



Volusia County High School Students,

Welcome to **STEM SOLUTIONS by Students!** Choose one PROBLEM you would like to solve. Pick only one PROBLEM, even if there are multiple choices from one municipality. There are questions from all areas of Volusia County. There is also a mentor list to help with any questions you might have. Good luck and have fun!

City of Deltona

BACKGROUND A new subdivision was constructed downhill from an older area that does not have any stormwater retention ponds. When heavy rains occur, runoff from the older area's streets and yards flow down the street and cause flooding downstream in the new subdivision. The old subdivision has forty lots ($\frac{1}{2}$ acre each) in a loop with paved roads.

PROBLEM How big of a retention area would be required to store 80% of the water from a summer rainstorm that drops 2" of rainfall in 1 hour. Use the 'Rational Equation' to calculate the volume. What is the impact to water quality in lb/yr for nitrogen. How could this area be utilized in a multifunctional manner?

Edgewater

Western Entrance into Edgewater:

BACKGROUND: People come into the City of Edgewater by using either US-1 or State Road 442, both of which are 4 lane roads. US-1 travels 2,369 miles along the entire east coast of America, from Key West to Maine. However, SR-442 only stretches 4 miles from the Indian River to I-95. Edgewater wants to make it easier for people coming in from the west, such as from Deltona and Orlando. Since SR-417 is the closest major highway serving the Orlando metro area, we want SR-442 to connect to SR-417.

PROBLEM: **Make a map showing your best route** for the road to be built connecting SR-442 to SR-417. Remember to consider the proposed Farmton DRI community. In addition, your submittal should also answer these questions:

- 1) What size road should be built? How long is your proposed route (in miles)?
- 2) What makes your route the best?
- 3) What environmental challenges will be faced? How does your route optimize the impacts to the environment versus the benefit of placing the road where you did?
- 4) What political challenges will be faced? How does your route impact private property? Who will use it the most?
- 5) What opposition do you think your proposed route will generate and from whom? How would you respond to such opposition?

New Smyrna Beach

PROBLEM 1: How do we solve the issue of dunes taking over the Grayce Barck Kenemer North Community Beachfront Park beach crossover or flooding from hurricane/significant rain events that wash out sand from under the Esther Street Beachfront Park that make the handicap ramps at both locations inaccessible?

More Info: There are pictures available from a 2014 washout at Esther Street Park. Water comes from retention area flows over the walls under the ramps and washed out stairs and access to the handicap ramp.

New Smyrna Beach

PROBLEM 2: Are lot sizes smaller than 45' wide x 100' deep practical for today's single family homes, given the following constraints:

1. Driveway width maximum: 40% of lot width
2. Driveway length minimum: 20 feet
3. Minimum setback from side lot lines: 5 feet (included appurtenances: A/C, pool equipment, generator, etc.)
4. Minimum Square Footage of House: 1,200 SF living space under A/C
5. Maximum lot coverage: 60% (includes building, driveway, pool, deck, patio, sidewalk, shed, etc.)

If not, what would you recommend the minimum lot size be?

Ponce Inlet

PROBLEM: In 2016 and 2017, Ponce Inlet experienced significant flood damage along the river, and levels are anticipated to rise approximately three feet above their current levels by the year 2100. What steps can developed communities such as Ponce Inlet take to reduce the risk of flooding to buildings and the community in general in the face of rising sea and river levels?

Port Orange

Flooding Issue

PROBLEM1: Please consider proposing a solution to the flooding that has occurred in the past near the intersection of Dunlawton Ave and Spruce Creek Road in Port Orange.

PROBLEM 2: Public Utilities

The City of Port Orange provides many residents with reclaimed water for irrigation throughout the year. City reclaimed water is produced by the Wastewater Treatment Plant, which during the rainy season, receives additional flow from inflow and infiltration (I&I) thus producing a surplus of reclaimed water when the demand for reclaimed is low. Conversely, during the dry season, much less reclaimed water is produced, due to fewer residents and surface evaporation in our reclaimed ponds, while the demand is high.

Challenge: Please find any possible solutions to help supplement reclaimed water during the dry season that is cost effective and will provide our residents with irrigation year-round.

South Daytona

PROBLEM: Residents living along the finger canals that lead to the Halifax River have concerns of silt accumulating throughout the canals. This is an issue because it is becoming increasingly difficult to navigate boats in these canals.

Residents who live off these canals dock their boats at their homes and need access to the Halifax River.

The residents who live along the canals would like to alleviate the problem but need to gather information before the request can be addressed further. The residents need a Cost/Benefit analysis on the ability to remove the silt from the canals.

The analysis needs to address a type of removal and how it benefits the residents along with how much it costs to create. There needs to be special concern placed on protecting the sea walls that the residents have.



Volusia County IT Department

The Problem: Identify and map for possible later eradication, invasive species along a segment of Volusia County's trail network or within one of Volusia County's parks or wilderness areas. Create a communication tool to educate the public about these local invasive species and the adverse effects on Florida's biodiversity and native plant communities, as well as impacts on endangered species via habitat loss and alteration.

Resources:

Volusia County IT is willing to provide mentoring in options for how to capture GPS data in the field and how to employ free web based Esri Geographic Information System (GIS) tools to display that information in both standalone interactive web maps or as part of a larger website. Esri GIS software is available at no cost to K-12 schools given a commitment by school staff to employ the technology in coursework or research and local GIS professionals willing to provide geo-mentoring and technical support to those instructors. Volusia County IT/GIS would be willing to facilitate that process.

Florida Exotic Pest Plant Council

<http://www.fleppc.org/list/2015FLEPPCLIST-LARGEFORMAT-FINAL.pdf>

Florida Natural Areas Inventory (FNAI) <http://www.fnai.org>

FNAI's Invasive species inventory initiative - <http://www.fnai.org/invasivespecies.cfm>

Volusia County IT/GIS will work with FNAI staff to subset and make available existing data for student review and use for areas selected for the project

An example of a Florida invasive species survey from 2011

<http://www.arcgis.com/home/webmap/viewer.html?webmap=eb45feea63de41b7b188ff1178acb388>