# DRAINAGE CONCEPT REPORT

**Date:** **January 22, 2008**

**Project:** **Kurt Street Widening Study**
**Lake County, Florida**

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## Introduction and Purpose

The project study corridor consists of Kurt Street from US 441 to just north of Golflinks Avenue. The existing roadway is a two lane, rural roadway with several locations that have been widened for the incorporation of turn lanes. The existing right-of-way width varies between 50 and 63 feet for the length of the project.

Lake County staff anticipates a proposed ultimate typical section consisting of two lanes with a center bi-directional turn lane. The proposed typical section incorporates curb and gutter throughout the entire corridor. **See Appendix A for proposed typical roadway section.**

The purpose of this Drainage Concept Report is to determine the most feasible stormwater management system for this project. Different drainage alternatives were evaluated and are described herein. Some of the items incorporated in each alternative include: permittability, hydraulics, and potential right-of-way acquisition issues.

## Existing Conditions

The general drainage pattern for the majority of the project is to the north and then west via overland sheet flow towards Lake Eustis. During minor stormevents, the runoff would not discharge into the lake due to natural conditions and development that has occurred in the area. However, runoff may eventually reach Lake Eustis during the larger stormevents. Due to the unique characteristics of each basin, a detailed description is provided below. Basins are shown on the **Existing Drainage Maps in Appendix B**.

Project area between US441 and US Self Storage North Driveway - Basin #1 (Stations 11+00 to 14+60):

The general direction of flow for this basin is from north to south with an eventual discharge into the US 441 bypass stormsewer system. Runoff from the roadway in this area is intercepted by the existing curb and gutter and conveyed to existing inlets near the intersection at US 441. The existing inlets then discharge into the US 441 bypass

conveyance system. There is currently no existing permitted water quality being provided for this basin. See **US 441 Widening Plans in Appendix C.**

Project area between US Self Storage North Driveway and Seminole Avenue - Basin #2 (Stations 14+60 to 36+80):
The runoff from the roadway in this basin is collected by small, existing roadside ditches and conveyed to the existing low area at the intersection with Ardice Avenue. The runoff turns slightly east away from the intersection and then north as mentioned previously. Since the basin will not discharge under normal rainfall conditions, it is assumed that the basin is land-locked. The intersection does periodically flood under normal rainfall (See **Floodplains and Floodways write-up in this document)**. There is no existing permitted stormwater system provided for this basin.

Project area between Seminole Avenue and Lake Technical Center Middle Driveway - Basin #3 (Stations 36+80 to 46+00):
The runoff from the roadway in this basin is collected by small, existing roadside ditches and conveyed to the existing low area near the southernmost driveway of the Lake Technical Center at Station 42+00. There are three small ponds located in the bottom of the basin adjacent to the west side of the roadway and on private property. The runoff from the west side of the roadway will discharge into the existing ponds, stage up and eventually discharge across the roadway to the east into the first and second residences along Charlotte Avenue. The runoff from the east side of the roadway also discharges to this area (See **Floodplains and Floodways write-up in this document)**. Again, the runoff turns slightly east and then north as mentioned previously. Since the basin will not discharge under normal rainfall conditions, it is assumed that the basin is land-locked. There is no existing permitted stormwater system provided for this basin.

Project area between Lake Technical Center Middle Driveway to just north of Golflinks Avenue (End of Project) - Basin #4 (Stations 46+00 to 60+60):
The runoff from the roadway in this basin is collected by small, existing roadside ditches and conveyed to the existing low area near Station 56+00. The runoff turns slightly east, into the existing Eustis High School Baseball Fields, and then north as mentioned previously. It appears that there may be fewer obstructions and the basin may discharge under normal rainfall conditions to Lake Eustis. However, this can not be verified and therefore it is assumed that the basin is land-locked. There is no existing permitted stormwater system provided for this basin.

Adjacent to the north end of the project, Kurt Street will continue with a proposed four lane typical section widening. The drainage concepts for this widening will be developed in the future. For this project, the drainage is assumed to be separate with no co-mingling of the basins.

**Stormwater Criteria**

The drainage concepts for this project are regulated by the rules and criteria set forth by Lake County, the Florida Department of Transportation (FDOT), and the St. Johns River Water Management District (SJRWMD). For this analysis, the rules of the FDOT were used in Basin #1 and SJRWMD rules were used in Basins #2-4. This project falls within the Wekiva Recharge Protection Basin which has additional criteria to be met. A meeting was held with Ms. Sandy Joiner of the SJRWMD on 12/28/2007 to verify the criteria.

Water Quality (SJRWMD):

It is anticipated that the stormwater management systems used for this project will be dry retention and\or exfiltration trenches. The required water quality volume shall be to provide 3.0 inches over all the impervious area to be constructed in the basin in accordance with the criteria for the Recharge.

The ultimate outfalls for this project are not considered Outstanding Florida Waters (OFW). However, Lake Eustis is considered an impaired water body and the stormwater must meet Phosphorus reduction criteria. This would only apply to Basin #4 where there is the potential of actual discharge to Lake Eustis.

Water Quality (FDOT):

Meet or exceed the requirements of the regulatory agency that has jurisdiction over the project.

Water Quantity for Basin #1 (FDOT):

To obtain a FDOT Drainage Connection Permit, the post development discharge rates must be attenuated down to the pre development discharge rates for all storm events up to the 100 year – 10 day storm event. For this analysis, this is accomplished by providing the pre/post volume difference for the 100 year – 10 day storm event.

Water Quantity for Basins #2-4 (SJRWMD):

These basins are landlocked and therefore the required volume to be provided is the pre/post difference for the 25 year – 96 hour storm event.

Each Basin's respective treatment and attenuation volumes (in acre-feet) are summarized below:

| Basin Number | Treatment Volume* (Dry Retention) | Attenuation Volume* | Volume Required** |
|---|---|---|---|
| 1 | 0.11 | 0.15 | 0.15 |
| 2 | 0.68 | 0.63 | 0.68 |
| 3 | 0.28 | 0.21 | 0.28 |
| 4 | 0.46 | 0.56 | 0.56 |

* see Stormwater Calculations in **Appendices D – G,** Soils Information in **Appendix H**
** Greater of the volume between treatment and attenuation

**Proposed Conditions**

Alternative stormwater management systems were developed for each of the project basins. See the **Alternative Stormwater Management Systems in Appendix B** which show the various alternatives and their locations. The larger volume between attenuation and treatment was used for sizing of the stormwater management systems.

Below is a description of each basin and the alternatives.

Basin #1 (11+00 to 14+60):

The proposed widening in this basin will occur on both sides of the existing roadway. The roadway is not going to be reconstructed, however, the runoff from the proposed impervious co-mingles with the existing roadway which requires all the impervious to be treated. Due to existing development adjacent to the project, there is no available vacant property within the basin. Therefore, only one alternative has been developed for this basin and it is described below.

a. Use an exfiltration trench under the proposed roadway to provide treatment and attenuation for the basin. This will require approximately 420 linear feet of a 36" exfiltration trench. **See Exfiltration Trench Detail in Appendix I.**

Basin #2 (14+60 to 36+80):

The proposed stormwater management system will provide treatment and attenuation for the widening on both sides of the roadway. Due to the existing development along the corridor, few vacant properties are available for ponds sites. Two properties have been identified with the first located adjacent to the west side of Kurt Street, approximately 300 feet south of the intersection with Ardice Avenue and is 0.33 acres in size. The second property is located in the northwest quadrant of the intersection with Huffsettler Road. The elevation of this second property is higher than the low point of the basin and only a portion of the roadway can be conveyed to this location. Exfiltration trenches are feasible in this basin also and have been incorporated into the alternatives. Based upon the geotechnical information, it is anticipated that dry retention ponds would be used for this basin. Two alternatives have been developed for this basin and they are described below:

a. Utilize the two available ponds sites for treatment and attenuation and supplement them with exfiltration trench. Since the portion of the basin north of Ardice Avenue cannot be conveyed to the ponds, an exfiltration trench would be used to capture the runoff. The exfiltration trench would be located north of Ardice Avenue and will require approximately 390 linear feet of a 36" exfiltration trench. **See Exfiltration Trench Detail in Appendix I.** The portion of the basin south of Ardice Avenue will maximize the 0.33 acre property with the remaining volume being conveyed to the property near

Huffsettler Road. This area is not flat and has a considerable rise in elevation across the pond site. It is estimated that approximately 0.20 acres will be needed for tie-in of the side slopes from the pond berm to the existing ground. It is estimated that the pond will need to be approximately 0.77 acres in size, therefore the total right-of-way needed will be 0.97 acres.

b. Use an exfiltration trench under the proposed roadway to provide treatment and attenuation for the basin. This will require approximately 1,885 linear feet of a 36" exfiltration trench. **See Exfiltration Trench Detail in Appendix I**.

A discussion was held regarding the existing stormwater pond behind the Eustis One Plaza and it's viability to use it for this basin. Some of the issues with using this pond include; the large amount of stormsewer system that would have to be installed within the Ardice Avenue and Ruleme Street right-of-way; the utilities impacts caused by this construction; obtaining a drainage easement over the pond to allow the County to discharge; upgrading the pond to current SJRWMD criteria in addition to providing the treatment and attenuation for Kurt Street; and the City has had maintenance issues with the pond in the past. Based on the above issues, it was agreed upon by County staff that this pond would not be included as a viable alternative in this report.

Basin #3 (36+80 to 46+00):

The proposed stormwater management system will provide treatment and attenuation for the widening on both sides of the roadway. Due to the existing development along the corridor, only one vacant property is available for a pond site. The property is located adjacent to the west side of Kurt Street, across from the middle driveway of Lake Technical Center. The property is near the high point of the basin and only a portion of the roadway can be conveyed to this location. Exfiltration trenches are feasible in this basin also and have been incorporated in the alternatives. Based upon the geotechnical information, it is anticipated that a dry retention pond would be used for this basin. Two alternatives have been developed for this basin and they are described below:

a. Utilize the available pond site for treatment and attenuation and supplement with exfiltration trench. The exfiltration trench would be located near the low point of the basin and will require approximately 610 linear feet of a 36" exfiltration trench. **See Exfiltration Trench Detail in Appendix I.** Approximately 200 feet of the basin can discharge to the pond and the estimated pond size would be 0.35 acres. This area is not flat and has a considerable rise in elevation across the pond site. It is estimated that approximately 0.30 acres will be needed for tie-in of the side slopes from the pond berm to the existing ground. The total right-of-way needed will be 0.65 acres.
b. Use an exfiltration trench under the proposed roadway to provide treatment and attenuation for the basin. This will require approximately 780 linear feet of a 36" exfiltration trench. **See Exfiltration Trench Detail in Appendix I**.

Discussions were held with County staff regarding the possible use of three existing dry retention ponds on private property near the low point of the basin. These ponds appear to be utilized as much as possible by the existing developments. The County was also concerned with the cost to acquire rights to drain into the ponds from the roadway. It was agreed that this option would not be further investigated due to the above concerns.

Basin #4 (46+00 to 60+60):
This basin has mainly commercial development adjacent to the right-of-way. However, some of those commercial properties have not been constructed and one of these has been identified as a potential pond site. The property is owned by Bryro, Inc. and is located in the southwest quadrant of the intersection of Kurt Street and Golflinks Avenue. The second property is located on the east side of Kurt Street, just south of the Eustis High School ball field and adjacent to the north parking lot of Lake Technical Center. A combination of ponds and exfiltration trench alternatives has been developed to provide the required volumes for this basin. They are described below.

a. Diverting all of the basin runoff to the Bryro property where a 0.64 acre dry retention pond will be constructed. This area is not flat and has a considerable rise in elevation across the pond site. It is estimated that approximately 0.30 acres will be needed for tie-in of the side slopes from the pond berm to the existing ground. The total right-of-way needed will be 0.94 acres.
b. Diverting all of the basin runoff to the EHS ball field property where a dry retention pond will be constructed. It is estimated that the total right-of-way needed will be 0.72 acres.
c. Utilizing only exfiltration trench for the basin stormwater system is another option. It is estimated that approximately 1,555 linear feet of 36" exfiltration trench will provide the required volume. **See Exfiltration Trench Detail in Appendix I.**

## Wetlands

No impacts to wetlands are anticipated due to the construction of the proposed ponds. (**See Appendix J for wetland information**)

## Floodplains and Floodways

Flooding History:
According to Lake County staff, the project has two areas that experience periodic flooding. Both of these areas are located in the low points of Basins 2 and 3 and are caused by the lack of outfall. Basin #2 has a low point at the intersection of Kurt Street and Ardice Avenue and the runoff from the basin generally sheet flows to this low point and then infiltrates into the ground. Basin #3 has a low point just south of the Lake Technical Center parking lot and this area floods not only the roadway, but the adjacent residential homes as well.

Floodways:
There are no regulatory floodways located within the limits of this corridor.

Floodplains:
Based upon the FEMA Flood Insurance Rate Map (Map No. 12069C0355 D) and current Lake County GIS, there are no anticipated impacts to 100 year floodplains within the project corridor. **See Appendix K for Floodplain Information.**

## Geotechnical

Geotechnical information was obtained throughout the project corridor. A summary report of this information has been prepared by GEC, Inc. dated 10/23/2007 and is included in **Appendix L**. In addition to the geotechnical information, research was conducted on existing permits adjacent to the project. This research helped to verify the geotechnical results and also to determine seasonal high water table (SHWT) elevations throughout the corridor. Based upon the above information, the SHWT elevations for this project are as follows:

a. Pond Alternate #1 in Basin #2, Estimated SHWT = 10.0' below existing ground (elevation 95.0)
b. Pond Alternate #2 in Basin #2, Estimated SHWT = 15.0' below existing ground (elevation 98.0)
c. Pond Location in Basin #3, Estimated SHWT = 11' below existing ground (elevation 100.0)
d. Pond Alternate #1 in Basin #4, Estimated SHWT = 11' below existing ground (elevation 93.0)
e. Pond Alternate #2 in Basin #4, Estimated SHWT = 9' below existing ground (elevation 90.0)

## Conclusions

The information provided in this report is current as of the date of this report and should be modified as the project progresses. The drainage concepts developed use the most current information possible with the understanding that many items are dynamic. Items such as right-of-way acquisition, final surveyed elevations, etc. could affect the results. Therefore, this information provides a useful tool to assist the County in the development of the preferred concept.