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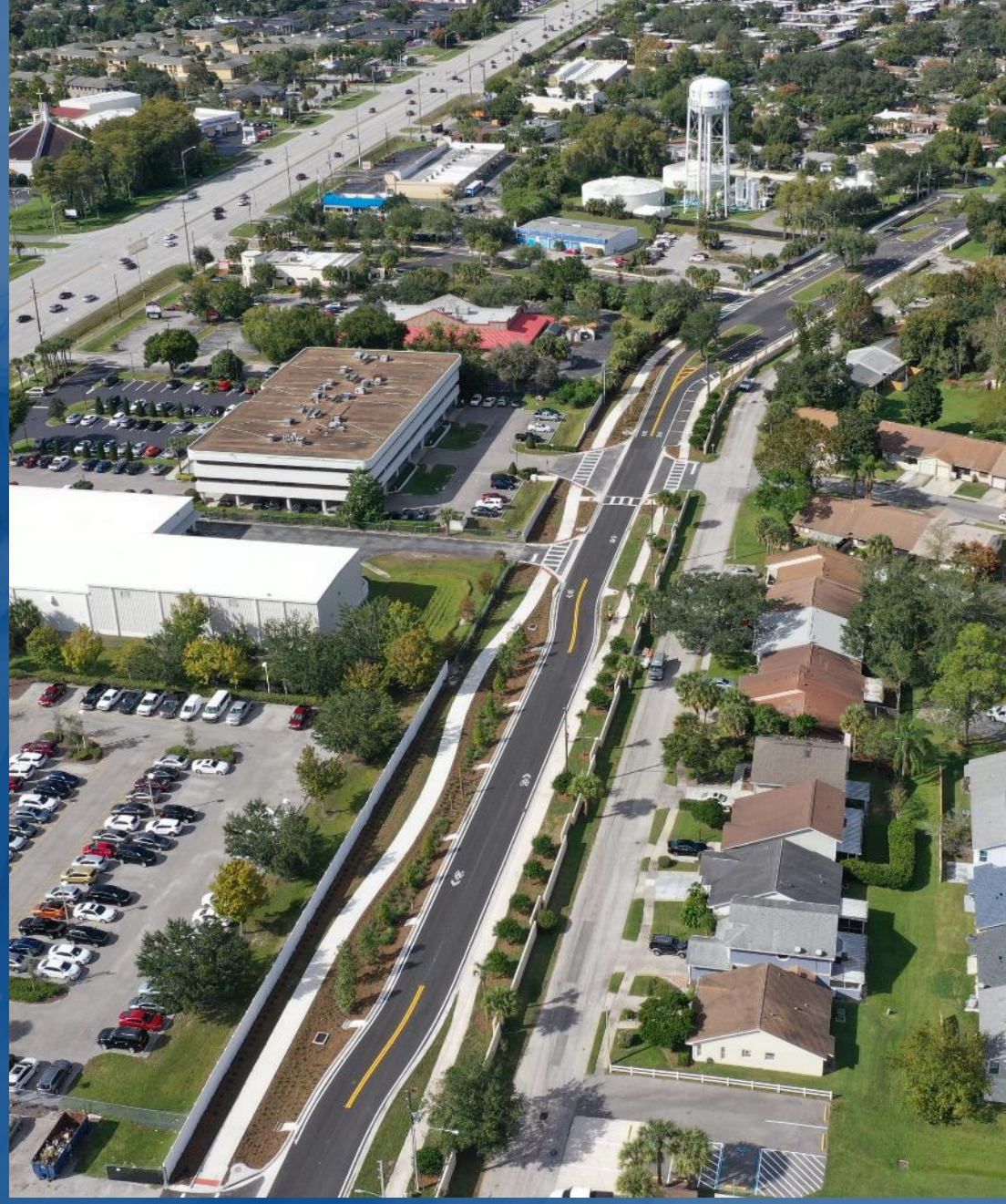
CASSELBERRY

SeSwA 2005 - 2025 Southeast Stormwater Association Celebrating 20 Years

PUTTING ROADS ON A DIET:

THE CASSELTON DRIVE GREEN INFRASTRUCTURE IMPROVEMENT PROJECT

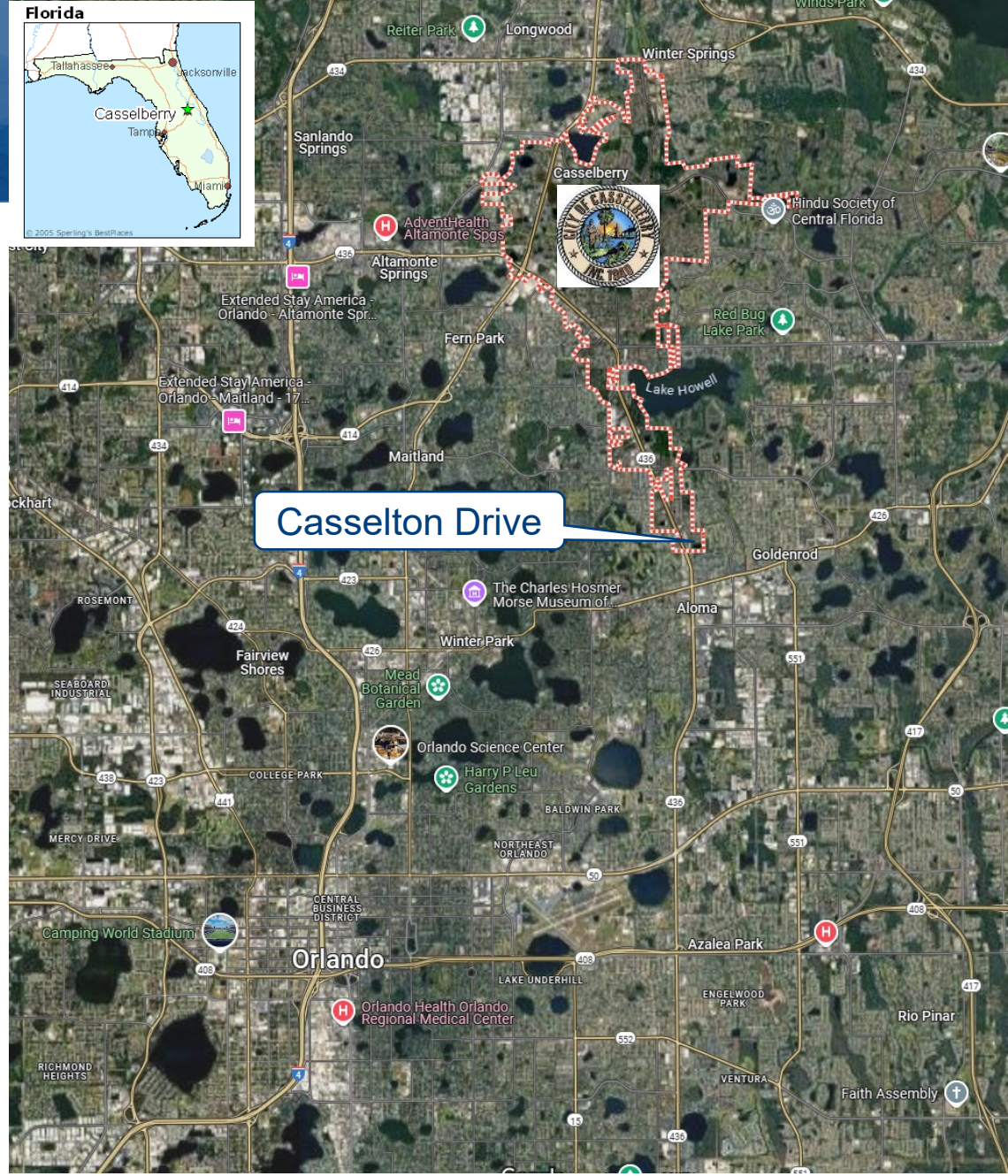
Ross Ellis, P.E., CPESC



SESWA 2025 Regional Stormwater Seminar | April 25, 2025 | Atlanta, GA

Background and Location

- Casselberry, FL
  - Pop. 30,000
- Casselton Drive
  - Half-mile road in southern Casselberry
  - 80-ft right-of-way
  - +50-ft wide, two-lane road
  - Low-volume collector road connecting commercial and residential areas to SR 436
  - Residents reported nuisance street parking and drag racing



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CASSELTON DRIVE IMPROVEMENTS

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Project Overview

Problem Statement

- Casselton Drive is oversized
  - Encourages nuisance street parking and high speeds;
  - Requires excess routine maintenance (street sweeping, restriping, etc.) and periodic repair (milling and resurfacing, etc.);
  - Generates excess stormwater runoff and associated nonpoint source pollution (sediment, oil and grease, heavy metals, etc.); and
  - Reduces the available public area for otherwise recreational and civic uses.

Opportunity

- Put Casselton Drive on a Road Diet
  - Reduce lane width to calm traffic and discourage street parking;
  - Increases open space for recreation;
  - Reduction in total imperious area reduces runoff and pollution;
  - Repair storm sewer, water main, and road surface during construction; and
  - Opportunity to implement green infrastructure (GI).

Project Overview

Scope of Work

- **Existing Conditions**
  - Topographic Survey
  - Geotechnical Investigation
  - CCTV Storm Sewer Inspection
  - Review historic construction, as-built, permit docs
  - Develop GIS Geodatabase
  - Hydraulic and Hydrologic (H&H) modeling to establish existing level of service (LOS) and evaluate base flood elevation (BFE)
- **Proposed Conditions**
  - Roadway and Drainage Concepts
  - Design and Construction Documents
  - H&H modeling to evaluate LOS improvements
  - Public Engagement and Permitting

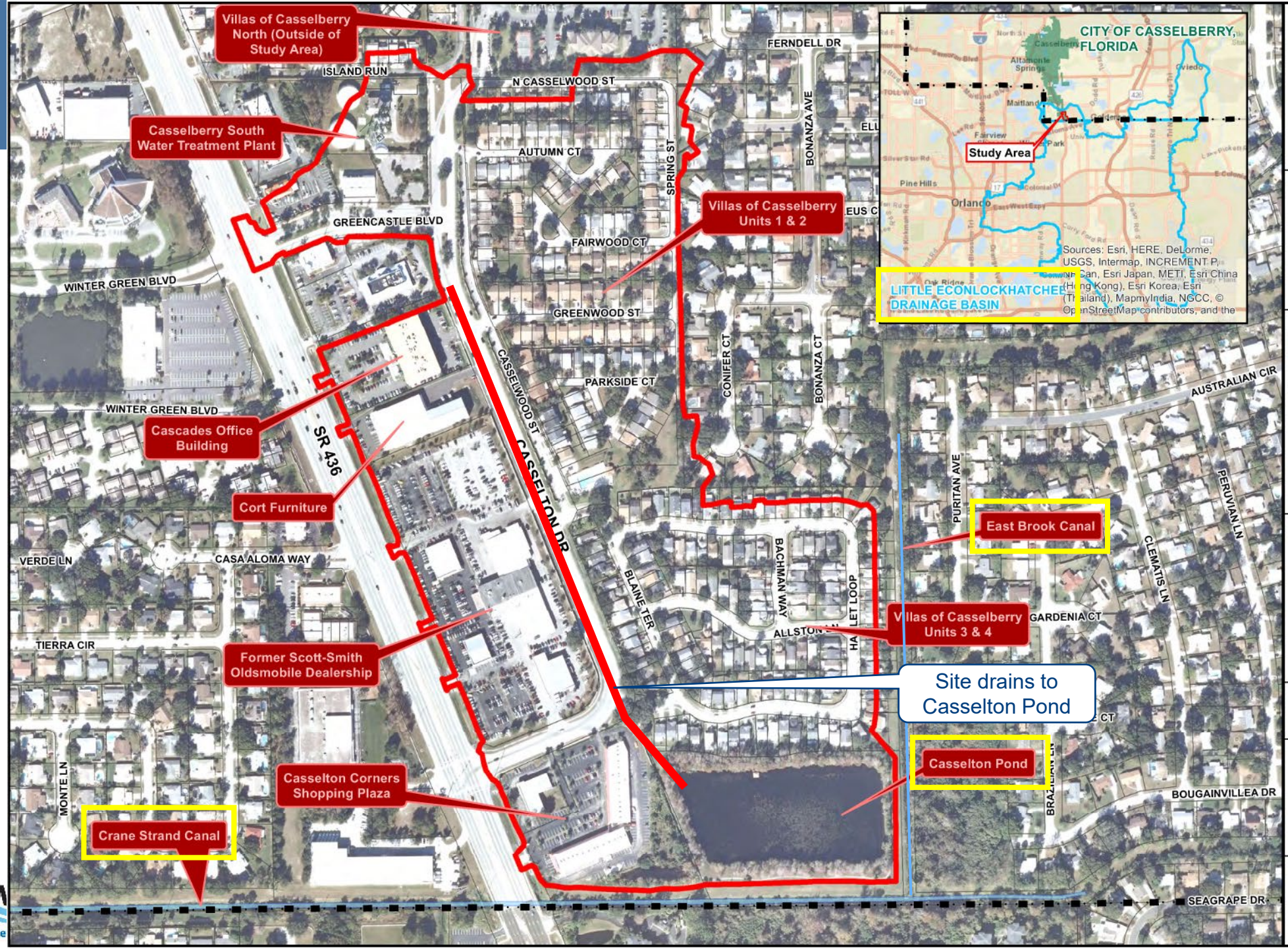
CASSELBERRY

Geosyntec consultants — Prime & Drainage

the balmoral group — Roadway

SSMC SUE • SURVEY • GIS — Topo & CCTV

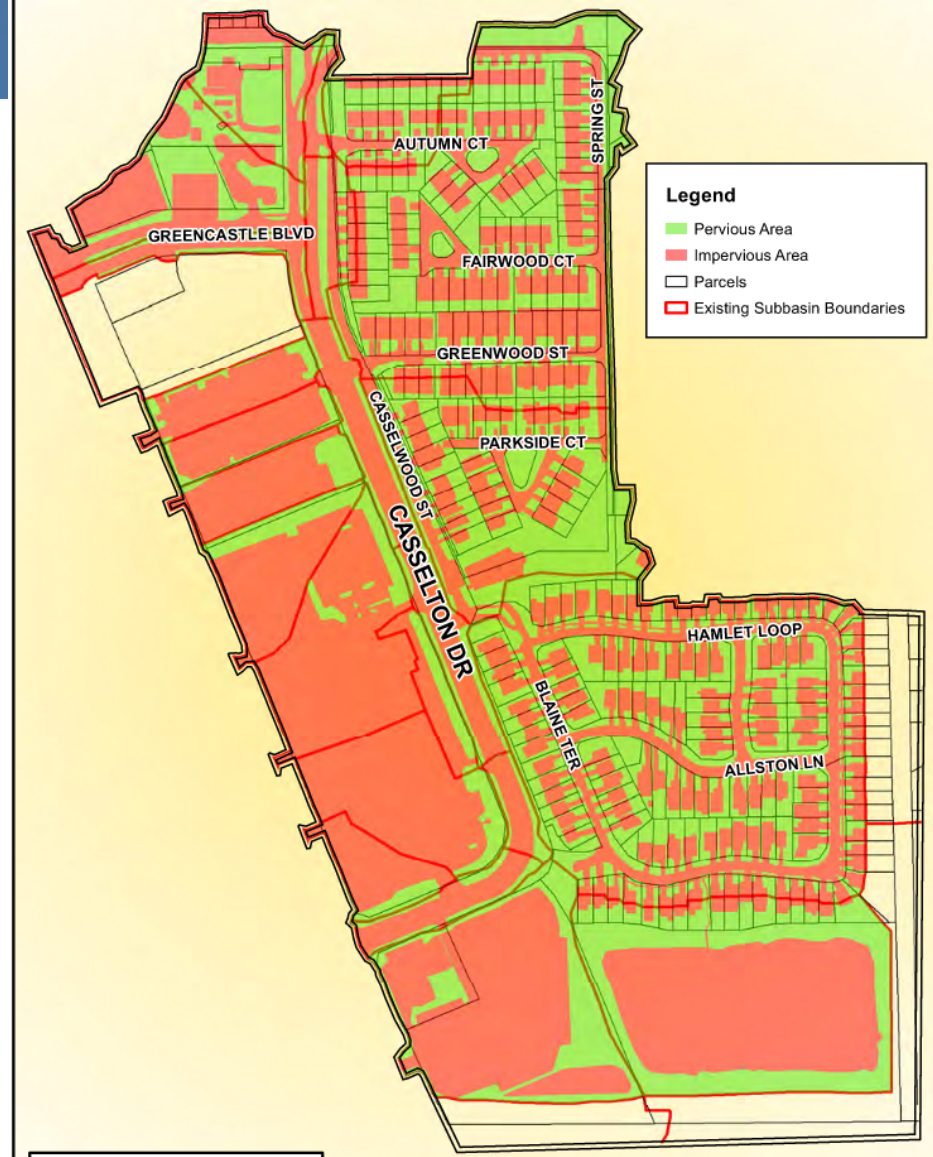
GEC Geotechnical and Environmental Consultants, Inc. — Geotech


Villas of Casselberry North (Outside of Study Area)
Casselberry South Water Treatment Plant
Villas of Casselberry Units 1 & 2
Cascades Office Building
Cort Furniture
Former Scott-Smith Oldsmobile Dealership
Casselton Corners Shopping Plaza
Crane Strand Canal
East Brook Canal
Villas of Casselberry Units 3 & 4
Site drains to Casselton Pond
Casselton Pond
ISLAND RUN
N CASSELWOOD ST
FERNDELL DR
AUTUMN CT
SPRING ST
BONANZA AVE
GREENCASTLE BLVD
WINTER GREEN BLVD
FAIRWOOD CT
GREENWOOD ST
PARKSIDE CT
CONIFER CT
CASSELWOOD ST
CASSELTON DR
SR 436
AUSTRALIAN CIR
PURITAN AVE
PERUVIAN LN
CLEMATIS LN
GARDENIA CT
BACHMAN WAY
BLAINE TER
VERDE LN
CASA ALOMA WAY
TIERRA CIR
MONTE LN
BOUGAINVILLEA DR
SEAGRAPE DR
CITY OF CASSELBERRY, FLORIDA
Study Area
LITTLE ECONLOCKHATCHEE DRAINAGE BASIN
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the
N
0
150
300
Feet
Legend
Study Area (Casselton Basin)
Parcels
County Boundary
Sources:
City Limits: Seminole County, 2014
Watersheds: Seminole County, 1998, Orange County, 2013
Roads: Seminole County, 2014
Aerial: FDOT, 2012
Parcels: Seminole County (2014), Orange County (2012)
Figure
1-2
Site Map
Drainage Report
Casselton Drive Improvements
Geosyntec consultants

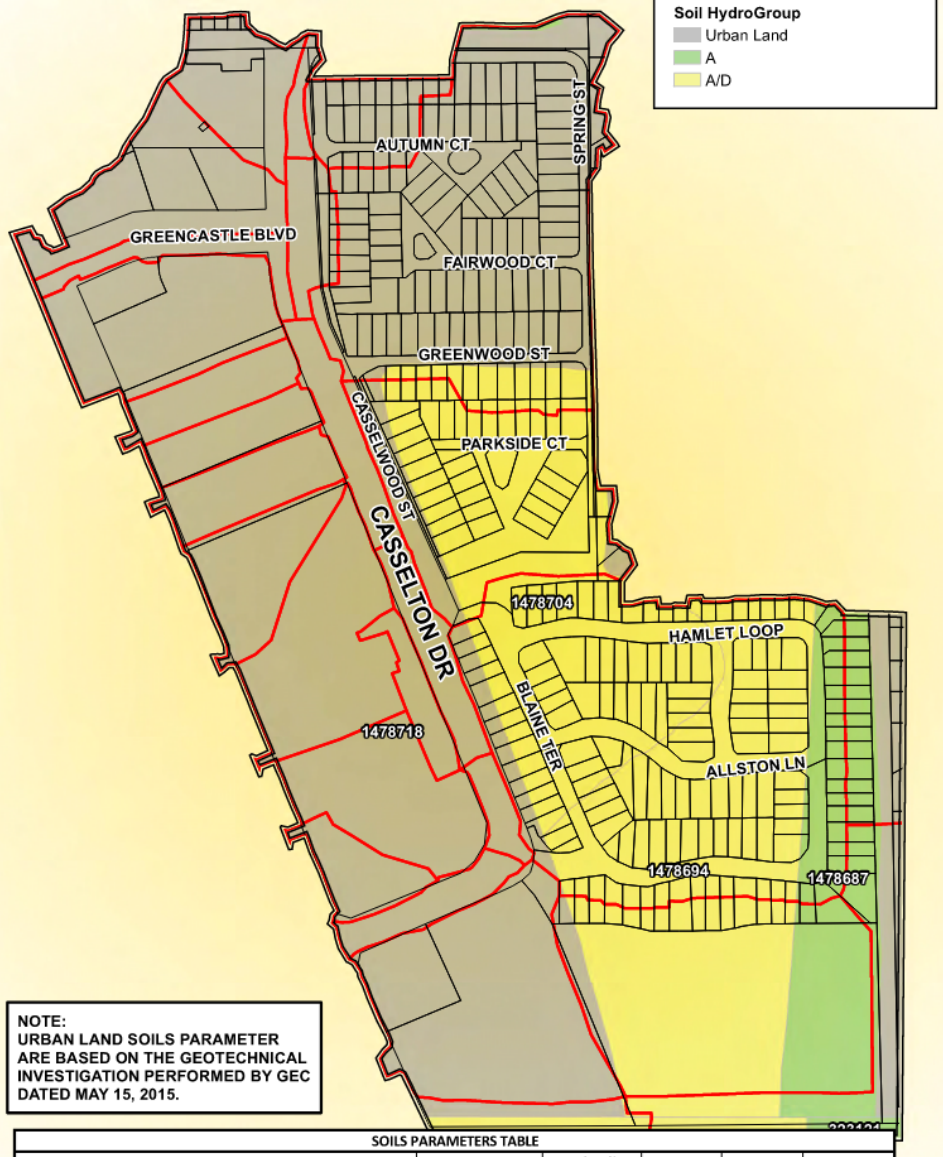
Existing Conditions

GIS Data Collection

- Topographic data
  - Survey by SSMC
  - SJRWMD 1-ft contours (1980s)
  - Orange County 1-ft Little Econlockhatchee Contours (2006)
  - Aerial topo data from SRJWMD and Orange County
- Digital Elevation Model (DEM)
  - 1-ft cell DEM raster developed in GIS
  - Used to delineate subbasin boundaries and drainage connectivity for H&H model
- USGS 7.5' quadrangles (1980)
- FEMA Flood Insurance Rate Map (2007)
- Seminole County GIS data (1998-2014)
- Casselberry Stormwater Digitized Drainage Infrastructure
- Various available construction plans and as-builts (1977-2010)
- SJRWMD Land Use and Land Cover polygons (2009)
- NRCS soil data polygons (2013)
- FDOT 0.9-ft resolution color aerials (2012)



NOTE:
PERVIOUS AND IMPERVIOUS AREA COVERAGES WERE DEVELOPED BY DIGITIZATION FROM AERIAL MAPS.



NOTE:
URBAN LAND SOILS PARAMETER ARE BASED ON THE GEOTECHNICAL INVESTIGATION PERFORMED BY GEC DATED MAY 15, 2015.

SOILS PARAMETERS TABLE

SOIL NAME	MUKEY	Hydraulic Conductivity (in/hr)	Soil Storage (in)	Soil Suction Head (in)	Soil Porosity
BASINGER, SAMSULA, AND HONTOON SOILS, DEPRESSIONAL	1478694	13.04	0.41	2.05	0.41
MYAKKA AND EAUGALLIE FINE SANDS	1478704	13.04	1.18	1.95	0.44
URBAN LAND	1478718	1.50	5.28	2.05	0.25
ARENTS, 0 TO 5 PERCENT SLOPES	1478687	35.01	6.56	2.17	0.43

N

0 175 350 Feet

Sources
Roads: Seminole County, 2014
Landuse: SJRWMD, 2009
Aerial: FDOT, 2012
Soils: NRCS, 2013

Figure
3-2

Soils and Impervious Area Map

Drainage Report

Casselton Drive Improvements

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ISLAND RUN
N CASSELWOOD ST
FERNDELL DR
BCASSEL005
BCASSEL004
BCASSEL003
AUTUMN CT
SPRING ST
BONANZA AVE
ELLWOOD CT
LEANNE CT
PONDEROSA AVE
COCOS LN
BCASSEL006
BCASSEL007
BCASSEL008
BCASSEL002
FAIRWOOD CT
COLEUS CT
BALSAM DR
GREENWOOD ST
BCASSEL009
BCASSEL010
BCASSEL011
PARKSIDE CT
CONIFER CT
BONANZA CT
WINTER GREEN BLVD
SR 436
CASSELTON DR
CASSELWOOD ST
BCASSEL012
BCASSEL001
AUSTRALIAN CIR
BCASSEL013
PURITAN AVE
CLEMATIS LN
BCASSEL014
BCASSEL016
VERDE LN
CASA ALOMA WAY
BCASSEL015
BLAINE TER
BACHMAN WAY
106106
ALLSTON LN
HAMLET LOOP
GARDENIA CT
TIERRA CIR
BCASSEL017
BCASSEL019
BCASSEL018
TANGERINE CT
BCASSEL020
MONTE LN
BCASSEL021
106107
Crane Strand Canal
Casselton Pond
N
0
150
300
Feet
Legend
Casselton Refinement Subbasins
Time of Cocentration Type
Channel Flow
Shallow Concentrated Flow
Sheet Flow
Sources:
Roads: Seminole County, 2014
Aerials: Florida Department of Revenue, 2012
Figure
3-1
Subbasin Map
Drainage Report
Casselton Drive Improvements
Geosyntec
consultants


ISLAND RUN
N CASSELWOOD ST
FERNDELL DR
FERNDELL DR
BONANZA AVE
ELLWOOD CT
LEANNE CT
PONDEROSA AVE
COCOS LN
COCOS CT
SPRING ST
AUTUMN CT
GREENCASTLE BLVD
COLEUS CT
FAIRWOOD CT
WINTER GREEN BLVD
BALSAM DR
GREENWOOD ST
CASSELWOOD ST
CONIFER CT
BONANZA CT
PARKSIDE CT
AUSTRALIAN CIR
WINTER GREEN BLVD
SR 436
CASSELTON DR
PURITAN AVE
PERUVIAN LN
VERDE LN
CASA ALOMA WAY
BLAINE TER
BACHMAN WAY
HAMLET LOOP
ALLSTON LN
CLEMATIS LN
GARDENIA CT
TIERRA CIR
TANGERINE CT
Casselton Pond
BRAZILIAN LN
BOUGAINVILLEA DR
MONTE LN
Crane Strand Canal
SEAGRAPE DR
N
0
150
300
Feet
Legend
Study Area (Casselton Basin)
Parcels
County Boundary
Casselton Dr Drainage Structure
Casselton Dr Drainage Pipe
Swale
Sources:
City Limits: Seminole County, 2014
Watersheds: Seminole County, 1998, Orange County, 2013
Roads: Seminole County, 2014
Aerial: FDOT, 2012
Parcels: Seminole County (2014), Orange County (2012)
Stormwater Infrastructure: Surveyed Storm Sewers and Drainage Structures by SSMC (2015)
Figure
3-3
Site Stormwater Infrastructure Map
Drainage Report
Casselton Drive Improvements
Geosyntec consultants

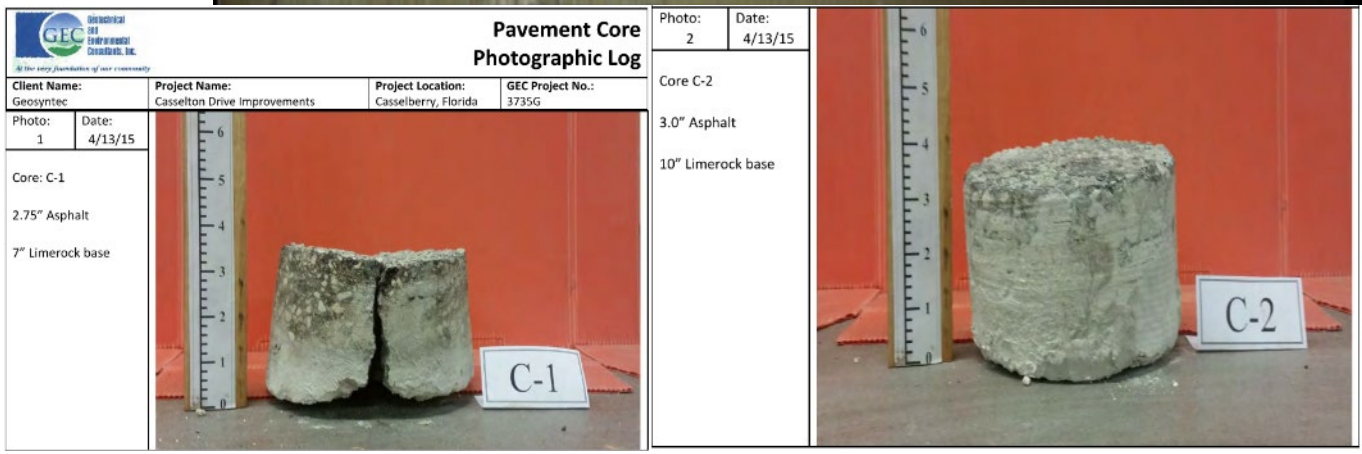
Existing Conditions

CCTV Inspection

- 425 storm sewer deficiencies observed
  - 306 joint separations
  - 61 pipe cracks
  - 37 joint infiltration
  - 12 holes or exposed gaskets
  - 9 broken concrete or exposed rebar

Geotechnical Investigation

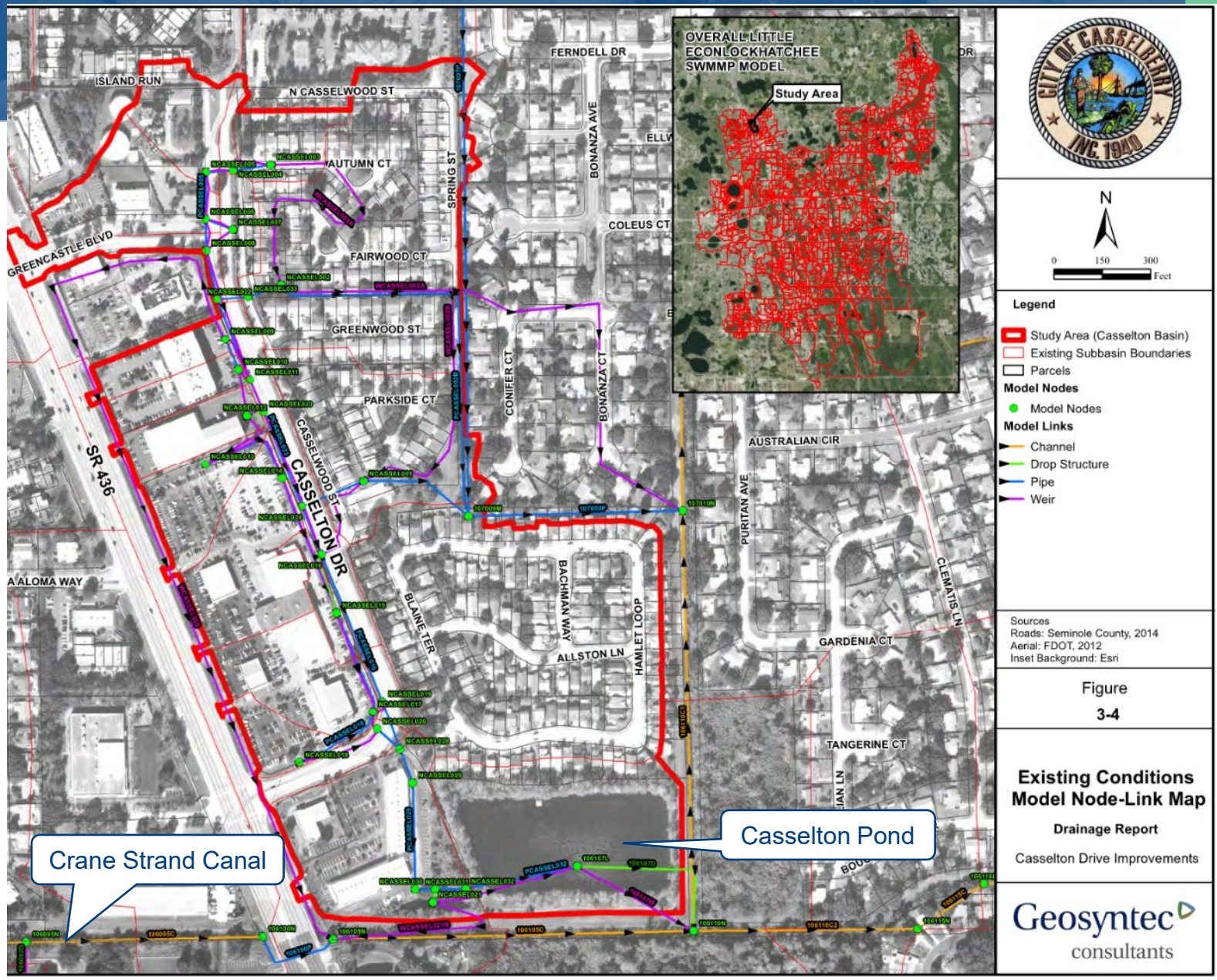
- 4 auger borings to 15 ft bgs
- 2 pavement cores
- 2 field permeability tests



Existing Conditions

H&H Model

- Little Econlockhatchee River Basin Stormwater Management Master Plan (Singhofen and Associates, 2001)
  - Model of study area including Crane Strand Canal, Eastbrook Canal, and Casselton Pond
  - Used as basis Existing Conditions ICPR model
  - Model refined based in GIS data and CCTV inspection
- 33 nodes (manholes and outfalls) and 69 links (pipes, weirs, and drop structures)

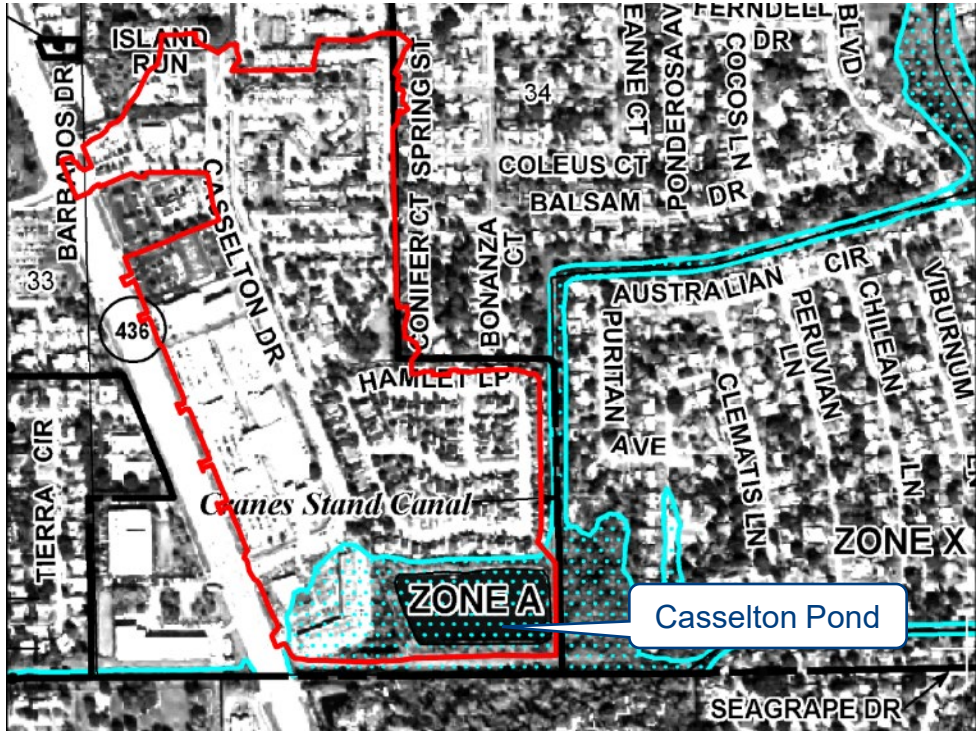


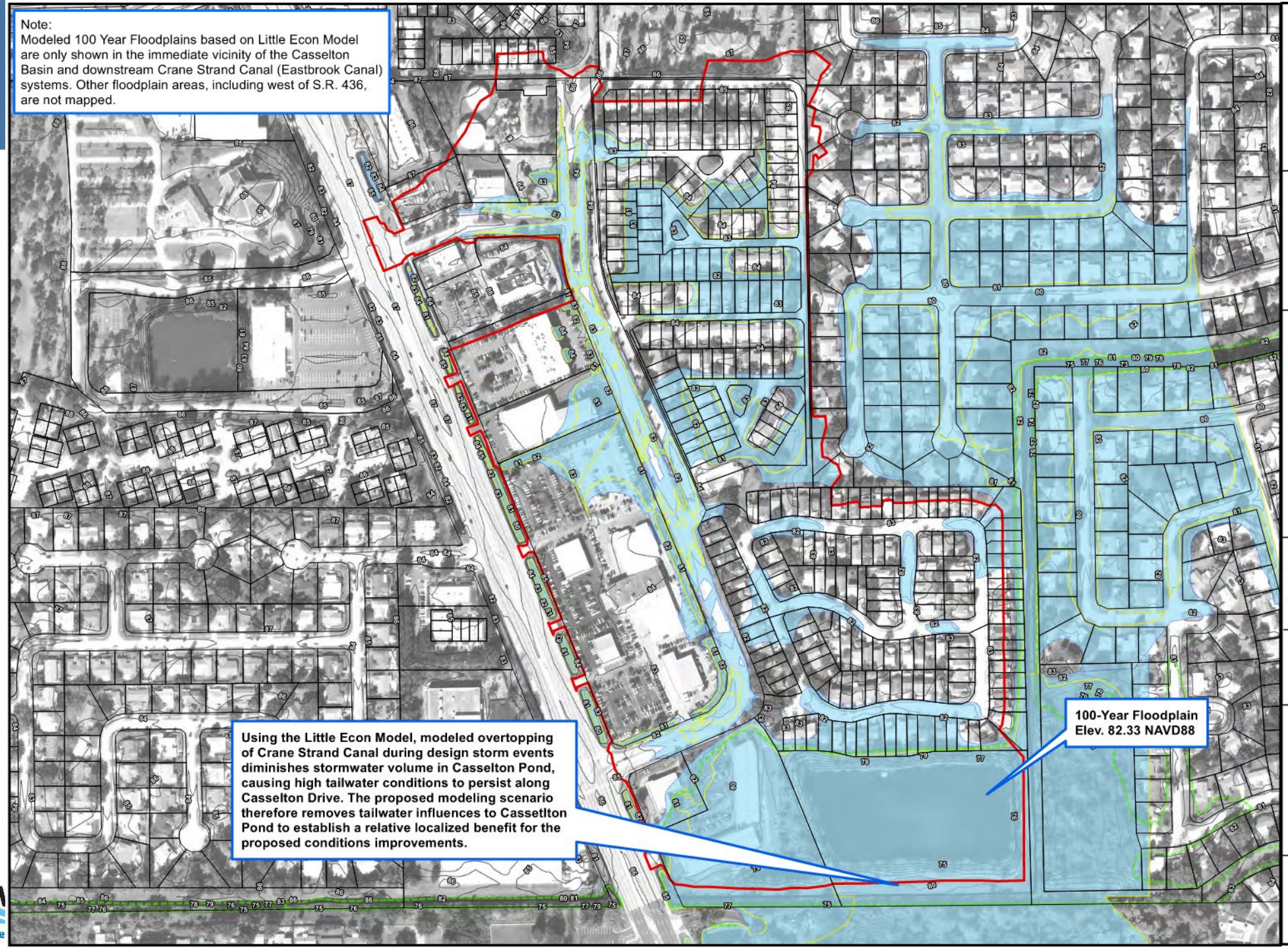
Existing Conditions

H&H Model Results

- Level of Service (LOS) Evaluation
  - Flood level established as:
    - Water surface elevation above road edge or top of manhole elevation for 10-yr storm
    - Water surface elevation above pond top of bank elevation for 25-yr storm
- Crane Strand and Eastbrook Canal Tailwater
  - Initial model run indicated significant LOS impairment in study area
  - Crane Strand Canal overtopping which reduced Casselton Pond available storage and inundated southern portions of Casselton Drive
  - Modeled floodplain limits for 100-yr storm more extensive than indicated in FEMA FIRM
  - Little Econ Model potentially overestimates impact of Crane Strand Canal
  - Extensive flooding modeled for 10-yr storm, but historic flooding not reported or documented
- "Positive Outfall" Scenario
  - Hypothetical scenario to negate tailwater effects from Crane Strand Canal
  - Approach used in previous modeling by others to size Casselton Pond for Villas of Casselberry Units 3 & 4 ERP
  - Allows for more robust evaluation of the benefits of proposed conditions
  - Results indicated less in study area

FLOODING LEVEL OF SERVICE (LOS) STANDARDS / CRITERIA			
Facility	**Storm Frequency / Duration**	**Physical Elevation Reference**	**Example in Project Area**
Local Road or Property Storm sewer or Culvert	10 year / 24 hour	Road Edge of Pavement or Manhole Top Elevation	Storm sewer inlet on Casselton Drive
Drainage Detention / Retention Area (with positive outfall)	25 year / 24 hour	Pond Top of Bank	Pond in Cort Furniture commercial development





CITY OF CASSELBERRY
INC. 1940

N

0 150 300
Feet

Legend

- Parcels
- Study Area (Casselton Basin)
- 10 Year Modeled Floodplain
- 100 Year Modeled Floodplain
- 1 ft Contours

FEMA Floodzone

- A

Sources:
Floodzones: FEMA, 2007
Topo: City of Casselberry, compiled from various contours from SJRWMD.
Aerial: FDOT, 2012.
Roads: Seminole County, 2014.

Figure

4-1

Existing Conditions 100 Year Modeled Floodplain Map

Drainage Report

Casselton Drive Improvements

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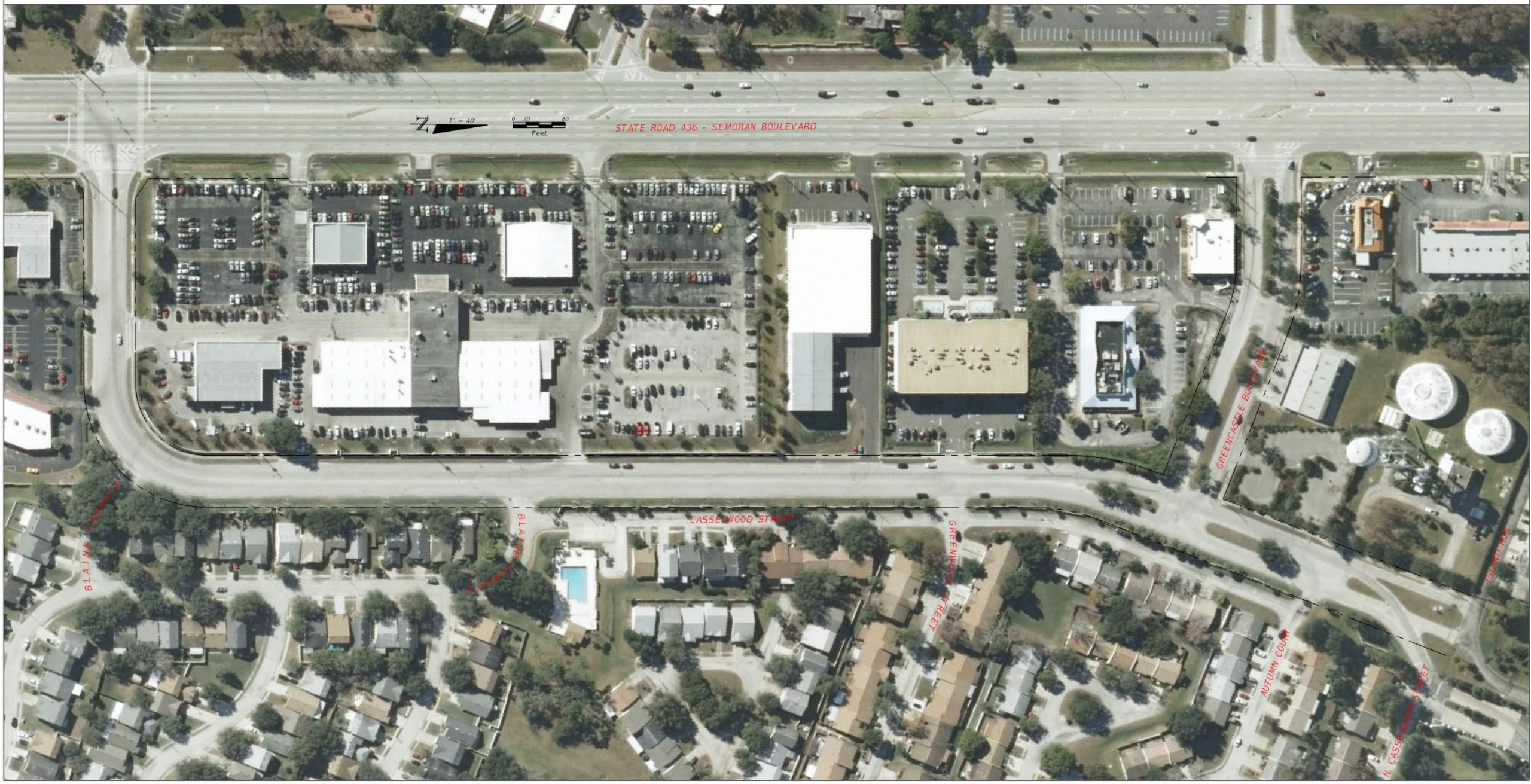

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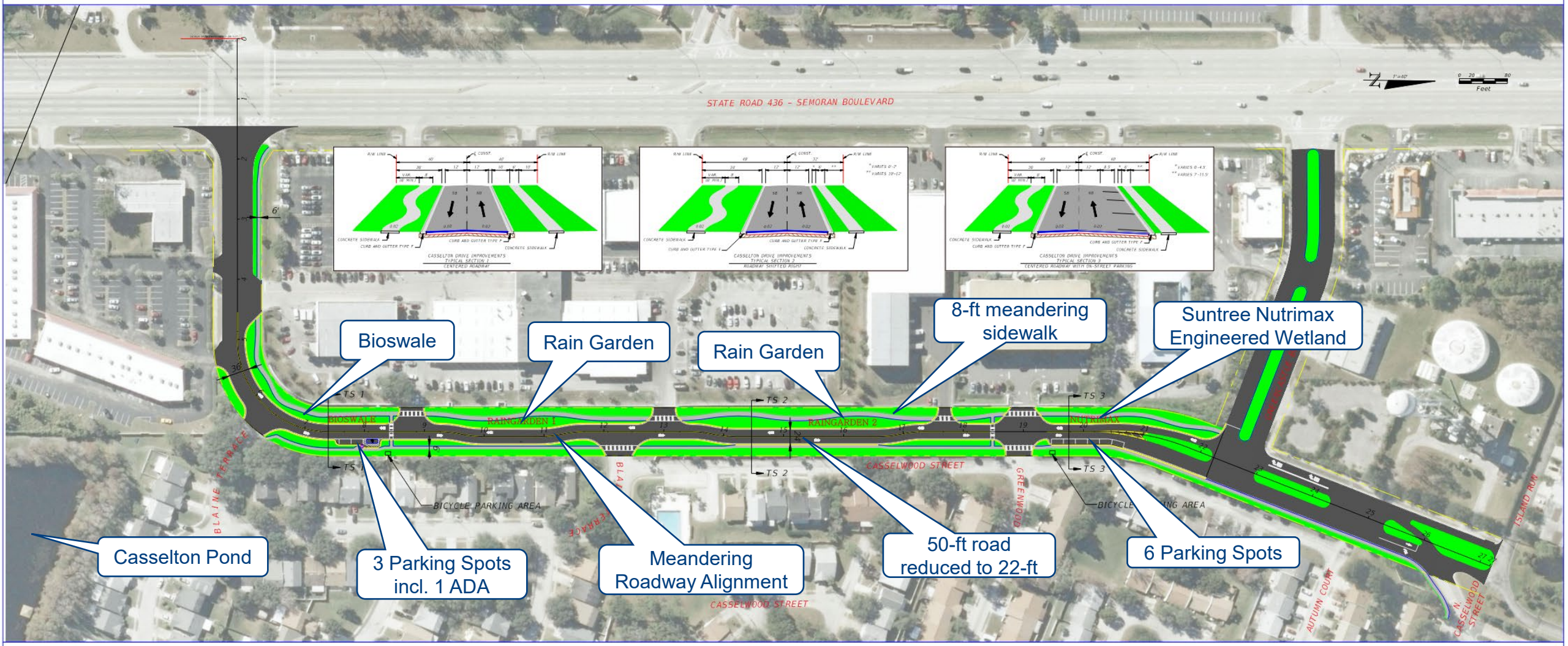
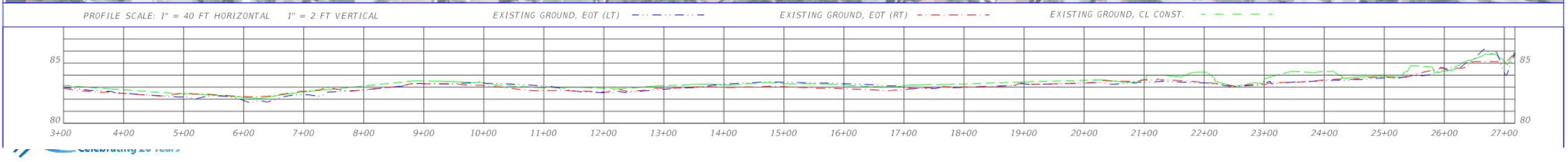
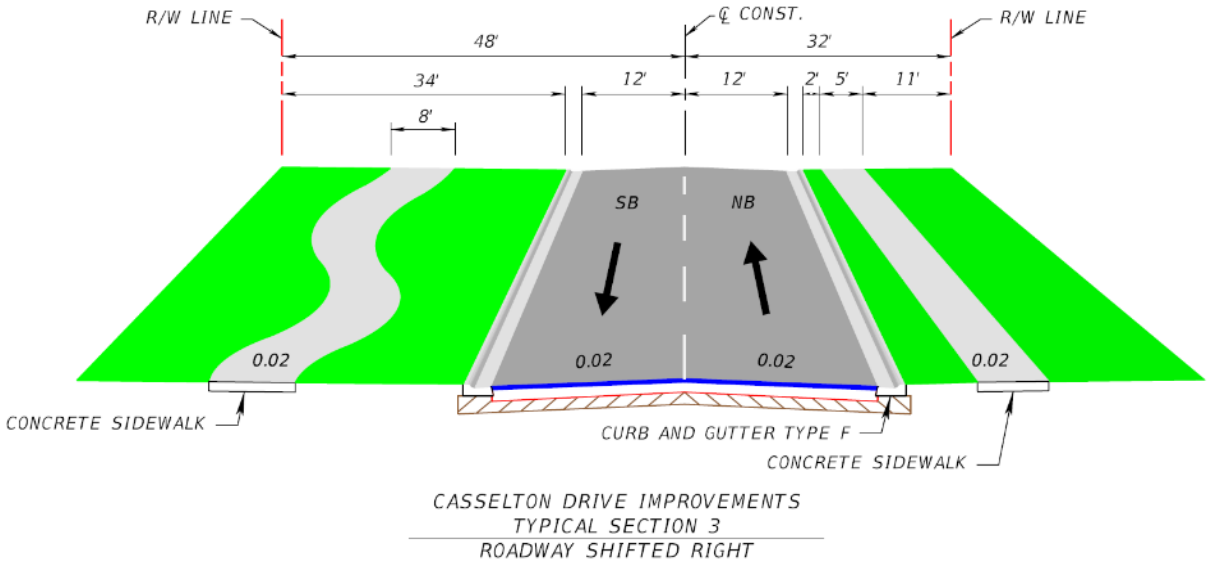




Proposed Conditions

Concept

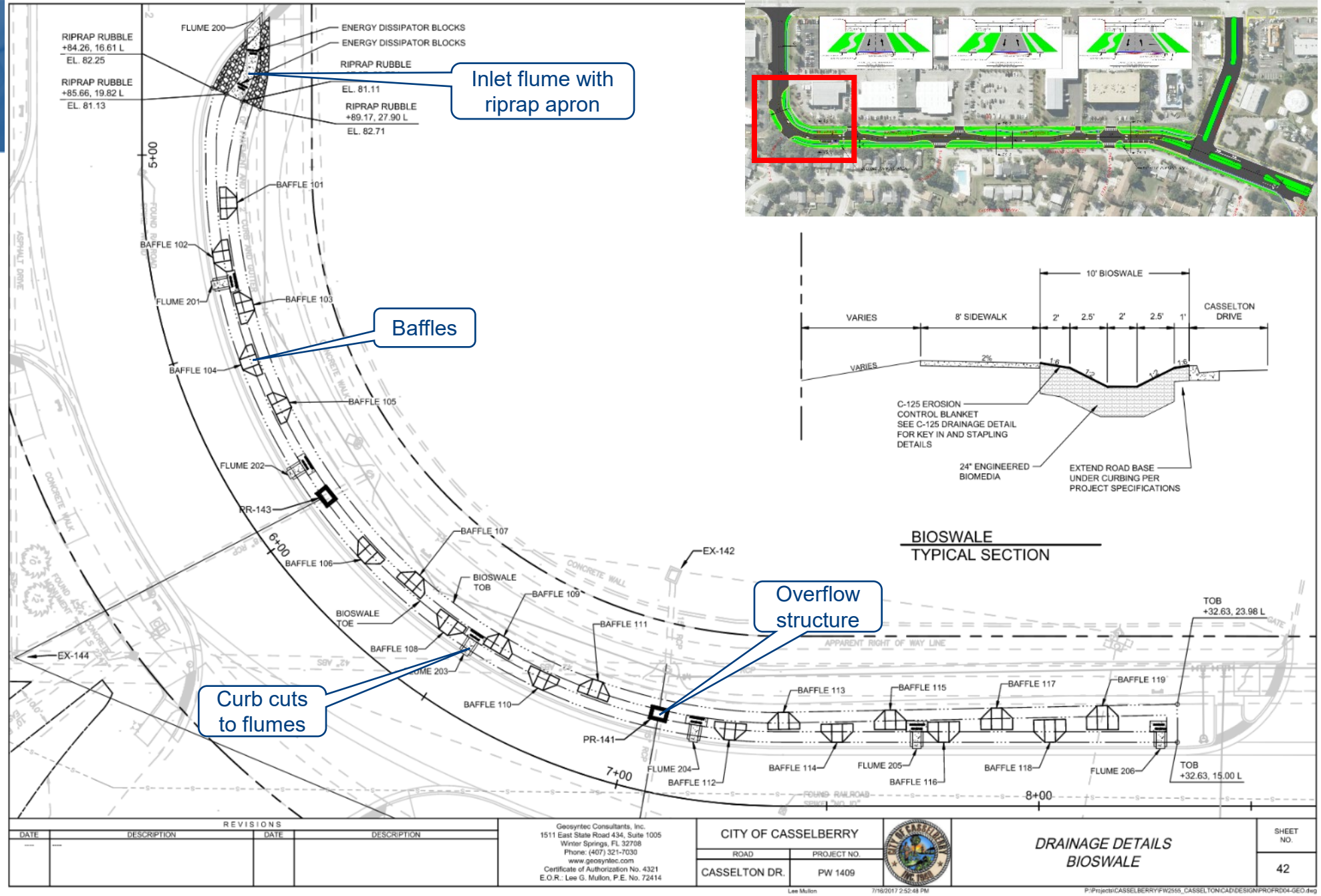
- Complete Street
  - Casselberry Multimodal Transportation Master Plan (2016)
    - Provide access, mobility, safety, and connectivity for all users
    - Promote improved health, economic growth, public safety, recreational opportunity, and social equality
- Road Diet
  - Narrowed and meandering roadway alignment
  - Mill and resurface asphalt with improved striping and crosswalks
  - Open space “linear park” amenity for neighborhood
  - 8-ft and 6-ft wide meandering sidewalks with ADA considerations
  - Limited on-street parking for visitors and local businesses
  - Water main and storm sewer replacement
  - Green infrastructure
    - Bioswale
    - Rain gardens
    - Suntree Nutrimax Engineered Wetland
    - Canopy trees



CASSELTON DRIVE IMPROVEMENTS
TYPICAL SECTION 3
ROADWAY SHIFTED RIGHT

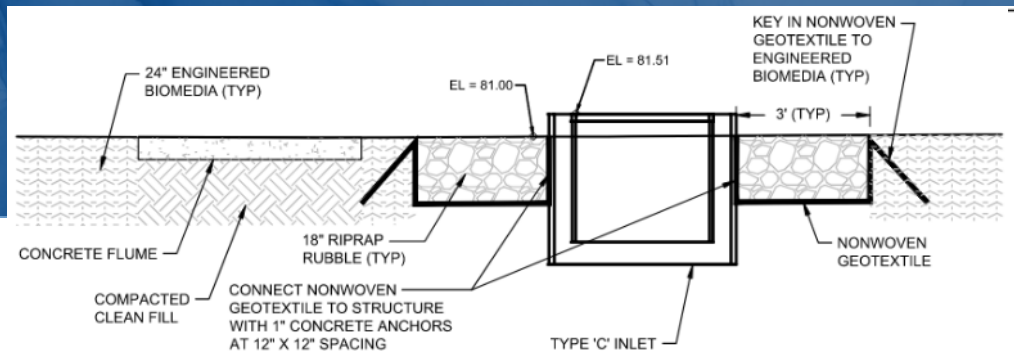
GI Design

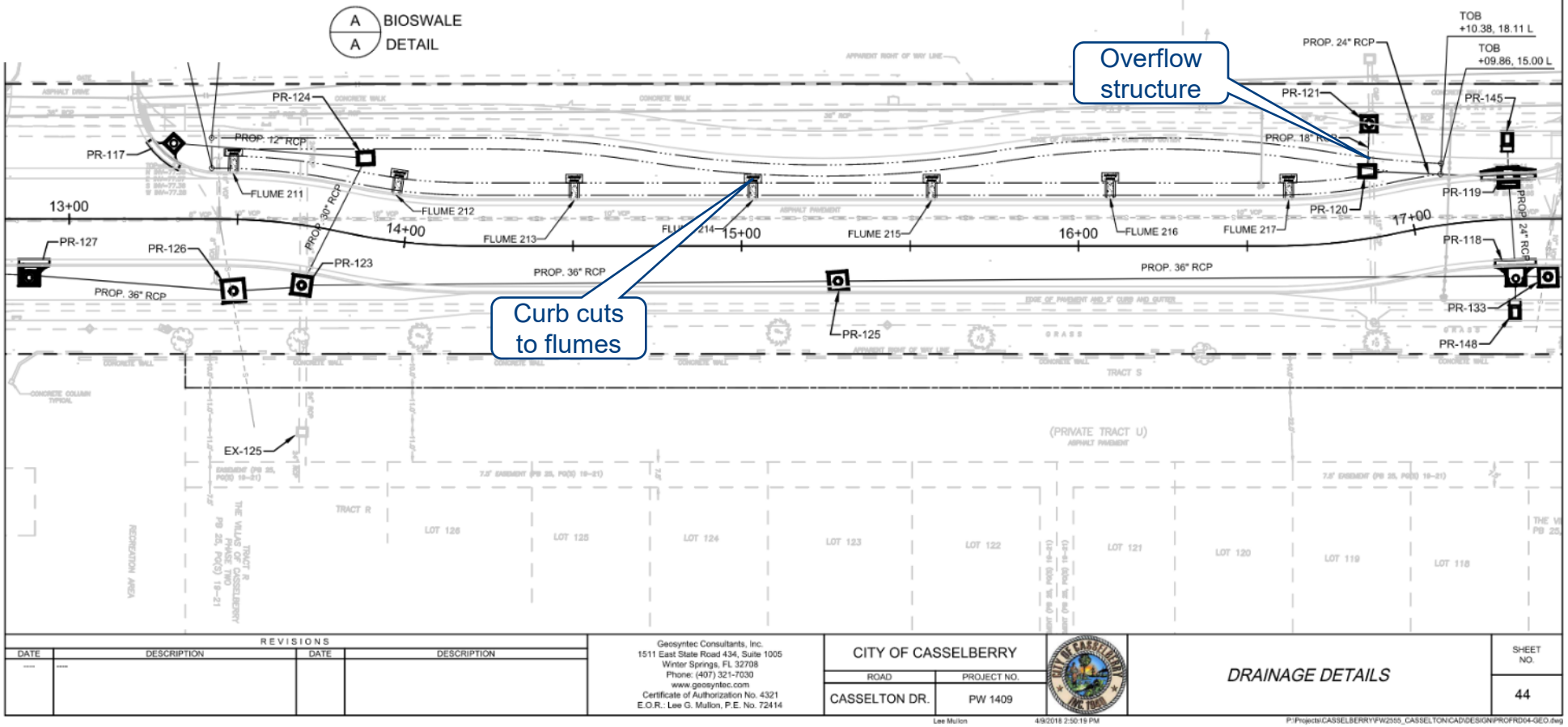
- Bioswale
  - Baffles for energy dissipation and to increase flow length
  - Curb cuts to concrete flumes
  - 24” engineered biomedia

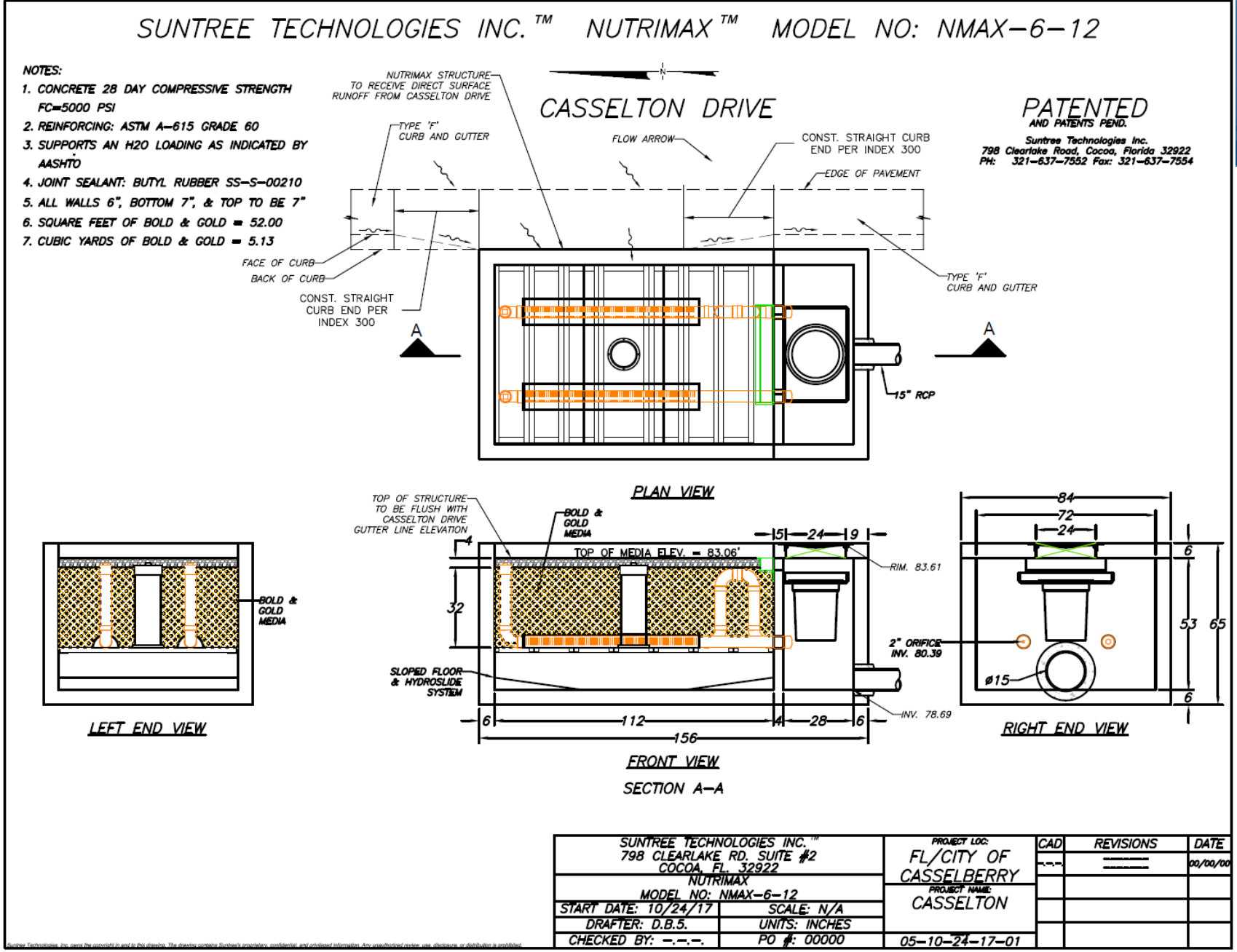


GI Design

- Rain Garden
  - Curb cuts to concrete flumes
  - 24” engineered biomedia







GI Design

- Suntree Nutrimax Engineered Wetland
  - Experimental opportunity

Proposed Conditions

H&H Model

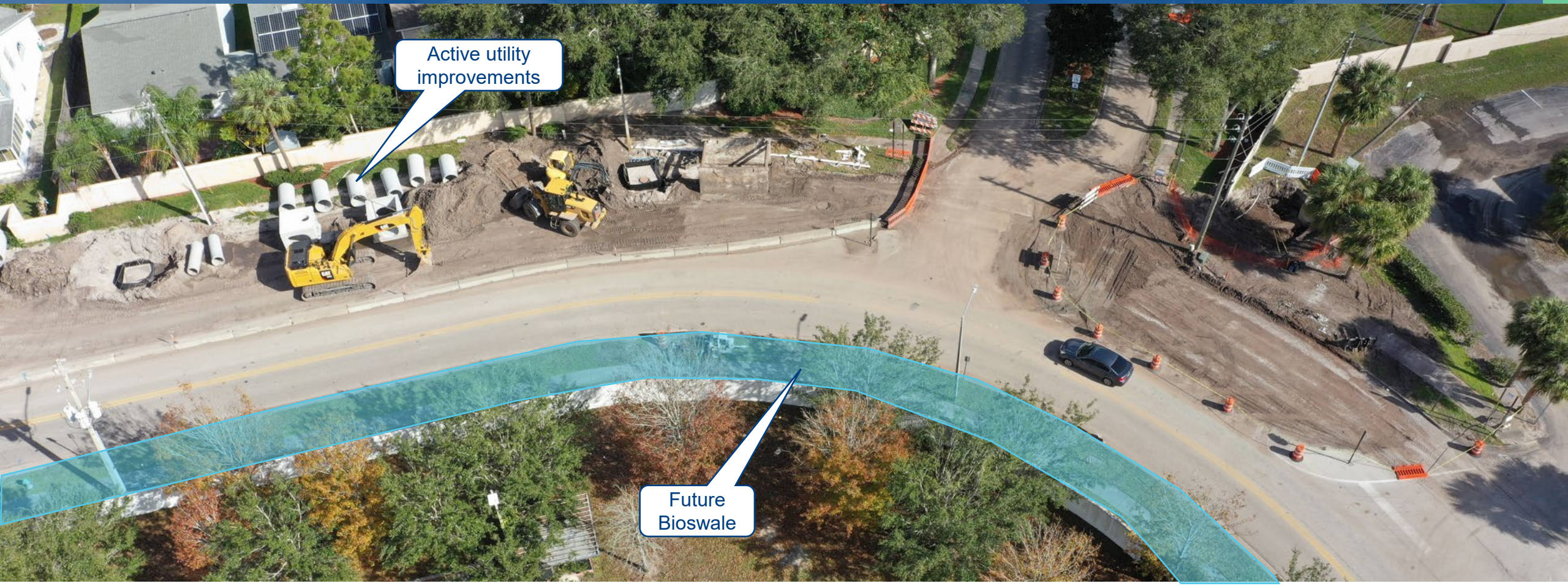
- Based on “Positive Outfall” existing conditions model
- Storm sewer segments upsized to resolve elevated HGL noted in Existing Condition

Results

- Decreased flooding depth up to 1.18 ft
  - 0.36 ft average reduction for flooded nodes for 10-yr, 24-hr storm
  - 0.34 ft average reduction for flooded nodes for 25-yr, 24-hr storm
  - 0.48 ft average reduction for flooded nodes for 100-yr, 24-hr storm
- Impervious area reduction of 0.51 acres
  - 7,239 cu ft reduction in discharge volume for 10-yr, 24-hr storm
  - 7,548 cu ft reduction in discharge volume for 25-yr, 24-hr storm
  - 7,997 cu ft reduction in discharge volume for 100-yr, 24-hr storm
  - Conservative; does not include volume reduction from GI

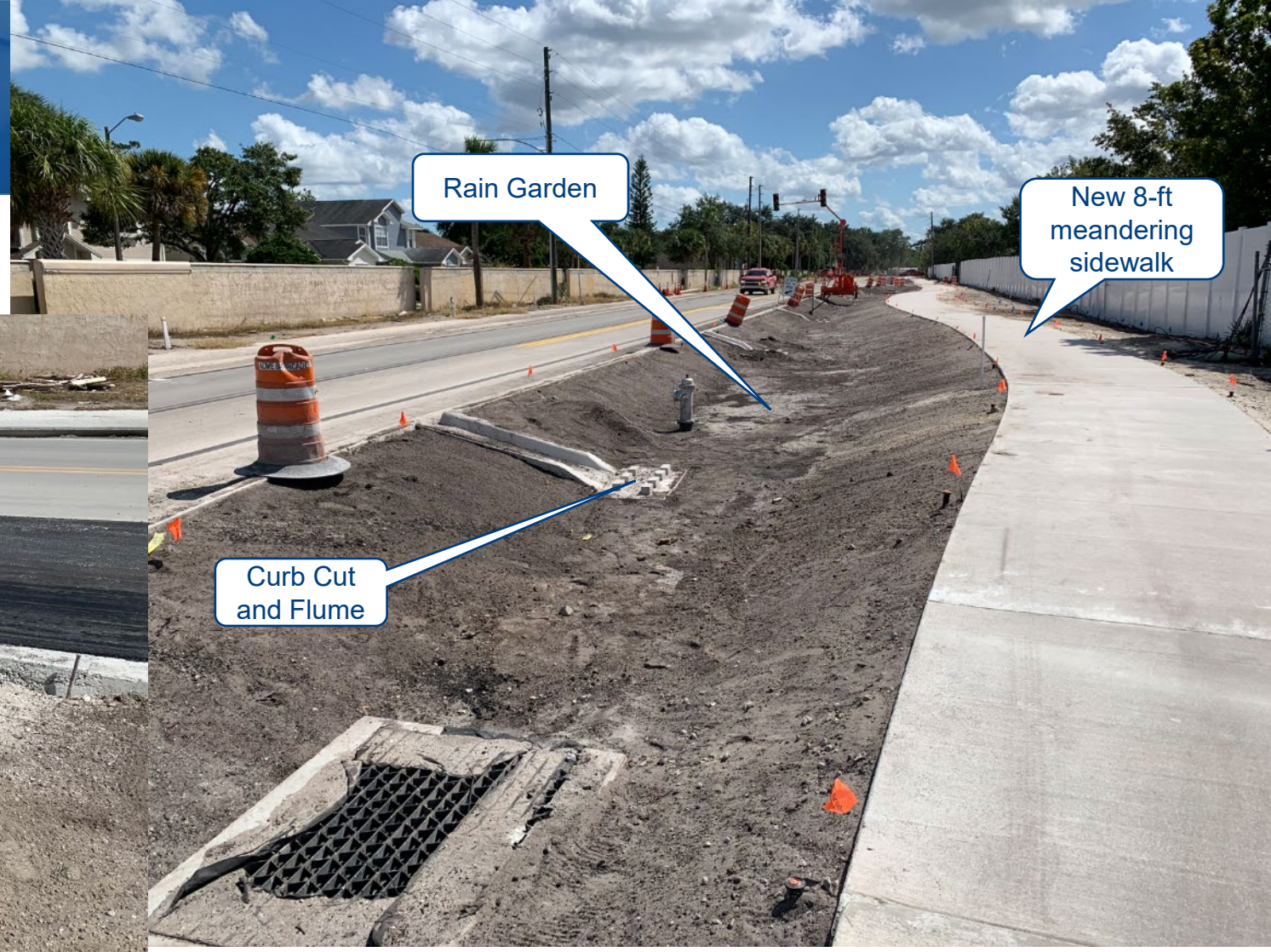
Construction

Construction



Construction

Construction



Construction


Rain Garden
Narrowed and meandering road alignment
Rain Garden
Bioswale

Construction


Nutrimax
Engineered
Wetland

Lessons Learned

Suntree Nutrimax Engineered Wetland

- Experimental installation
- Inlet basket filled with media
- Recommend stone layer to anchor media

Lessons Learned

- Have conservations with your DOT counterparts and other stakeholders
  - Coordinate and pool resources for multi-objective infrastructure projects
  - Win-win outcomes for safer, healthier, and cost-effective public works
- 10-ft travel lanes are sufficient for most roads
  - Typical DOT sections are overkill for most roads
  - The average vehicle width is 6 ft
  - Narrow roads are safer, cost less to build and maintain, reduce impervious area, and allow for more space in ROW for other modes of transportation

Geosyntec consultants

CASSELBERRY

Q&A

Thank you!

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