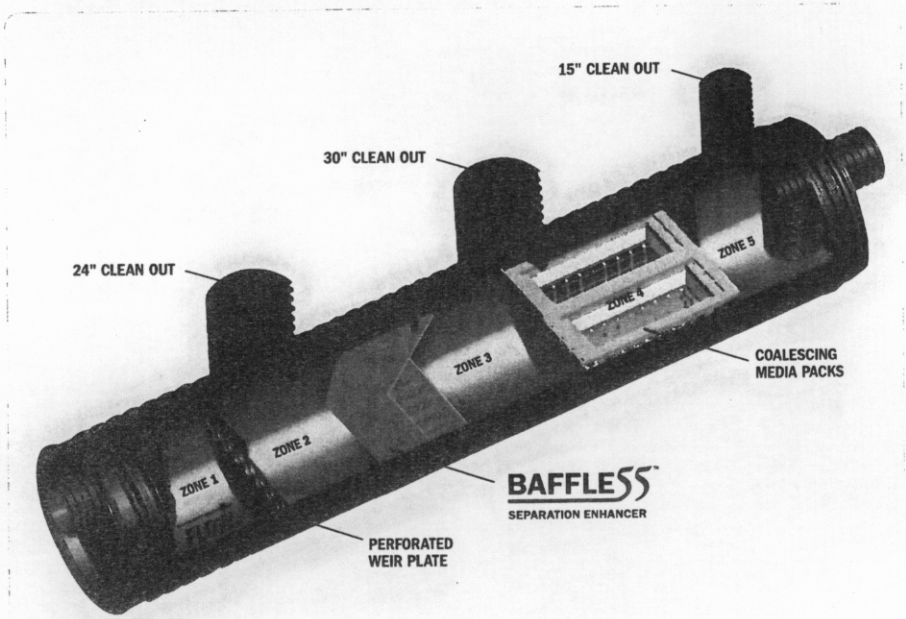
To help municipalities, developers and contractors meet EPA Phase II requirements, Hancor offers a full line of top performing BMP products, including our newest development, the revolutionary Hancor Storm Water Quality Unit.

NO OTHER WATER QUALITY UNIT COMPARES

The new Hancor Storm Water Quality Unit offers outstanding performance to help municipalities protect the quality of storm water runoff. Made of extremely durable, non-corrosive, lightweight HDPE, this product also offers a very cost-effective solution, to meet EPA Phase II requirements.

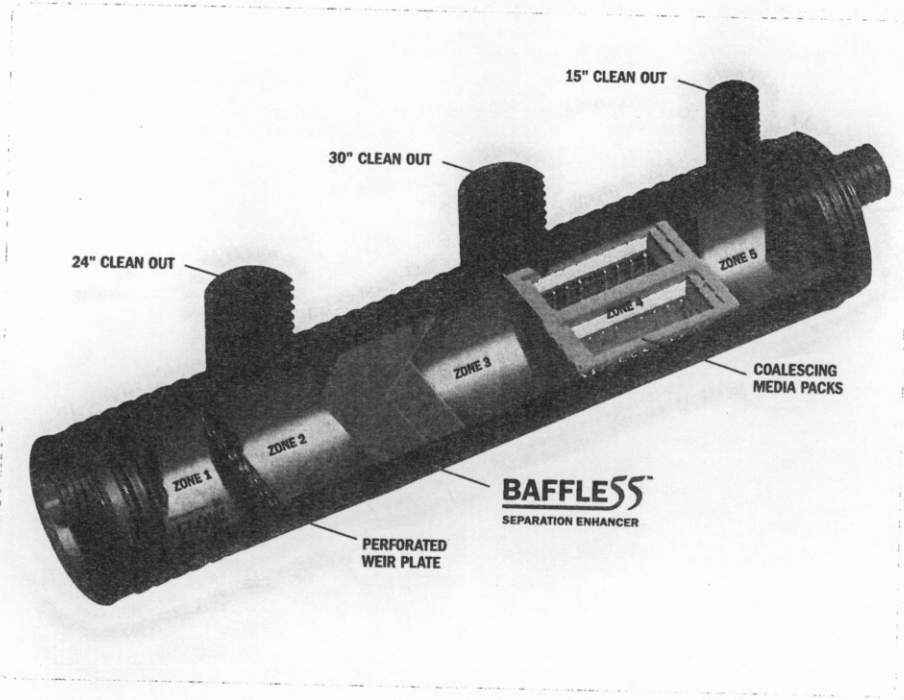


HANCOR'S STORM WATER QUALITY UNIT



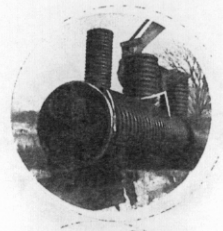
Hancor

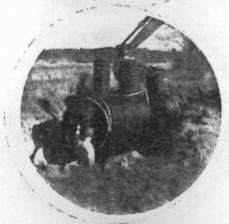
HANCOR'S STORM WATER QUALITY UNIT

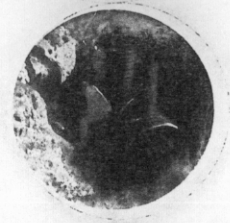


HOW THE NEW HANCOR STORM WATER QUALITY UNIT WORKS:

1) Storm water enters the unit via a 90˚ inlet elbow, which stops the straight line flow and reduces the velocity of the storm water when it enters ***Zone 1***. In ***Zone 1***, the heavy solids and floatables settle out.
2) The storm water passes through the first weir plate, designed as a perforated strainer to retain some floatables and promote separation of heavy sediment.
3) The storm water is then forced to flow through the ***Baffle 55 Separation Enhancer***, fiberglass corrugated baffle plate assembly. With a 55˚ incline angle and corrugations running with the flow, it promotes sediment and oil separation. The sediment travels down the corrugations and remains in ***Zone 2***, while the oil separates out and travels up the corrugations into ***Zone 3***.
4) Next, the storm water skims over a weir into spherical ***Coalescing Media Packs*** – a unique network of ribs, struts, and drop rods that changes the water flow patterns several times to expedite oil and water separation. The separated oil floats to the top of the water level and remains in ***Zones 3*** and ***4*** for removal during normal maintenance.
5) The storm water now enters ***Zone 5*** where processed storm water is allowed to exit through a 90˚ elbow and any remaining floatables may be captured and remain in ***Zone 5***.

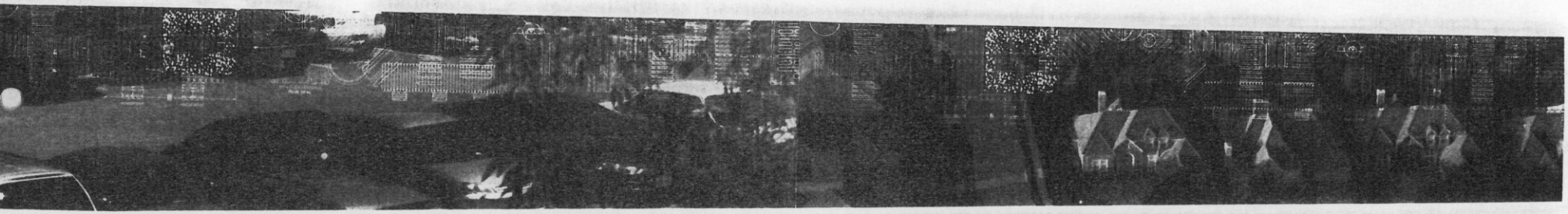






THE EASY TO INSTALL, COST-EFFECTIVE SOLUTION

HDPE has long been recognized as a highly durable and top performing material for storm water management systems. The Hancor Storm Water Quality Unit's lightweight construction makes this product even more cost-effective by reducing installation time, labor costs, and eliminates the need for heavier equipment typically required for other water quality products.



Hancor®
Technology • Innovation • Solutions™

SCOPE

This specification describes 48" and 60" (1200 and 1500 mm) Storm Water Quality Units for use in onsite point source storm water treatment applications.

REQUIREMENTS

Storm Water Quality Units shall have a smooth interior and annular exterior corrugations. To aid in contaminant separation, units shall be designed with not less than five containment zones. Each containment zone shall be separated from the next by use of baffle or weir plates designed to reduce re-suspension of contaminant into the treated storm water.

WATER QUALITY UNIT DIMENSIONS AND SPECIFICATIONS

	I.D Inch (mm)	O.D Inch (mm)	Total Capacity Ft (gal)	Sludge Capacity Ft (gal)	Weight Lbs (Kg)	Design Flow Rate cfs (gpm)
48 Inch Unit	48 (1200)	55.0 (1397)	201 (1504)	57 (426)	850 (385)	0-2.4 (0-1077)
60 Inch Unit	60 (1500)	67.3 (1709)	334 (2498)	68 (509)	1000 (454)	0-2.4 (0-1077)

Baffle and weir plates shall be welded at all interfaces between the plate and water quality unit. Plates shall be reinforced with thrust blocks or gussets positioned on the downstream side of the plate to be retained.

Storm Water Quality Units shall have at least one zone containing Baffle 55 separation enhancement technology. Corrugated baffle plates shall be positioned on adjustable 3/4" spacing with plates placed on a 55-degree angle of repose. Corrugations shall be orientated parallel to the direction of water flow.

Storm Water Quality Units shall provide adequate clean-out and inspection access into each containment zone. Inspection/clean-out ports shall be supplied standard with a solid H-20 wheel load rated ductile iron grate specifically molded to fit each unit.

JOINT PERFORMANCE

Connections between the separator unit and pipe shall be joined with the BLUE SEAL® (bell-and-spigot) joint meeting AASHTO M294, or MP7. Connections shall be watertight according to the requirements of ASTM D3212. Gaskets shall be made of polyisoprene meeting the requirements of ASTM F477 with the addition that the gaskets shall not have any visible cracking when tested according to ASTM D1149 after 72 hour exposure in 50 PPHM ozone at 104°F (40°C). Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly.

MATERIAL PROPERTIES

- Pipe & fitting material used to produce separator units shall be high density polyethylene meeting ASTM D3350 minimum cell classification of 335400C. The pipe material shall be Hancor Resin 8™, which is a slow crack resistant material evaluated using the single point notched constant tensile load (SP-NCTL) test. Average SP-NCTL test specimens must exceed 24 hrs. with no test result less than 17 hrs. All smooth baffle and weir plates shall be high-density polyethylene.
- Corrugated baffle plates shall be fiberglass panels. Panels shall be 0.06" thick with 1/2" x 2.5" corrugations.

INSTALLATION

Installation shall be in accordance with Hancor's Storm Water Quality Unit installation instructions using typical flexible pipe installation methods.

OFFICIAL PARTNER
DUCKS UNLIMITED

LEADERSHIP IN ENVIRONMENTAL PROTECTION

Hancor is a leader in BMP solutions utilizing High Density Polyethylene (HDPE), the material of choice for total lower installation costs, compressed completion schedule and long, low-maintenance service life.

Hancor is committed to preservation of the environment, and is an Official Partner of Ducks Unlimited, the world's leading wetland conservation organization.

All sales of Hancor product are subject to a limited warranty and purchasers are solely responsible for installation and use of Hancor products and determining whether a product is suited for any specific needs. Please consult a full copy of Hancor's Terms and Conditions for Sale for further details.

Direct Contact

Customer Service
888-FOR PIPE (367-7473)
Fax 888-FAX PIPE (329-7473) 24 hours a day

Application Engineering
For technical questions, call
800-2HANCOR (242-6267), ext. 809

Electronic Media

Web Site
Find market- and application-specific information and the latest industry news at our On-Line Pipeline – www.hancor.com

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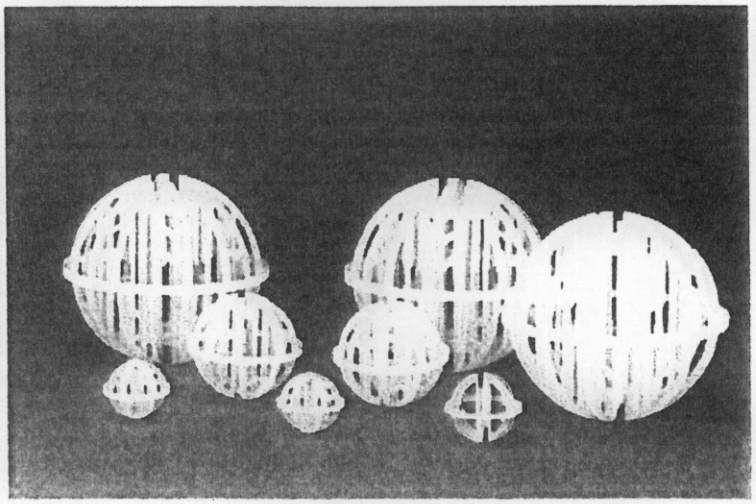
The coalescing media that is placed in the FloGard Units for Hancor Storm Water Quality Unit - MODEL II (Only)



Coalescing Media (Jaeger Tri-Packs®)

Coalescing Media: The function of the coalescing media is to change and dissipate the storm water flow pattern in several directions. Continued flow of the liquid will allow the storm water to free itself of the contaminants that are physically attached to the liquid. This process assists in the oil and water separation and allows the oil particles to find other oil particles, which then adhere to each other. This process causes the oil particles to become larger and more buoyant. They will float to the top of the water level keeping the oil particles out of the exiting storm water from Chamber 4 of the Hancor Storm Water Quality Unit (Model II Only).

Jaeger Tri-Packs® are hollow spherical column plastic packings constructed of a unique network of ribs, struts, and drip rods. Its geometry was totally revolutionary and unprecedented at the time of its 1978 introduction and it continues to be the packing to which all others are compared. Plastic Jaeger Tri-Packs® are distinguished from other packings by its superior geometric shape. Their spherical shape allows each element to roll into the "packed position" without forming void areas common to irregular shaped packings or those with excessive pins and appurtenances. With Jaeger Tri-Packs®, there is no need for allowances for settling and nesting is virtually impossible. The round Jaeger Tri-Packs® offers reliable and predictable loading of your tower which means reliable and predictable performance.

In addition to the superior geometric shape, an active surface area is vital to mass transfer. The unique network of ribs, struts and drip rods have proven to give the Jaeger Tri-Packs® a distinct advantage in providing excellent wetting qualities and maintaining liquid distribution through the packed bed. Some suppliers claim more surface area, but surface area alone is not an indication of performance.

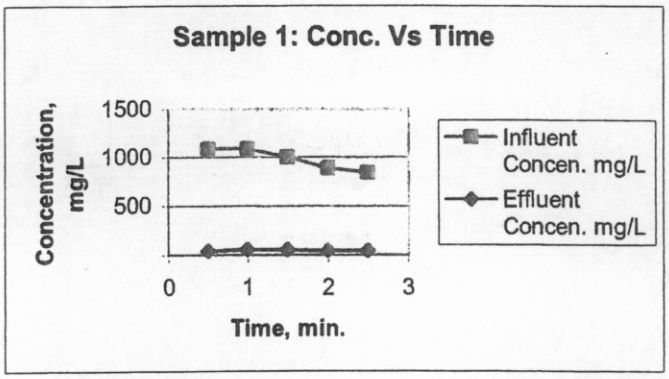
Jaeger Tri-Packs® made of polypropylene (PP) have been certified by NSF to Standard 61 for use in potable water applications. Molding plants are located in California, Kansas and Ontario, Canada providing coverage to all parts of North America.

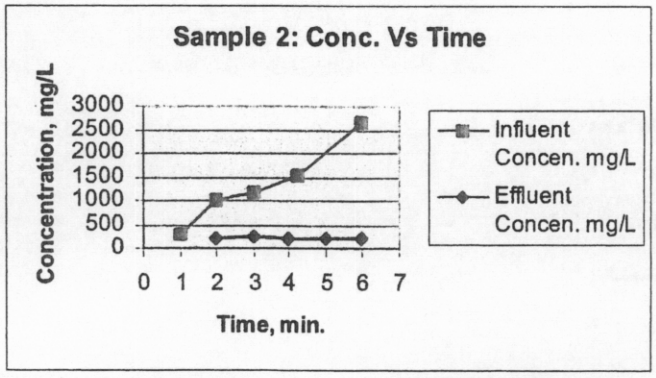
Hancor Storm Water Quality Unit: Test Data

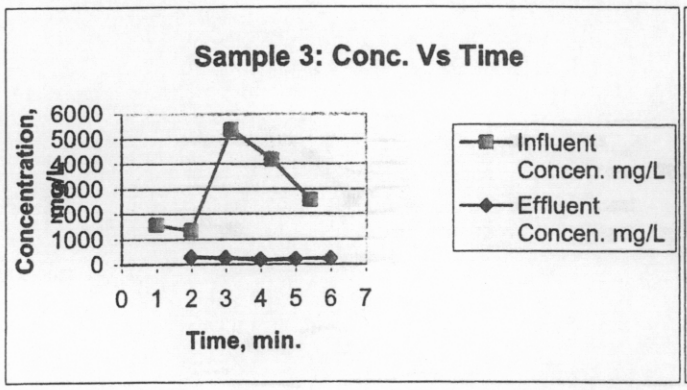
A field evaluation test of the Hancor Storm Water Quality Unit was conducted in May of 2003 by Ohio Northern University (ONU) to evaluate the removal efficiency of the system under different flows and different system configurations. The unit was installed near the town of Findlay, Ohio.

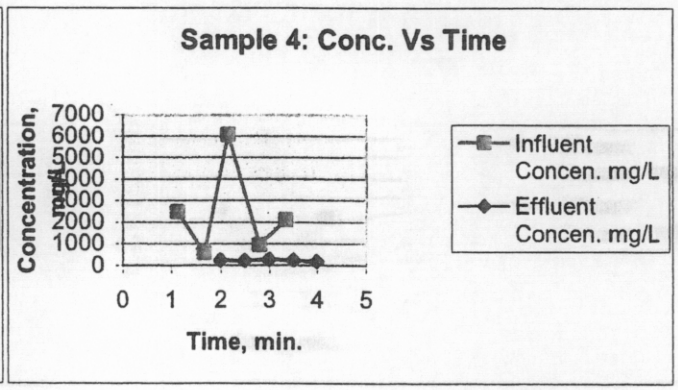
Results of the test runs are shown below:

Test Run (No.)	Influent Conc. Range (mg/L)	Effluent Conc. Range (mg/L)	Average Contaminant Removal
1	840-1080	40-50	95%
2	293-2627	200-240	84%
3	1320-5320	180-280	92%
4	560-2440	160-240	91%









Water Quality Units

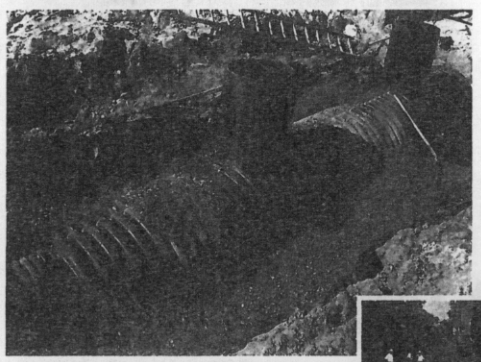
Standards for storm water quality will necessarily vary by location and land use. The most targeted sources of runoff pollution are paved areas in urban and industrial sites. These are generally small (< 1 acre), or 40 ha with high traffic loads, such as parking lots and gas stations, that generate significant concentrations of contaminant particles and hydrocarbons.

Because of land constraints, ADS underground Water Quality Units* have become an increasingly efficient solution for treating storm water. These durable, lightweight structures have been specifically designed for fast installation and easy maintenance.

Benefits

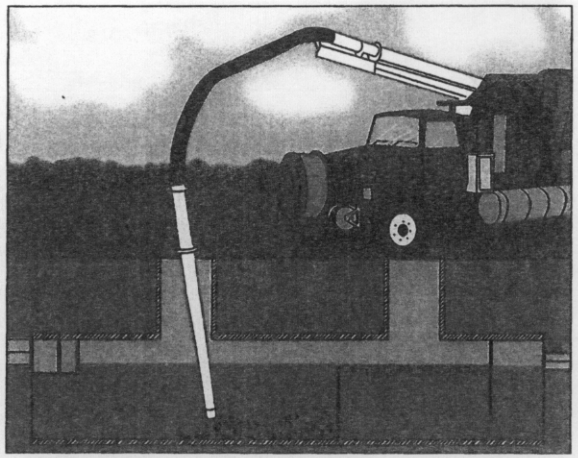
- Laboratory tests have shown an 80% TSS removal rate.
- Removes floatable debris such as oils and greases.
- Available in 36" (900mm) through 60" (1500mm) diameters.
- Lightweight High Density Polyethylene (HDPE) unit installs easily with a minimum of manpower. Heavy cranes are not necessary to install the unit.
- Each unit is fitted with access risers for easy inspection and maintenance of the sediment and oil chambers.
- The unit is inexpensive because the design is simple and there are no moving parts.
- The bypass system prevents re-suspension of captured solids by diverting water flows greater than the first flush.
- HDPE resists abrasion and chemicals found in storm water and in the surrounding soil.

*Patent Pending



The Patent Pending ADS Water Quality Unit is lightweight and easy to install, requiring little in the way of manpower or heavy equipment.

A bypass system (right) is installed to prevent water flows greater than the first flush from re-suspending captured pollutant particles.



The ADS Water Quality Unit is fitted with access risers for easy inspection and maintenance.

Standard Models

Product Number	Diameter (in) (mm)	Length (ft) (m)	Inlet Size (in) (mm)	Outlet Size (in) (mm)	Treated Flow Rate (cfs) (L/s)	Sed. Vol. (ft^3) (m^3)	Oil Vol. (ft^3) (m^3)	Sieve Size
3620WQA	36 (900)	20 (6)	10 (250)	8 (200)	1.5 (42)	65 (1.8)	30 (0.8)	140
3640WQA	36 (900)	40 (12)	10 (250)	10 (250)	3.2 (91)	137 (3.9)	63 (1.8)	140
3620WQB	36 (900)	20 (6)	10 (250)	6 (150)	0.7 (20)	65 (1.8)	30 (0.8)	200
3640WQB	36 (900)	40 (12)	10 (250)	8 (200)	1.6 (45)	137 (3.9)	63 (1.8)	200
4220WQA	42 (1050)	20 (6)	12 (300)	8 (200)	1.75 (49)	83 (2.3)	38 (1.1)	140
4240WQA	42 (1050)	40 (12)	12 (300)	12 (300)	3.66 (104)	175 (5.)	81 (2.3)	140
4220WQB	42 (1050)	20 (6)	12 (300)	6 (150)	0.86 (24)	83 (2.3)	38 (1.1)	200
4240WQB	42 (1050)	40 (12)	12 (300)	8 (200)	1.83 (52)	175 (5.)	81 (2.3)	200
4820WQA	48 (1200)	20 (6)	12 (300)	8 (200)	2.26 (64)	116 (3.3)	55 (1.6)	140
4840WQA	48 (1200)	40 (12)	12 (300)	12 (300)	4.78 (135)	245 (6.9)	115 (3.3)	140
4820WQB	48 (1200)	20 (6)	12 (300)	6 (150)	1.13 (32)	116 (3.3)	55 (1.6)	200
4840WQB	48 (1200)	40 (12)	12 (300)	10 (250)	2.39 (68)	245 (6.9)	115 (3.3)	200
6020WQA	60 (1500)	20 (6)	15 (375)	10 (250)	2.95 (84)	183 (5.2)	87 (2.5)	140
6040WQA	60 (1500)	40 (12)	15 (375)	15 (375)	6.23 (176)	385 (10.9)	184 (5.2)	140
6020WQB	60 (1500)	20 (6)	15 (375)	8 (200)	1.47 (42)	183 (5.2)	87 (2.5)	200
6040WQB	60 (1500)	40 (12)	15 (375)	10 (250)	3.12 (88)	385 (10.9)	184 (5.2)	200

140 sieve is equal to a particle size of 0.0042" (0.106mm)
200 sieve is equal to a particle size of 0.0030" (0.075mm)

Design variations

The standard models listed above will provide efficient removal of pollutant particles and hydrocarbons for the majority of site conditions. For unusual conditions, ADS can recommend a system combining a variety of sizes and configurations.

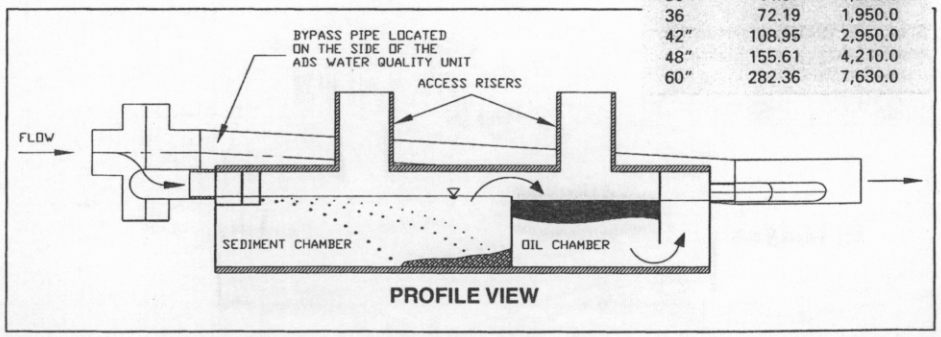
ADS can also incorporate other pollutant control features into the drainage network. These include inlet protection devices, trash screens, filtration systems, and a large selection of sediment prevention products from our strategic partner, SI® Geosolutions.

Peak Flow Rate

The by-pass pipe of the ADS WQU is designed to convey the peak storm water flow of the storm line.

For example, @ a 1% slope, peak flow rates for the by-pass line are as follows:

	CFS	L/S
12"	3.8419	103.9
15"	6.971	188.0
18"	11.343	307.0
24"	24.451	661.0
30"	44.37	1,240.0
36	72.19	1,950.0
42"	108.95	2,950.0
48"	155.61	4,210.0
60"	282.36	7,630.0



PROFILE VIEW

Appendix 6.0

Environmental Assessment

URS

Memorandum

Date: February 22, 2011

To: Marty Peate

From: Tia Norman

cc:

Subject: **SR 29 LaBelle from CR 80A (Cowboy Way) to US 27**
FPID No. 417878-1-22-01
Pond Siting Environmental Overview

Introduction

This technical memorandum presents a summary of the environmental characteristics of each proposed pond site.

Each proposed pond site was evaluated for the presence of wetlands and other surface waters based on field evaluations and habitat mapping conducted on 10-12 February 2009; 21-23 April 2009; 23-25 February 2010; and 4 March 2010. Existing land uses/vegetative cover within each site were classified using the Florida Land Use, Cover and Forms Classification System (FLUCFCS) (FDOT 1999). Reported soil types within each pond site were taken from the U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS), *Soil Survey of Glades County, Florida*, 2000 and the U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS), *Soil Survey of Hendry County, Florida*, 1990. Each site was also evaluated for the potential occurrences of Federal and state listed plant and animal species. For a species to be considered potentially present, the pond site must be within the species' range and must contain suitable habitat for the species.

The locations and size of each pond site within each of the three segments are listed below in Table 1. Table 2 provides a summary of the existing land uses/vegetative cover within each potential pond site. Below are descriptions of each pond site including the potential occurrences of Federal and state listed plant and animal species.

URS Corporation
7650 West Courtney
Campbell Causeway
Tampa, FL 33607-1462
Tel: 813.286.1711
Fax:813.286.6587
www.urscorp.com

TABLE 1
LOCATIONS AND SIZE OF POTENTIAL POND SITES

Segment	Site ID	Location	Area (acres)
1	Pond South	West side of SR 29 and approximately 200 feet north of Favor Street.	2.12
	Pond 0	Beneath SR 29 southbound bridge alternative and directly north of the Caloosahatchee River.	1.15
	Pond 1	East side of SR 29 (North Bridge Street) between Buser Avenue and Nobles Road.	2.01
	Pond 2	East side of SR 29 approximately 650 feet north of Nobles Road.	1.32
	Pond 3	Southeast side of SR 29 approximately 1,100 feet northeast of Marshall Field Road SW (CR 731).	3.15
	Pond 4	Southeast side of SR 29 approximately 900 feet southwest of Pollywog Crossover Road.	3.14
	Pond 5	Southeast side of SR 29 proposed ROW approximately 3,000 feet northeast of Pollywog Crossover Road.	3.14
	Pond 6-1	Southeast side of SR 29 proposed ROW approximately 600 feet northeast of SR 78.	2.91
	Pond 6-2	Southeast side of SR 29 proposed ROW approximately 600 feet northeast of SR 78.	3.69
	Pond 7	Southeast side of SR 29 proposed ROW approximately 2,200 feet northeast of SR 78.	3.00
2	Pond 8A	Northwest side of SR 29 approximately 2.2 miles northeast of SR 78.	4.44
	Pond 8B	Southeast side of SR 29 proposed ROW approximately 2.2 miles northeast of SR 78.	4.00
	Pond 9A	Northwest side of SR 29 approximately 1.6 miles southwest of Chapparal Avenue NW.	1.43
	Pond 9B	Southeast side of SR 29 proposed ROW approximately 1.5 miles southwest of Chapparal Avenue NW.	2.00
	Pond 10	Southeast side of SR 29 proposed ROW approximately 3,500 feet southwest of Chapparal Avenue NW.	6.32
	Pond 11A	Southeast side of SR 29 proposed ROW approximately 1,000 feet southwest of Chapparal Avenue NW.	2.73
	Pond 11B	Southeast side of SR 29 proposed ROW directly southwest of Chapparal Avenue NW.	3.93
	Pond 12-13A	Southeast side of SR 29 proposed ROW approximately 1.4 miles southwest of Island Road.	3.49
	Pond 13B	Southeast side of SR 29 proposed ROW approximately 3,400 feet southwest of Island Road.	2.63
	Pond 14A	Southeast side of SR 29 proposed ROW approximately 3,300 feet northeast of Island Road.	2.70
	Pond 14B-15-1	Northwest side of SR 29 proposed ROW approximately 4,100 feet northeast of Island Road.	4.09

3	Pond 14B-15-2	Northwest side of SR 29 proposed ROW approximately 3,000 feet southwest of SR 74.	7.01
	Pond 16A	North side of SR 74 proposed ROW approximately 1,700 feet east of SR 29.	3.66
	Pond 16-17	Southeast side of SR 29 southwest of US 27.	68.80

TABLE 2
EXISTING LAND USES/VEGETATIVE COVER WITHIN EACH POTENTIAL POND SITE

Site ID	FLUCFCS[1] Code(s)	FLUCFCS[1] Description
Pond South	120	Residential, Medium Density
Pond 0	190	Open Land
Pond 1	617	Mixed Wetland Hardwoods
Pond 2	212	Unimproved Pasture
Pond 3	211	Improved Pasture
Pond 4	211	Improved Pasture
Pond 5	211	Improved Pasture
Pond 6-1	438/631	Mixed Hardwoods/Wetland Scrub
Pond 6-2	438/641	Mixed Hardwoods/Freshwater Marsh
Pond 7	211/242/510	Improved Pasture/Sod Farm/Streams and Waterways
Pond 8A	211 /641	Improved Pasture/Freshwater Marsh
Pond 8B	211	Improved Pasture
Pond 9A	643	Wet Prairie
Pond 9B	211/641/643	Improved Pasture/Freshwater Marsh/Wet Prairie
Pond 10	643	Wet Prairie
Pond 11A	617	Mixed Wetland Hardwoods

Pond 11B	617/641	Mixed Wetland Hardwoods/Freshwater Marsh
Pond 12-13A	320	Shrub and Brushland
Pond 13B	643	Wet Prairie
Pond 14A	510/643	Streams and Waterways/Wet Prairie
Pond 14B-15-1	510/643	Streams and Waterways/Wet Prairie
Pond 14B-15-2	534/643	Reservoir less than 10 acres/Wet Prairie
Pond 16A	643	Wet Prairie
Pond 16-17	641	Freshwater Marsh

1. Florida Department of Transportation. *Florida Land Use, Cover and Forms Classification System* (FLUCFCS), Third edition (1999).

Pond South

Pond South is located on the west side of SR 29 approximately 200 feet north of Favor Street. This pond site is 2.12 acres in size and lies within a residential area. Adjacent land use types include restaurants, a daycare center, and side streets. There are no wetlands or other surface waters present within Pond South. Mapped soils within this pond site include Boca sand which is not classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

This pond site does not contain suitable habitat for any state or Federal listed species. No wildlife was observed within or adjacent to Pond South during the field evaluations.

Pond 0

Pond 0 is located north of the Caloosahatchee River beneath the SR 29 southbound bridge alternative. This pond site is 1.15 acres in size and consists of open land. Adjacent land use types include roadways and the Caloosahatchee River bank. There are no wetlands or other surface waters present within Pond 0. Mapped soils within this pond site include Udifluvents which is not classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Due to the location of Pond 0 to the Caloosahatchee River, several listed bird species have the potential to occur within or adjacent to the pond site, including wood stork (*Mycteria americana*), limpkin (*Aramus guarana*), little blue heron (*Egretta caerulea*), snowy egret (*Egretta thula*), tricolored heron (*Egretta tricolor*), and white ibis (*Eudocimus albus*). Suitable habitat (open land) within Pond 0 is available for the southeastern American kestrel (*Falco sparverius paulus*), gopher tortoise (*Gopherus polyphemus*), eastern indigo snake (*Drymarchon corais couperi*), gopher frog (*Rana capito*), Florida pine snake (*Pituophis*

melanoleucus mugitis), and Florida mouse (*Podomys floridanus*). No wildlife was observed within or adjacent to Pond 0 during field evaluations.

Pond 1

Pond 1 is located on the east side of SR 29 (North Bridge Street) between Buser Avenue and Nobles Road. This pond site is 2.01 acres in size and consists of mixed wetland hardwoods dominated by swamp laurel (*Quercus laurifolia*), red bay (*Persea palustris*), cabbage palm (*Sabal palmetto*), and red maple (*Acer rubrum*). Adjacent land use types consist residential, open land, and roadways. Mapped soils within this pond site consist of Wabasso sand which is not classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Pond 1 is entirely comprised of a forested wetland system. Due to the availability of suitable habitat and close proximity to the Caloosahatchee River, several listed species have the potential to occur with Pond 1 including the mangrove fox squirrel (*Sciurus niger avicennia*), wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis. No wildlife was observed within or adjacent to Pond 1 during field evaluations.

Pond 2

Pond 2 is located on the east side of SR 29 approximately 650 feet north of Nobles Road. This pond site is 1.32 acres in size and consists of unimproved pasture that extends beyond the pond site on the east, north, and south sides. No wetlands or other surface waters are present within Pond 2. Mapped soils within this pond site include Riviera fine sand which is classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Due to the availability of suitable habitat, the southeastern American kestrel, Florida sandhill crane (*Grus Canadensis pratensis*), Florida burrowing owl (*Athene cunicularia floridana*), gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake, and Florida mouse have the potential to occur within the Pond 2. No wildlife was observed within or adjacent to Pond 2 during field evaluations.

Pond 3

Pond 3 is located on the southeast side of SR 29 approximately 1,100 feet northeast of Marshall Field Road SW (CR 731). This pond site is 3.15 acres in size and consists of improved pasture that extends beyond the pond site on the southeast side. Adjacent land use types consist of commercial and services, roadway, and a freshwater marsh wetland. No wetlands or other surface waters are present within Pond 3. Mapped soils within this pond site include Oldsmar sand and Floridana fine sand, depressional (less than 5 percent of pond site). Oldsmar sand is not classified as hydric while Floridana fine sand, depressional is classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Due to the availability of suitable habitat, the southeastern American kestrel, Florida sandhill crane, Florida burrowing owl, gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake, and Florida mouse have the potential to occur within Pond 3. No wildlife was observed within or adjacent to Pond 3 during field evaluations.

Pond 4

Pond 4 is located on the southeast side of SR 29 approximately 900 feet southwest of Pollywog Crossover Road. This pond site is 3.14 acres in size and consists of improved pasture that extends beyond the pond site on all sides. No wetlands or other surface waters are present within Pond 4. Mapped soils within this pond site include Oldsmar sand which is not classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Due to the availability of suitable habitat, the southeastern American kestrel, Florida sandhill crane, Florida burrowing owl, gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake, and Florida mouse have the potential to occur within Pond 4. No wildlife was observed within or adjacent to Pond 4 during field evaluations.

Pond 5

Pond 5 is located on the southeast side of SR 29 proposed right-of-way (ROW) approximately 3,000 feet northeast of Pollywog Crossover Road. This pond site is 3.14 acres in size and consists of improved pasture that extends beyond the pond site on all sides. No wetlands or other surface waters are present within Pond 5. Mapped soils within this pond site include Immokalee sand which is not classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Due to the availability of suitable habitat, the southeastern American kestrel, Florida sandhill crane, Florida burrowing owl, gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake, and Florida mouse have the potential to occur within Pond 5. No wildlife was observed within or adjacent to Pond 5 during field evaluations.

Pond 6-1

Pond 6-1 is located on the southeast side of SR 29 proposed ROW approximately 600 mile northeast of SR 78. This pond site is 2.91 acres in size and consists primarily of upland mixed hardwoods. Approximately 5 percent of the western portion of the pond site is comprised of wetland scrub habitat. Adjacent land use types consist of freshwater marsh habitat. Mapped soils within this pond site include Pople fine sand and Gator muck depressional (less than 5 percent of pond site). Pople fine sand is not classified as hydric while Gator muck is classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Due to the availability of suitable habitat, several listed species have the potential to occur within Pond 6-1 including the mangrove fox squirrel, wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis. No wildlife was observed within or adjacent to Pond 6-1 during field evaluations.

Pond 6-2

Pond 6-2 is located on the southeast side of SR 29 proposed ROW approximately 600 feet northeast of SR 78. This pond site is 3.69 acres in size and consists primarily of freshwater marsh habitat (approximately 80 percent) within the center of the pond site. The remainder of the pond consists of upland mixed hardwoods that surround the freshwater marsh. Mapped soils within this pond site include Pople fine sand which is not classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Due to the availability of suitable habitat, several listed species have the potential to occur within Pond 6-2 including the mangrove fox squirrel, wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis. No wildlife was observed within or adjacent to Pond 6-2 during field evaluations.

Pond 7

Pond 7 is located on the southeast side of SR 29 proposed ROW approximately 2,200 feet northeast of SR 78. This pond site is 3.00 acres in size and consists mostly of improved pasture (approximately 90 percent) and a sod farm on the eastern portion. A drainage ditch runs through the east side of the pond site. Adjacent land use types consist of freshwater marsh on south of Pond 7 and additional sod farm. Mapped soils within this pond site include Immokalee sand which is not classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Due to the availability of suitable habitat within Pond 7, the southeastern American kestrel, Florida sandhill crane, Florida burrowing owl, gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake, and Florida mouse have the potential to occur within the pond site. Within the drainage ditch, several listed bird species may potentially occur including wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis. No wildlife was observed within or adjacent to Pond 7 during field evaluations.

Pond 8A

Pond 8A is located on the northwest side of SR 29 approximately 2.2 miles northeast of SR 78. This pond site is 4.44 acres in size and consists of primarily of improved pasture (approximately 90 percent) with a freshwater marsh extending into the southeastern portion of the pond site. Adjacent land use types consist of improved pasture that extends

northeastward of the pond site. Mapped soils within this pond site include Oldsmar sand which is not classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Due to the availability of suitable habitat, several listed bird species have the potential to occur within the freshwater marsh portion of Pond 8A including wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis. Within the improved pasture portion of the pond site, the southeastern American kestrel, Florida sandhill crane, gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake, and Florida mouse have the potential to occur. No wildlife was observed within or adjacent to Pond 8A during field evaluations.

Pond 8B

Pond 8B is located on the southeast side of SR 29 proposed ROW approximately 2.2 miles northeast of SR 78. This pond site is 4.00 acres in size and consists of improved pasture. Adjacent to the south side of the pond is a forested wetland (bottomland swamp). No wetlands or other surface waters are present within the pond site. Mapped soils within this pond site include Oldsmar sand which is not classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Due to the availability of suitable habitat within Pond 8B, the southeastern American kestrel, Florida sandhill crane, Florida burrowing owl, gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake, and Florida mouse have the potential to occur within the pond site. No wildlife was observed within or adjacent to Pond 8B during field evaluations.

Pond 9A omitted

Pond 9A is located on the northwest side of SR 29 approximately 1.6 miles southwest of Chapparal Avenue NW. The pond site is 1.43 acres in size and consists of wet prairie. Adjacent land use types consist of improved pasture northwest of the pond site and a linear drainage ditch southeast of the pond site. Mapped soils within this pond site include Immokalee sand which is not classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007). Mapped soils within this pond site include Malabar fine sand which is classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Pond 9A is entirely comprised of a low lying, herbaceous wetland system. Due to the availability of suitable habitat, the Florida sandhill crane and eastern indigo snake have the potential to occur within the pond site. No wildlife was observed within or adjacent to Pond 9A during field evaluations.

Pond 9B ✓

Pond 9B is located on the southeast side of the SR 29 proposed ROW approximately 1.5 miles southwest of Chapparal Avenue NW. This pond site is 2.00 acres in size and consists of improved pasture (approximately 33%) in the southeast portion, freshwater marsh (approximately 33%) in the northwest portion, and wet prairie in the remaining portion of the pond site. Adjacent land use types consist of additional improved pasture southeast of the pond site. Mapped soils within this pond site include Malabar fine sand which is classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

The majority of Pond 9B consists of wetland habitat. Due to the availability of suitable habitat, the southeastern American kestrel, Florida sandhill crane, Florida burrowing owl, gopher tortoise, eastern indigo snake, gopher frog, Florida pine snake, and Florida mouse have the potential to occur within the improved pasture portion and/or the wet prairie portion of the pond site. Within the freshwater marsh portion of Pond 9B, the wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis have the potential to occur. No wildlife was observed within or adjacent to Pond 9B during field evaluations.

Pond 10

Pond 10 is located on the southeast side of the SR 29 proposed ROW approximately 3,500 feet southwest of Chapparal Avenue NW. This pond site is 6.32 acres in size and consists of wet prairie that extends from all sides of the pond site. Mapped soils within this pond site include Malabar fine sand and Malabar fine sand, high (approximately 50 percent of the pond site). Malabar fine sand is classified as hydric while Malabar fine sand, high is not classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Pond 10 is entirely comprised of a low lying, herbaceous wetland system. Due to the availability of suitable habitat, the Florida sandhill crane and eastern indigo snake have the potential to occur within the pond site. No wildlife was observed within or adjacent to Pond 10 during field evaluations.

Pond 11A

Pond 11A is located on the southeast side of the SR 29 proposed ROW approximately 1,000 feet southwest of Chapparal Avenue NW. This pond site is 2.73 acres in size and consists of mixed wetland hardwoods that extend beyond the pond site on all sides. Mapped soils within this pond site include Pineda fine sand which is classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Pond 11A is entirely comprised of a forested wetland system. Due to the availability of suitable habitat, several listed species have the potential to occur with Pond 11A including the mangrove fox squirrel, wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis. No wildlife was observed within or adjacent to Pond 11A during field evaluations.

Pond 11B

Pond 11B is located on the southeast side of the SR 29 proposed ROW directly southwest of Chapparal Avenue NW. This pond site is 3.93 acres in size and consists of primarily mixed wetland hardwoods (approximately 90 percent). The west corner of Pond 11B consists of freshwater marsh habitat. Mapped soils within this pond site include Malabar fine sand, high which is not classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Pond 11B is comprised entirely of a wetland system, most of which is forested. Due to the availability of suitable habitat, several listed species have the potential to occur within Pond 11B including mangrove fox squirrel, wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis. No wildlife was observed within or adjacent to Pond 11B during field evaluations.

Pond 12-13A

Pond 12-13A is located on the southeast side of the SR 29 proposed ROW approximately 1.4 miles southwest of Island Road. This pond site is 3.49 acres in size and consists of shrub and brushland habitat that extends southeast of the pond site. Mapped soils within this pond site include Myakka fine sand which is not classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Due to the availability of suitable habitat within Pond 12-13A, the eastern indigo snake has the potential to occur within this pond site. No wildlife was observed within or adjacent to Pond 12-13A during field evaluations.

Pond 13B

Pond 13B is located on the southeast side of the SR 29 proposed ROW approximately 3,400 feet southwest of Island Road. This pond site is 2.63 acres in size and consists of wet prairie. Adjacent habitat types consist of shrub and brushland and slash pine swamp forest. Mapped soils within this pond site include Malabar fine sand and Basinger fine sand (approximately 5 percent of pond site) both of which are classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Pond 13B is entirely comprised of a low lying, herbaceous wetland system. Due to the availability of suitable habitat, the Florida sandhill crane and eastern indigo snake have the potential to occur within the pond site. No wildlife was observed within or adjacent to Pond 13B during field evaluations.

Pond 14A

Pond 14A is located on the southeast side of the SR 29 proposed ROW approximately 3,300 feet northeast of Island Road. This pond site is 2.70 acres in size and consists primarily of wet prairie (approximately 95 percent) with a drainage ditch running north and south through the center of the pond site. Mapped soils within this pond site include Myakka fine sand which is not classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Pond 14A is entirely comprised of a low lying herbaceous wetland system. Due to the availability of suitable habitat, the Florida sandhill crane and eastern indigo snake have the potential to occur within the wet prairie portion of the pond site. The wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis have the potential to occur within the drainage ditch within the pond site. No wildlife was observed within or adjacent to Pond 14A during field evaluations.

Pond 14B-15-1

Pond 14B-15-1 is located on the northwest side of the SR 29 proposed ROW approximately 4,100 feet northeast of Island Road. This pond site is 4.09 acres in size and primarily consists of wet prairie (greater than 95 percent) that extends beyond the pond site on all sides. A drainage ditch runs through the southeast portion of the pond site. Mapped soils within this pond site include Basinger fine sand which is classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Pond 14B-15-1 is entirely comprised of a low lying herbaceous wetland system. Due to the availability of suitable habitat, the Florida sandhill crane and eastern indigo snake have the potential to occur within the wet prairie portion of the pond site. The wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis have the potential to occur within the drainage ditch within the pond site. No wildlife was observed within or adjacent to Pond 14B-15-1 during field evaluations.

Pond 14B-15-2

Pond 14B-15-2 is located on the northwest side of the SR 29 proposed ROW approximately 3,000 feet southwest of SR 74. This pond site is 7.01 acres in size and consists of a reservoir within the northwest half of the pond site and wet prairie in the remainder of the pond site. Adjacent land use types consist of additional wet prairie. Mapped soils within this pond site include Basinger fine sand which is classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Pond 14B-15-2 is contains a low lying herbaceous wetland system as well as an open water reservoir with little vegetation. Due to the availability of suitable habitat, the Florida sandhill crane and eastern indigo snake have the potential to occur within the wet prairie portion of the pond site. Within the reservoir, the American alligator (*Alligator mississippiensis*) has the

potential to occur. No wildlife was observed within or adjacent to Pond 14B-15-2 during field evaluations.

Pond 16A

Pond 16A is located on the north side of the SR 74 proposed ROW approximately 1,700 feet east of SR 29. This pond site is 3.66 acres in size and consists of wet prairie that extends beyond the pond site. Mapped soils within this pond site include Immokalee sand and Basinger fine sand (approximately 50 percent of pond site). Immokalee sand is not classified as hydric while Basinger fine sand is classified as hydric by the *Hydric Soils of Florida Handbook* (Hurt 2007).

Pond 16A is entirely comprised of a low lying, herbaceous wetland system. Due to the availability of suitable habitat, the Florida sandhill crane and eastern indigo snake have the potential to occur within the pond site. No wildlife was observed within or adjacent to Pond 16A during field evaluations.

Pond 16-17

Pond 16-17 is located on the southeast side of SR 29 southwest of US 27. This pond site is 68.80 acres in size and consists of freshwater marsh habitat. Adjacent land use types consist of sand live oak. This pond site has been mapped as water.

Pond 16-17 is entirely comprised of a low lying, herbaceous wetland system. Due to the availability of suitable habitat, several listed bird species have the potential to occur including the wood stork, limpkin, little blue heron, snowy egret, tricolored heron, and white ibis. No wildlife was observed within or adjacent to Pond 16-17 during field evaluations.

Appendix 7.0

Hazardous Material and Contamination Assessment

DRAFT PSR Contamination Screening Report

Project Development & Environment (PD&E) Study for SR 29 (Labelle) From CR 80A (Cowboy Way) to US 27 Hendry and Glades Counties, Florida

FPN: 417878-1-22-01

Prepared for:

Florida Department of Transportation
District One
801 North Broadway Street
Bartow, Florida 33830

Prepared by:

TIERRA, INC.
7351 Temple Terrace Highway
Tampa, Florida 33637
Tierra Project No.: 6511-07-293

March 2011

Executive Summary

The information presented in this letter report is not intended to meet the full requirements of the Contamination Screening Evaluation Report (CSER), but rather to provide an initial risk ranking of all preliminary pond sites to support the Pond Siting Report (PSR). The contamination screening evaluation presented herein is based on historical aerial photograph and topographic map reviews, governmental database reviews and site reconnaissance. The complete Level I CSER is on-going and will provide additional information for all pond sites selected for final design.

The preliminary contamination screening evaluation has resulted in the following risk rankings for the pond site alternatives:

Pond Alternative	Risk Ranking
South	Medium
0	Medium
1	Low
2	No
3	No
4	No
5	No
6-1	No
6-2	No
7	No
8A	No
8B	No

Pond Alternative	Risk Ranking
9A	No
9B	No
10	No
11A	No
11B	No
12-13A	No
13B	No
14A	No
14B-15-1	No
14B-15-2	No
16A	No
16-17	Low

Pond Alternative locations are included in Appendix A.

For those sites considered for final design with risk rankings of "Medium" or "High", Tierra recommends Level II field screening to determine if environmental impacts exist at the proposed pond sites.

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Pond South

Pond South is located west of SR 29 from approximate Baseline Survey Station 189+00 to 192+00. The approximate location is shown in **Appendix A**. During site reconnaissance, a residential mobile home was observed. In addition, Pond South is located approximately 500 feet south of Handy Food Store #58 (1040 S SR 29, LaBelle, Florida). Handy Food Store #58 reported a discharge in September 1988. The site was accepted into the Early Detection Incentive (EDI) program in January 1991. These tanks were removed in March 2005 and a Site Rehabilitation Completion Order (SRCO) was issued in November 2010. In July 2004, three (3) additional USTs were installed. A discharge was reported in November 2009. In January 2011, Florida Department of Environmental Protection (FDEP) requested a Site Assessment Report Addendum (SARA) prior to a Remedial Action Plan being implemented. Historical aerial photographs depict Handy Food Store #58 as a fuel station in 1940, 1952, 1968, 1973, 1983 and 1990.

General view of Pond South

Residential mobile home within Pond South

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "Sears, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. Two (2) structures are depicted in 1958. In addition, a drainage feature traverses the alternative. A copy of the map is included in **Appendix B**.

Historical aerial photographs dated 1968, 1973, 1983, 1990, 1995 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 1

Year	Comment	Source
1968	Residential	FDOT Survey and Mapping
1973	Residential	FDOT Survey and Mapping
1983	Residential	FDOT Survey and Mapping
1990	Residential	FDOT Survey and Mapping
1995	Residential	FDOT Survey and Mapping
2005	Residential	FDOT Survey and Mapping

Pond 0

Pond 0 is located west of SR 29 from approximate Baseline Survey Station 285+00 to 287+00. The approximate location is shown in **Appendix A**. During site reconnaissance, the alternative was observed as overgrown brush. In addition, Pond 0 is located adjacent to Handy Food Store #82 (200 Old Circle 78, LaBelle, Florida). Handy Food Store #82 is currently in the Early Detection Incentive (EDI) program with a site cleanup score of 51. Two (2) 8,000 gallon USTs were installed in February 1989. A discharge was reported in June 1988. The discharge status is "On-Going." In August 2005, two (2) 10,000 gallon USTs were installed and the 8,000 gallon USTs remained in place but were put out of service. The 8,000 gallon USTs were removed in October 2007. A total of 1701 tons of petroleum impacted soils were removed at that time. Historical aerial photographs dated 1983, 1990, 1995 and 2005 depict Handy Food Store #82 site as a fuel station.

General view of Pond 0

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "LaBelle, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. The map indicates Pond 0 has been developed but no structures are noted in 1958 and 1973. A copy of the map is included in **Appendix B**.

Historical aerial photographs dated 1968, 1973, 1983, 1990, 1995 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 2

Year	Comment	Source
1968	Disturbed land with no structures	FDOT Survey and Mapping
1973	Disturbed land with no structures	FDOT Survey and Mapping
1983	Disturbed land with no structures	FDOT Survey and Mapping
1990	Disturbed land with no structures	FDOT Survey and Mapping
1995	Disturbed land with no structures	FDOT Survey and Mapping
2005	Disturbed land with no structures	FDOT Survey and Mapping

Pond 1

Pond 1 is located east of SR 29 from approximate Baseline Survey Station 295+00 to 299+00. The approximate location is shown in **Appendix A**. During site reconnaissance, the alternative was observed from SR 29, as dense vegetation. Pond 1 was not accessible due to locked gates and dense vegetation. Historical aerial photographs were used to further document historical use for areas that were inaccessible during the reconnaissance.

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "LaBelle, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. The map indicates Pond 1 as undisturbed land in 1958 and 1973. A copy of the map is included in **Appendix B**.

Historical aerial photographs dated 1968, 1973, 1983, 1990, 1995 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 3

Year	Comment	Source
1968	Pastureland	FDOT Survey and Mapping
1973	Pastureland	FDOT Survey and Mapping
1983	Dense Vegetation	FDOT Survey and Mapping
1990	Dense Vegetation	FDOT Survey and Mapping
1995	Dense Vegetation	FDOT Survey and Mapping
2005	Dense Vegetation	FDOT Survey and Mapping

Pond 2

Pond 2 is located east of SR 29 from approximate Baseline Survey Station 313+00 to 315+00. The approximate location is shown in **Appendix A**. During site reconnaissance, the alternative was observed from SR 29, as dense vegetation. Pond 2 was not accessible due to locked gates and dense vegetation. Historical aerial photographs were used to further document historical use for areas that were inaccessible during the reconnaissance.

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "LaBelle, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. The map indicates Pond 2 as partially disturbed land with no structures in 1958 and 1973. A copy of the map is included in **Appendix B**.

Historical aerial photographs dated 1968, 1973, 1983, 1990, 1995 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 4

Year	Comment	Source
1968	Pastureland	FDOT Survey and Mapping
1973	Pastureland	FDOT Survey and Mapping
1983	Pastureland	FDOT Survey and Mapping
1990	Pastureland	FDOT Survey and Mapping
1995	Pastureland	FDOT Survey and Mapping
2005	Pastureland	FDOT Survey and Mapping

Pond 3

Pond 3 is located east of SR 29 from approximate Baseline Survey Station 345+00 to 349+00. The approximate location is shown in **Appendix A**. During site reconnaissance, the alternative was observed from SR 29, as pastureland. Pond 3 was not accessible due to locked gates. Historical aerial photographs were used to further document historical use for areas that were inaccessible during the reconnaissance.

General view of Pond 3

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "LaBelle, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. The map indicates Pond 3 as disturbed land with no structures in 1958 and 1973. A copy of the map is included in **Appendix B**.

Historical aerial photographs dated 1968, 1973, 1983, 1990, 1995 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 5

Year	Comment	Source
1968	Pastureland	FDOT Survey and Mapping
1973	Pastureland	FDOT Survey and Mapping
1983	Pastureland	FDOT Survey and Mapping
1990	Pastureland	FDOT Survey and Mapping
1995	Pastureland	FDOT Survey and Mapping
2005	Pastureland	FDOT Survey and Mapping

Pond 4

Pond 4 is located east of SR 29 from approximate Baseline Survey Station 381+00 to 384+00. The approximate location is shown in **Appendix A**. During site reconnaissance, the alternative was observed from SR 29, as pastureland. Pond 4 was not accessible due to locked gates. Historical aerial photographs were used to further document historical use for areas that were inaccessible during the reconnaissance.

General view of Pond 4

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "LaBelle, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. The map indicates Pond 4 as disturbed land with no structures in 1958 and 1973. A copy of the map is included in **Appendix B**.

Historical aerial photographs dated 1968, 1973, 1983, 1990, 1995 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 6

Year	Comment	Source
1968	Pastureland	FDOT Survey and Mapping
1973	Pastureland	FDOT Survey and Mapping
1983	Pastureland	FDOT Survey and Mapping
1990	Pastureland	FDOT Survey and Mapping
1995	Pastureland	FDOT Survey and Mapping
2005	Pastureland	FDOT Survey and Mapping

Pond 5

Pond 5 is located east of SR 29 from approximate Baseline Survey Station 425+00 to 429+00. The approximate location is shown in **Appendix A**. During site reconnaissance, the alternative was observed from SR 29, as pastureland. Pond 5 was not accessible due to locked gates. Historical aerial photographs were used to further document historical use for areas that were inaccessible during the reconnaissance.

General view of Pond 5

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "LaBelle, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. The map indicates Pond 5 as disturbed land with no structures in 1958 and 1973. A copy of the map is included in **Appendix B**.

Historical aerial photographs dated 1968, 1973, 1983, 1995 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 7

Year	Comment	Source
1968	Pastureland	FDOT Survey and Mapping
1973	Pastureland	FDOT Survey and Mapping
1983	Pastureland	FDOT Survey and Mapping
1995	Pastureland	FDOT Survey and Mapping
2005	Pastureland	FDOT Survey and Mapping

Ponds 6-1 and 6-2

Ponds 6-1 and 6-2 are located east of SR 29 and north of SR 78 from approximate Baseline Survey Station 473+00 to 479+00. The approximate locations are shown in **Appendix A**. During site reconnaissance, the alternatives were observed as pastureland/dense vegetation from SR 78 due to locked gates and dense vegetation. Historical aerial photographs were used to further document historical use for areas that were inaccessible during the reconnaissance.

General view of Ponds 6-1 and 6-2

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "LaBelle, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. The map indicates Ponds 6-1 and 6-2 as partially disturbed land with no structures in 1958 and 1973. A marsh or swamp feature is noted in Pond 6-2. A copy of the map is included in **Appendix B**.

Historical aerial photographs dated 1968, 1973, 1983, 1995 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 8

Year	Comment	Source
1968	Pastureland	FDOT Survey and Mapping
1973	Pastureland	FDOT Survey and Mapping
1983	Pastureland	FDOT Survey and Mapping
1995	Pastureland	FDOT Survey and Mapping
2005	Pastureland	FDOT Survey and Mapping

Pond 7

Pond 7 is located east of SR 29 from approximate Baseline Survey Station 489+00 to 492+00. The approximate location is shown in **Appendix A**. During site reconnaissance, the alternative was observed from SR 29, as pastureland. Pond 7 was not accessible due to locked gates. Historical aerial photographs were used to further document historical use for areas that were inaccessible during the reconnaissance.

General view of Pond 7

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "LaBelle, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. The map indicates Pond 7 as disturbed land with no structures in 1958 and 1973. A copy of the map is included in **Appendix B**.

Historical aerial photographs dated 1968, 1973, 1983, 1995 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 9

Year	Comment	Source
1968	Pastureland	FDOT Survey and Mapping
1973	Pastureland	FDOT Survey and Mapping
1983	Pastureland	FDOT Survey and Mapping
1995	Pastureland	FDOT Survey and Mapping
2005	Pastureland	FDOT Survey and Mapping

Ponds 8A and 8B

The pond alternatives are located east and west of SR 29 from approximate Baseline Survey Station 576+00 to 588+00. The approximate locations are shown in **Appendix A**. During site reconnaissance, the alternatives were observed from SR 29, as pastureland. Ponds 8A and 8B were not accessible due to locked gates. Historical aerial photographs were used to further document historical use for areas that were inaccessible during the reconnaissance.

General view of Pond 8A

General view of Pond 8B

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "LaBelle, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. The map indicates Ponds 8A and 8B as disturbed land with no structures in 1958 and 1973. A copy of the map is included in **Appendix B**.

Historical aerial photographs dated 1973, 1983, 1995 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 10		
Year	Comment	Source
1973	Pastureland	FDOT Survey and Mapping
1983	Pastureland	FDOT Survey and Mapping
1995	Pastureland	FDOT Survey and Mapping
2005	Pastureland	FDOT Survey and Mapping

Ponds 9A and 9B

The pond alternatives are located east and west of SR 29 from approximate Baseline Survey Station 620+00 to 629+00. The approximate locations are shown in **Appendix A**. During site reconnaissance, the alternatives were observed from SR 29, as pastureland. Ponds 9A and 9B were not accessible due to locked gates. Historical aerial photographs were used to further document historical use for areas that were inaccessible during the reconnaissance.

General view of Pond 9A

General view of Pond 9B

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "LaBelle, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. The map indicates Ponds 9A and 9B as disturbed land with no structures in 1958 and 1973. A copy of the map is included in **Appendix B**.

Historical aerial photographs dated 1973, 1983 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 11

Year	Comment	Source
1973	Pastureland	FDOT Survey and Mapping
1983	Pastureland	FDOT Survey and Mapping
2005	Pastureland	FDOT Survey and Mapping

Pond 10

Pond 10 is located east of SR 29 from approximate Baseline Survey Station 666+00 to 669+00. The approximate location is shown in **Appendix A**. During site reconnaissance, the alternative was observed from SR 29, as pastureland. Pond 10 was not accessible due to locked gates. Historical aerial photographs were used to further document historical use for areas that were inaccessible during the reconnaissance.

General view of Pond 10

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "LaBelle, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. The map indicates Pond 10 as disturbed land with no structures in 1958 and 1973. A copy of the map is included in **Appendix B**.

Historical aerial photographs dated 1973, 1983, 1995 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 12

Year	Comment	Source
1973	Pastureland	FDOT Survey and Mapping
1983	Pastureland	FDOT Survey and Mapping
1995	Pastureland	FDOT Survey and Mapping
2005	Pastureland	FDOT Survey and Mapping

Ponds 11A and 11B

The pond alternatives are located east of SR 29 from approximate Baseline Survey Station 689+00 to 703+00. The approximate locations are shown in **Appendix A**. During site reconnaissance, the alternatives were observed from SR 29, as pastureland. Ponds 11A and 11B were not accessible due to locked gates and dense vegetation. Historical aerial photographs were used to further document historical use for areas that were inaccessible during the reconnaissance.

General view of Ponds 11A and 11B

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "Goodno, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. The map indicates Ponds 11A and 11B as undisturbed land in 1958 and 1973. A marsh or swamp feature is located adjacent to the ponds. A copy of the map is included in **Appendix B**.

Historical aerial photographs dated 1973, 1983, 1995 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 13		
Year	Comment	Source
1973	Dense Vegetation	FDOT Survey and Mapping
1983	Dense Vegetation	FDOT Survey and Mapping
1995	Dense Vegetation	FDOT Survey and Mapping
2005	Dense Vegetation	FDOT Survey and Mapping

Ponds 12-13A and 13B

Ponds 12-13A and 13B are located east of SR 29 from approximate Baseline Survey Station 792+00 to 796+00 and 833+00 to 836+00. The approximate locations are shown in **Appendix A**. During site reconnaissance, Pond 12-13A was observed from SR 29 as vacant land with heavy brush and Pond 13B was observed from SR 29, as pastureland. Ponds 12-13A and 13B were not accessible due to locked gates. Historical aerial photographs were used to further document historical use for areas that were inaccessible during the reconnaissance.

General view of Pond 12-13A

General view of Pond 13B

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "Palmdale, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. The map indicates Ponds 12-13A and 13B as disturbed land with no structures in 1958 and 1973. A copy of the map is included in **Appendix B**.

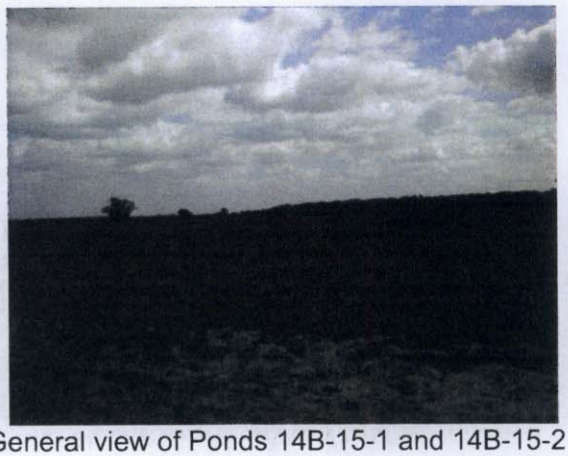
Historical aerial photographs dated 1973, 1983, 1995 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 14		
Year	Comment	Source
1973	Dense Vegetation	FDOT Survey and Mapping
1983	Dense Vegetation	FDOT Survey and Mapping
1995	Pond 12-13B: Dense Vegetation Pond 13: Pastureland	FDOT Survey and Mapping
2005	Pond 12-13B: Dense Vegetation Pond 13: Pastureland	FDOT Survey and Mapping

Ponds 14A, 14B-15-1 and 14B-15-2

Ponds 14A, 14B-15-1 and 14B-15-2 are located west and east of SR 29 from approximate Baseline Survey Station 904+00 to 920+00. The approximate locations are shown in **Appendix A**. During site reconnaissance, the alternatives were observed from SR 29, as vacant pastureland. The alternatives were not accessible due to locked gates. Historical aerial photographs were used to further document historical use for areas that were inaccessible during the reconnaissance.

General view of Pond 14A



General view of Ponds 14B-15-1 and 14B-15-2

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "Palmdale, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. The map indicates Ponds 14A and 14B-15-1 as disturbed land with a dirt roadway traversing the alternatives in 1958 and 1973. A water feature is located within Pond 14B-15-2. A copy of the map is included in **Appendix B**.

Historical aerial photographs dated 1973, 1983, 1995 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 15

Year	Comment	Source
1973	Pastureland	FDOT Survey and Mapping
1983	Ponds 14A and 14B-15-1: Pastureland Pond 14B-15-2: Retention and Pastureland	FDOT Survey and Mapping
1995	Ponds 14A and 14B-15-1: Pastureland Pond 14B-15-2: Retention and Pastureland	FDOT Survey and Mapping
2005	Ponds 14A and 14B-15-1: Pastureland Pond 14B-15-2: Retention and Pastureland	FDOT Survey and Mapping

Pond 16A

Pond 16a is located west of SR 29 and north of CR 74 from approximate Baseline Survey Station 951+00 to 953+00. The approximate location is shown in **Appendix A**. During site reconnaissance, the alternative was observed from CR 74, as pastureland. Pond 16A was not accessible due to locked gates. Historical aerial photographs were used to further document historical use for areas that were inaccessible during the reconnaissance.

General view of Pond 16A

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "Palmdale, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. The map indicates Pond 16A as disturbed land with a dirt roadway traversing the alternative in 1958 and 1973. A copy of the map is included in **Appendix B**.

Historical aerial photographs dated 1973, 1983, 1995 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 16		
Year	Comment	Source
1973	Pastureland	FDOT Survey and Mapping
1983	Pastureland	FDOT Survey and Mapping
1995	Pastureland	FDOT Survey and Mapping
2005	Pastureland	FDOT Survey and Mapping

Pond 16-17

Pond 16-17 is located south of SR 29 and west of SR 27 from approximate Baseline Survey Station 976+00 to 990+00. The approximate location is shown in **Appendix A**. During site reconnaissance, the alternative was observed as vacant land and is adjacent to a railroad corridor. The land has historical been utilized as a borrow site. Pond 16-17 was not accessible due to locked gates. Historical aerial photographs were used to further document historical use for areas that were inaccessible during the reconnaissance.

General view of Pond 16-17

Historical Land Use Summary

The U.S.G.S. 7.5-Minute "Palmdale, Florida" quadrangle topographic map, published in 1958 and photorevised in 1973, was reviewed. The map indicates Pond 16-17 as a borrow site in 1958 and 1973. A copy of the map is included in **Appendix B**.

Historical aerial photographs dated 1973, 1983, 1995 and 2005 were reviewed. A summary of our review is depicted in the table below. Copies of the photographs are included in **Appendix C**.

Table 17		
Year	Comment	Source
1973	Borrow activity	FDOT Survey and Mapping
1983	Borrow activity	FDOT Survey and Mapping
1995	Borrow activity	FDOT Survey and Mapping
2005	Borrow activity	FDOT Survey and Mapping

Regulatory Review

An environmental database search using the EDR Radius Map Report was conducted in April 2010 to identify sites within close proximity of the alternative pond sites containing documented or suspected petroleum contamination or other hazardous materials. The regulatory review of federal and state environmental records utilizes an integrated geographic information system database. The search was conducted as a preliminary screening tool to identify facilities that are registered with various county, state, and federal agencies. Based on the information obtained from the radius map report, two (2) sites were identified within close proximity to Pond South and Pond 0. Records were reviewed on the FDEP OCULUS website for Handy Food Store #58 and #82 in March 2011. A copy of the radius map report is included in **Appendix D**.

Risk Ranking

Table 18

Pond Alternative	Risk Ranking	Comment
South	Medium	500 feet south of LUST* site
0	Medium	Adjacent to LUST* site
1	Low	
2	No	
3	No	
4	No	
5	No	
6-1	No	
6-2	No	
7	No	
8A	No	
8B	No	
9A	No	
9B	No	
10	No	
11A	No	
11B	No	
12-13A	No	
13B	No	
14A	No	
14B-15-1	No	
14B-15-2	No	
16A	No	
16-17	Low	Borrow site; adjacent to rail corridor

* Leaking Underground Storage Tank

For sites ranked "No" or "Low", no additional work is recommended at this time. Should a facility's permitting or regulatory status change between now and the time acquisitions are initiated, additional screening should be conducted. For those sites with risk rankings of "Medium" or "High", Tierra recommends additional field assessment to determine if environmental impacts exist at the proposed pond sites. Regardless of the risk ranking, all pond sites selected for final design will require Level II field screening. The field screening scope of work should include, at a minimum, soil borings to the proposed depth of the pond and soil sampling for total arsenic. Other sample analyses may be required based on historical land use of the pond site and surrounding properties. The District Contamination Impact Coordinator should be consulted regarding the field screening scope of work for all final pond sites.

Appendix 8.0

Cultural Resources Assessment

Memo

To: Martin A. Peate, URS Corporation
From: Adam M. Schieffer and Kate Hoffman, Janus Research
Date: 3/23/2011
Re: Summary of the Pond Site Results from the S.R. 29 LaBelle CRAS Report for Use in the S.R. 29 LaBelle Pond Siting Report

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In 2010, Janus Research conducted fieldwork for the Cultural Resources Assessment Survey (CRAS) for the S.R. 29 PD&E Study from C.R. 80A (Cowboy Way) to U.S. 27 in Hendry and Glades County for the Florida Department of Transportation, District One. The project corridor was divided into three segments (see Figure 1) as follows:

- Segment 1: From C.R. 80A (Cowboy Way) to north of S.R. 78;
- Segment 2: From north of S.R. 78 to C.R. 74; and
- Segment 3: From C.R. 74 to U.S. 27.

Twenty-four potential pond sites were included within the area surveyed, and at the request of the URS Corporation, findings related to the pond site locations from the CRAS report are summarized in this brief memorandum.

During the CRAS survey, the historic resources Area of Potential Effects (APE) for the pond locations associated with the rural portions of the three segments of the project corridor included the footprint of the pond site and 200 feet from the edge of each pond location. Within the city limits of LaBelle, the historic resources APE for ponds was limited to the parcels on which the pond site is located and any immediately adjacent parcels. The archaeological APE for the CRAS survey was limited to the construction footprint of the pond sites.

Background Information

Physical Environment

The majority of the associated ponds were located within low lying, poorly drained areas of cleared pasture and pasture with relatively sparse tree cover. Several instances of pond locations that did not fit the description above were located within the City of LaBelle and included a small grassy area of hammock, an area of spoil bank along the Caloosahatchee River, and a disturbed area of former citrus grove.

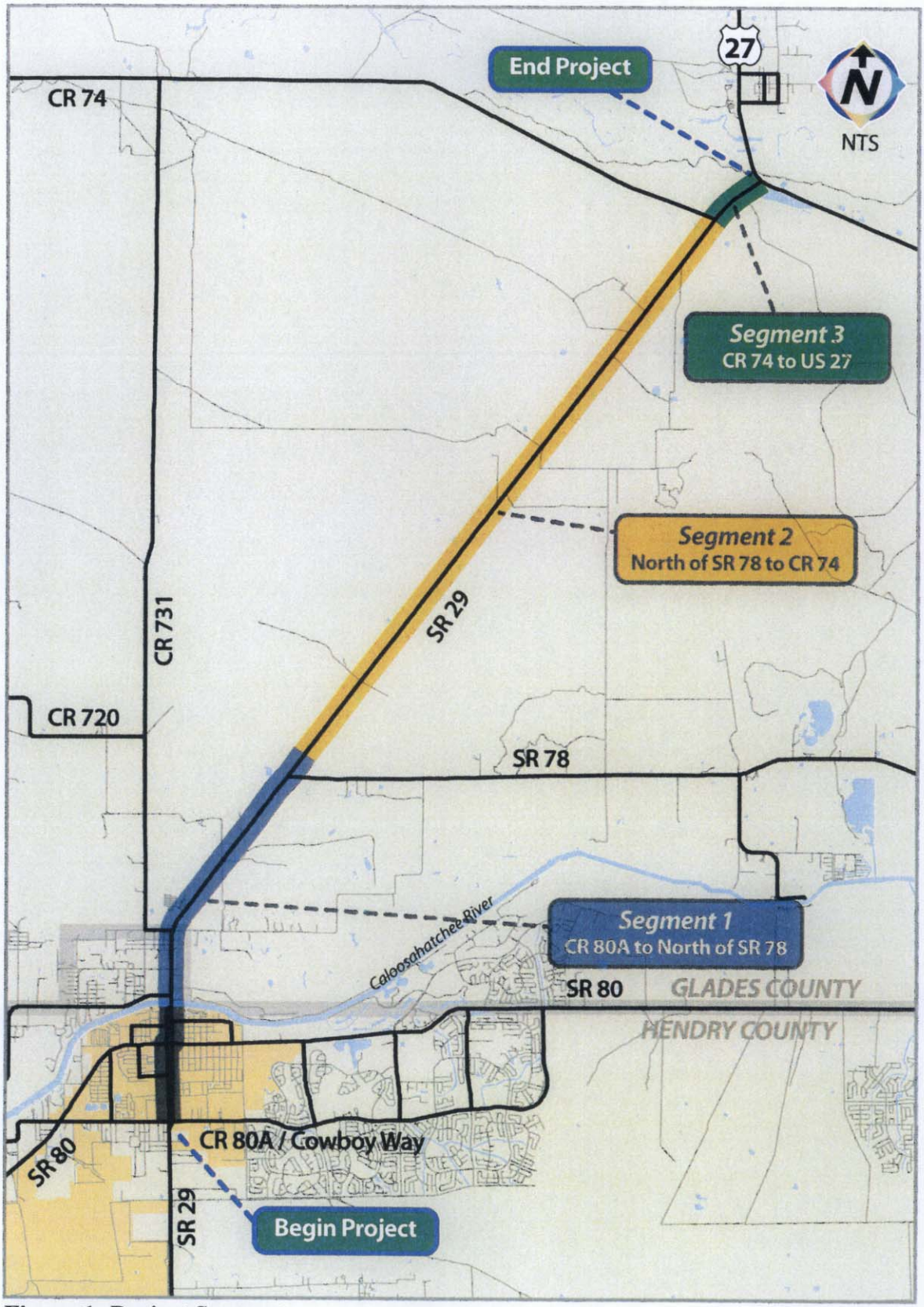

Figure 1: Project Segments

Florida Master Site File (FMSF) Review

The review of the FMSF conducted for the CRAS survey identified no previously recorded archaeological sites within the archaeological APE for the pond locations. Two previously recorded historic bridges were located within the historic resources APE for pond sites during the FMSF search. FDOT Bridge #050032 over York Branch (8GL370) is located within 200 feet of Ponds 11a and 11b, and FDOT Bridge #050035 over Lone Pine Creek (8GL371) is located within 200 feet of Pond 8b.

Archaeological Site Potential

Based on the background research and archaeological field reconnaissance conducted for the CRAS survey, the 24 pond site locations were determined to have low archaeological site potential.

Field Survey Results

Archaeological Resources

Prior to the field survey, the pond sites were considered to have low archaeological site potential. Archaeological testing was conducted within pond locations on a judgmental basis and no cultural material was identified within any of the pond locations during the CRAS survey. Representative photographs of the pond locations are included in the CRAS report, and therefore are not included within this brief memorandum.

Segment 1 Ponds

Ten ponds were located within Segment 1 of the S.R. 29 LaBelle project corridor (Pond South, Pond 0, Pond 1, Pond 2, Pond 3, Pond 4, Pond 5, Pond 6-1, Pond 6-2, and Pond 7). Twelve shovel tests were excavated within these pond locations, none of which identified any cultural material. The only pond that was not subjected to subsurface testing was Pond 0, as it was located within fill along the bank of the Caloosahatchee River.

Pond 2, Pond 3, Pond 4, Pond 5, and Pond 7 were each located within pasture land and one judgmental shovel test was conducted in each pond location. One shovel test was conducted within the boundaries of Pond South (open grassy area with isolated live oak) and Pond 1 (abandoned citrus with oak and greenbriar), three shovel tests were excavated within Pond 6-1 (hammock environment), and two shovel tests were excavated within Pond 6-2 (wetland surrounded by palm, oak, and wild grape).

Segment 2 Ponds

Twelve ponds were located within Segment 2 of the S.R. 29 LaBelle project corridor (Pond 8a, Pond 8b, Pond 9a, Pond 9b, Pond 10, Pond 11a, Pond 11b, Pond 12-13a, Pond 13b, Pond 14a, Pond 14b-15-1, and Pond 14b-15-2). Sixteen shovel tests were excavated within these pond locations, none of which identified any cultural material.

One shovel test was placed within each of the following ponds: Pond 8a, Pond 8b, Pond 9a, Pond 9b, Pond 10, Pond 12-13a, Pond 13b, Pond 14a, Pond 14b-15-1, and Pond 14b-15-2 (areas consisting of various types of cattle pasture with the exception of Pond 12-13a which contained planted trees). Pond 11a and Pond 11b (areas of palm, oak, and palmetto) were subjected to three shovel tests each.

Segment 3 Ponds

Two pond locations, Pond 16a and Pond 16-17, were located within Segment 3 of the S.R. 29 LaBelle project corridor.

One shovel test was conducted within Pond 16a (pasture with palmetto clusters and isolated cabbage palm) and no shovel tests were conducted within Pond 16-17 (existing borrow pit). No cultural material was identified.

Historic Resources

During the CRAS survey, one historic linear resource, the Atlantic Coast Line (South Central Florida Express) Railroad (8GL456), was identified within the historic resources APE for the pond sites. While SHPO has not evaluated this resource regarding National Register eligibility, 8GL456 is considered by the surveyor to be eligible for listing in the National Register of Historic Places (National Register) under Criterion A for its contributions to development, commerce, and transportation in the state.

Two previously recorded bridges were located within the historic resources APE, FDOT Bridge #050032 over York Branch (8GL370) and FDOT Bridge #050035 over Lone Pine Creek (8GL371). However, the fieldwork conducted for the S.R. 29 CRAS report resulted in the determination that both bridges were reconstructed in 1999. Therefore, the bridges are no longer considered historic. FMSF Change of Status forms were prepared for both bridges and were included in Appendix B of the CRAS report.

Summary

No archaeological sites were identified within or adjacent to any of the pond site locations during the CRAS survey. One potentially National Register–eligible historic linear resource (8GL456) is located adjacent to the northern boundary of Pond 16-17. No historic resources are located within the historic resources APE for any of the remaining 23 pond site locations.

APPENDICES

1.0 CORRESPONDENCE AND DOCUMENTATION
- 1.1 FDOT
- 1.2 SWFWMD
- 1.3 Manatee County
- 1.4 Field Notes and Photos

2.0 MISCELLANEOUS MAPS
- 2.1 Drainage Maps
- 2.2 Pond Site Alternatives Exhibits
- 2.3 FIRMettes
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3.0 SOILS AND HIGH WATER INFORMATION
- 3.1 Geotechnical Report Excerpts
- 3.2 SCS Information

4.0 POND SIZING CALCULATIONS
- 4.1 Hydraulic Feasibility Calculations
- 4.2 Pollutant Loading Removal Calculations
- 4.3 ICPR Model

5.0 BIOLOGICAL ASSESSMENT

6.0 HAZARDOUS MATERIAL AND CONTAMINATION ASSSESSMENT

7.0 CULTURAL RESOURCES ASSESSMENT

8.0 PRELIMINARY COST ANALYSIS
- 8.1 Construction Cost
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