Regular Workshop – April 17, 2017
Agenda Item 9

Agenda Item: Canal Dredging Feasibility Study Report Update

Presenter: Town Manager, Staff;
Dr. Cliff Truitt and Jenna Phillips, PE,
Taylor Engineering, Inc.

Summary: At the October 17, 2016 Regular Workshop Meeting, representatives of Taylor Engineering presented the preliminary results of the Canal Dredging Feasibility Study. At that meeting, there was consensus to move forward on action items outlined by the Town Manager. The attached memo provides a summary report of the work performed to date.

Attachments: 3-24-17 Memo, Public Works Director to Manager;
Taylor Engineering Canal Condition Surveys;
PowerPoint Presentation.

Recommended Action: Pending discussion, provide direction to Manager.

M E M O R A N D U M

Date: March 24, 2017

TO: Dave Bullock, Town Manager

FROM: Juan Florensa, Public Works Director

SUBJECT: Canal Feasibility Study Report Update

At the October 17, 2016 Regular Workshop Meeting the Town Commission held discussions regarding a canal dredging maintenance project. Dr. Cliff Truitt, P.E., and Ms. Jenna Phillips of Taylor Engineering presented the results of the Canal Dredging Feasibility Study. After providing an overview of canal conditions Town-wide, the consultant presented aerial pictures with colors [red/yellow/green] denoting current depths.

Discussions centered on future optimal/desired navigation depth of canals that would trigger different types of permitting requirements from State and Federal regulatory agencies. Other salient issues discussed were protection of natural habitats and impacts to environmentally protected seagrasses. Greer (Beer Can) Island and the potential of the closing of the cove in the back part of the island under the bridge was also of concern.

Discussion ensued as to how to fund future projects, options and methodologies to ensure that benefits to individual parcels derived from dredging were commensurate with the assessment of those parcels.

Based on Town Manager recommendation, the Town Commission provided direction as follows:

- Focus on areas presented as “red” with their related “yellow” areas
- Develop cost estimates
- Look at permitting requirements, mitigation issues and costs, disposal, and beneficial use of dredged material if beach compatible
- Develop a regular monitoring plan of Townwide canals
- Develop long range cost estimates for a regular long term canal maintenance program
- Consider setting aside recurring annual funding into a canal dredging fund for future projects
- Develop funding options for a canal dredging program for the “red” and “yellow” canals

Town staff has asked Taylor Engineering to:

- Focus on the ‘hot spot’ canals and/or areas that are characterized in ‘red’ on the canal aerial figures developed from the Canal Dredging Feasibility Study. This study will also focus on the related ‘yellow’ shoaled areas.
- Assume that the minimum ‘threshold’ navigable depth for purposes of defining red and yellow areas is three (3) feet above Mean Lower Low Water (MLLW).
- Develop cost estimates

The anticipated schedule of the program is as follows:

- Comprehensive bathymetric survey of priority (red and related yellow) canals – Summer 2017
- Verify limits of seagrasses – Summer 2017
- Start preliminary design – Fall 2017
- Prepare/Submit permit applications and regulatory coordination – December 2017
- Regulatory approval/Final design – Spring 2018
- Construction timeframe – Summer/Fall 2018

Taylor Engineering staff will be present at the April 17, 2017 Regular Workshop Meeting to review in detail the work performed to date and provide recommendations of budget planning level construction estimates and proposed sediment management handling areas.

Please contact me if you have any questions or require additional information.

March 24, 2017

MEMORANDUM

Re: Addendum #1 – Canal Dredging Conceptual Design Summary

Based on the preliminary/interim results of the original Canal Feasibility Study Scope of Work, the Town of Longboat Key (Town) determined criteria to be used for a potential maintenance project. Based on this direction and an expanded scope, Taylor Engineering made the following assumptions to provide a basis for the design criteria:

- This new scope of work builds on the results of the original feasibility study for volumetric calculations, possible resource issues and the GIS database. However, the focus is now on the 'hot spot' canals and/or areas that are characterized in 'red' on the canal aerial figures developed from the feasibility study (as shown in Figure 1). The adjoining, associated 'yellow' shoaled areas are included in the analysis as areas of 'restricted access'.
- During the October 2016 workshop presentation, we summarized data showing that the average vessel drafts within County boating-sheds range between 2 and 3 feet. Therefore, the Town direction was for us to use a depth of 3 feet below Mean Lower Low Water (MLLW) as a minimum 'threshold'; which would result in adequate navigable depth for *most* vessels at all stages of the tide.
- Engineering judgement was used to establish which red 'hot spot' areas were of significance (needed to be dredged in the initial maintenance program) and the horizontal extent of that dredging.
- For every location where red threshold conditions exist to the extent that dredging is proposed, the volume calculations assume that all dredge cut depths will be consistent with the full permitted or exempt depths for each canal.
- The yellow canal areas of concern are included in the dredge volume only if:
    - The yellow areas are contiguous with red areas, and
    - The existing depths are less than -3 ft-MLLW or using subjective rationale such as connecting two similar but not contiguous areas where depths might be deeper than -3 feet.

Figure 1: Example Aerial Graphic Illustrating Available Water Depths

A. Conceptual Design for Hot Spot Canal Regions

Following the guidelines established above, a total of 16 canals were identified as priority dredging areas. The preliminary dredging volume for each of those 16 canals was calculated using the likely permitted/exempt depths and assuming an average canal width as estimated based on visual aerial interpretation. To account for presence of existing structures (bulkheads, docks, mooring piles) a typical 10 ft offset was assumed from each side. A triangular dredge cut design was assumed using 1:3 side slopes to the permitted/exempt depth. The resulting maximum top of cut width is 30 feet and a minimum top of cut width of 12 feet for interior narrow channels. Open water or access canals were limited to 50 foot widths.

Table 1 below identifies the 16 priority canals and their respective conceptual dredging volumes. All of these values will require field verification and further refinement as the program evolves and design progresses.

Table 1: Conceptual Design Canal Dredging Summary

	Dimensions Per GIS & Aerial Imagery		Info from Town			Addendum Conceptual Design			
Canal Name	Total Canal Length (ft)	Avg Canal Width (ft)	Authorized Exempt Depth (ft-NGVD)	Permitted Depth (ft-NGVD)	No Permit - Assumed Dredge Depth	Adjusted Dredge Width (ft)	Avg Cut Depth (ft)	Horz Dredge Limits (ft)	Volume (CY) - Triangular Cut
1	1996	50	-4.4			30	2.4	200	178
1a	1756	85			-5.4	30	3.4	1,500	1,889
2	2600	75		-5.4		30	3.4	200	252
3	885	35	-4.4			15	2.4	600	267
6	1428	40	-4.4			20	2.4	775	459
18	2154	40	-3.4			20	1.4	900	311
20p	849	35			-5.4	15	3.4	925	582
21p	2435	55			-5.4	35	3.4	900	1,322
21a	1368	50			-5.4	30	3.4	850	1,070
22a	1870	37	-5.4			20	3.4	1,200	1,007
31d	800	50			-5.4	30	3.4	350	441
32p	13280	40		-5.4		20	3.4	1,000	840
33a	1343	73			-5.4	50	3.4	950	1,994
49	1685	73		-5.4		50	3.4	450	944
55	2193	50			-5.4	50	3.4	300	630
55a	647	130			-5.4	50	3.4	450	944
	41,486.8							**11,550**	**13,131**

The volumes in the table total approximately 13,131 cubic yards (CY). For purposes of conservative construction planning, and considering future design refinements as well as additional shoaling before the project is actually started, a 50% contingency factor is reasonable, producing a preliminary planning level estimate of nearly 20,000 CY. The total estimated dredge cut length is approximately 11,550 feet or 2.2 track miles. Based on the location of the canals proposed for dredging, the project can be divided into three regions; the northern region including canals 1 to 6; mid-key region including canals 18 to 22a, and the southern region including canals 31d to 55a.

B. Dredge Material Management/Transfer Site Options

Taylor Engineering performed an initial desktop assessment of potential dredged material management sites for which the contractor might use for handling, dewatering, and transferring the dredged material. Taylor Engineering prepared a list of potential sites including their estimated available space for each site. We conducted a subsequent preliminary field visit to evaluate the viability of each site and collect measurements to calculate approximate dredged material capacity. Based on the limited space available for dewatering, the use of geotextile tubes or holding containers is recommended for each of the sites instead of a traditional open-air, diked dewatering system. This type of approach also allows for the construction operations and dredged material to be less obtrusive.

Table 2: Potential Dredge Material Management Sites & Estimated Capacities

DMMA No.	Adjacent Canal	Location	Size/Approx Capacity		Area	
		Address or Cross-Streets	*Width (ft)*	*Length (ft)*	*(sq ft)*	*(acre)*
1	N/A	Old Gas Station at Broadway & GMD Intersection	60	85	5,100	0.12
2	2	Along Palm Rd/Cedar Intersection at Whitney bch	21	>200	4,200	0.10
3	31d	Beach/Bay Access Park	42	76	3,192	0.07
4	55	Overlook Park - East side	20	500	10,000	0.23
		Overlook Park - West side	25	250	6,250	0.14
5	19	Durante Park (B/w St. Judes Dr & Gulf Bay rd)	65	143	9,295	0.21
6	55	City Island	275	375	103,125	2.37
7		Bayfront Park	20	200	4,000	0.09

Based on conversation with Town staff, existing Town rights of way might provide viable options as well. The size of the dredged material management sizes must accommodate equipment, adequate space for geotextile tubes and/or enclosed containers and flocculant dosage units, and a crew of laborers.

C. Permitting and Mitigation Planning

Among the priority canals, five of them are 'exempt' and an additional three canals have been previously permitted. Eight of the sixteen priority canals (1a, 20p, 21p, 21a, 31d, 33a, 55, and 55a) have not been exempt or permitted, therefore an individual permit may be required in cases where the canal is considered natural. Existing man-made canals are typically considered 'exempt' by the regulatory agencies for maintenance that meets certain criteria contained in Section 40D-4.051 (FAC). Our original field work identified several areas with viable seagrass beds; oyster habitat is also present in some locations. A pre-application meeting with agency staff would be necessary to determine how they will review seagrass impacts for canals that otherwise would be considered 'exempt' for maintenance. Mitigation may be required for these canals as well as for any resource impacts to canals that undergo individual permit review.

Typical mitigation costs for seagrass impacts can be on the order of $500,000 per acre for planting new seagrass as part of an off-site restoration effort. At this point in the planning stage, there is no way to quantify what the level of impact might be or to assess how the agencies might respond.

We do know based on prior projects that other potential options for mitigation of seagrass impacts can be acceptable and might include actions such as:

- Removing derelict vessels located near existing seagrass beds
- Removing and/or modifying structures that might improve circulation for seagrasses (abandoned docks, cut derelict walls, etc)
- Grading down spoil islands along the channel (but, not within protective boundaries around channel)

- Coordinate mitigation "credits" for other habitat restoration project in the area (e.g., within Bayfront park living shoreline; Manatee County mitigation 'bank')

D. Conceptual Opinion of Probable Cost

Based on a total 'planning level' estimated dredge volume of 20,000 CY, spread over three 'regions' along the Key, we assumed that a contractor would use three separate dredged material management/transfer sites in order to minimize pumping or hauling distances. Based on engineering experience and judgement, Taylor Engineering selected a range of typical unit costs (per cubic yard) for excavating, dewatering, transferring and disposing of the dredged material for the 16 canals. When these typical unit costs are applied to the estimated volume of 20,000 CY, the total estimated construction cost ranges from $600,000 to $1 million.

In addition to the direct construction costs, Taylor Engineering recommends planning for an additional +/- $150,000 to $200,000 for final engineering and design services, to include bathymetric and resource surveys, permitting, bid assistance, and construction phase services. Note that the engineering fees may vary depending on the regulatory permit and mitigation requirements which are somewhat unknown at this point.

E. Next Steps - Proposed Project Schedule

If the Town decides to move forward with a priority canal maintenance project, the following are the recommended 'next steps' for design, permitting and implementation; the Town likely will also want to re-open the prior conversation about funding options:

1. Comprehensive bathymetric survey of priority (red and related yellow) canals – Summer 2017
2. Verify limits of natural resources (must be conducted within June – Sept window) – Summer 2017
3. Start preliminary design – Fall 2017
4. Prepare/Submit permit applications and regulatory coordination – Fall 2017
5. Regulatory approval/Final design – Spring 2018
6. Construction timeframe – Summer/Fall 2018

TAYLOR ENGINEERING, INC.

Town of Longboat Key
Project Update

Canal Dredging
Expanded Feasibility
Study

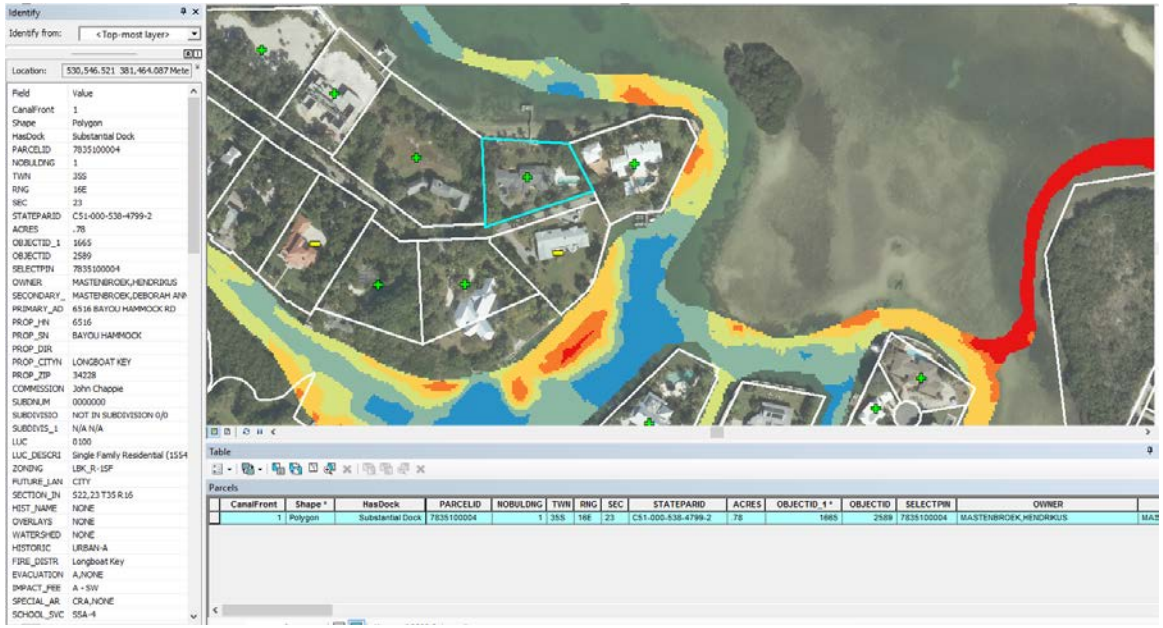
April 17, 2017

Overview

- Review of October 2016 Presentation
- Conceptual Design Development
- Estimated Shoal Volumes
- Dredged Material Transfer/Dewatering
- Permitting/Mitigation Discussion
- Estimated Construction Costs
- Canal 1a/Greer Island Disposal Option
- Next Steps…

Data Collection

- Prior work efforts:
  - Developed GIS database
  - Collected preliminary field data
  - Estimated canal shoal volumes



Conceptual Design – Canal Inventory

- Evaluated 91 canals/waterways, totaling ~147,000 ft (almost 28 miles)
- Found 18 canals with some degree of “hot spot” shoaling, using our preliminary criterion: < 2 ft depth (Mean Lower Low Water [MLLW], Red)
- Our assessment indicates these hot spots result in ‘restricted access’ during MLLW along length of about 12,500 ft (~2.4 miles) or 9% of total
- Deeper draft boats would be a concern for areas in Yellow (representing 49 canals), these added to Red would be about 33% of entire length

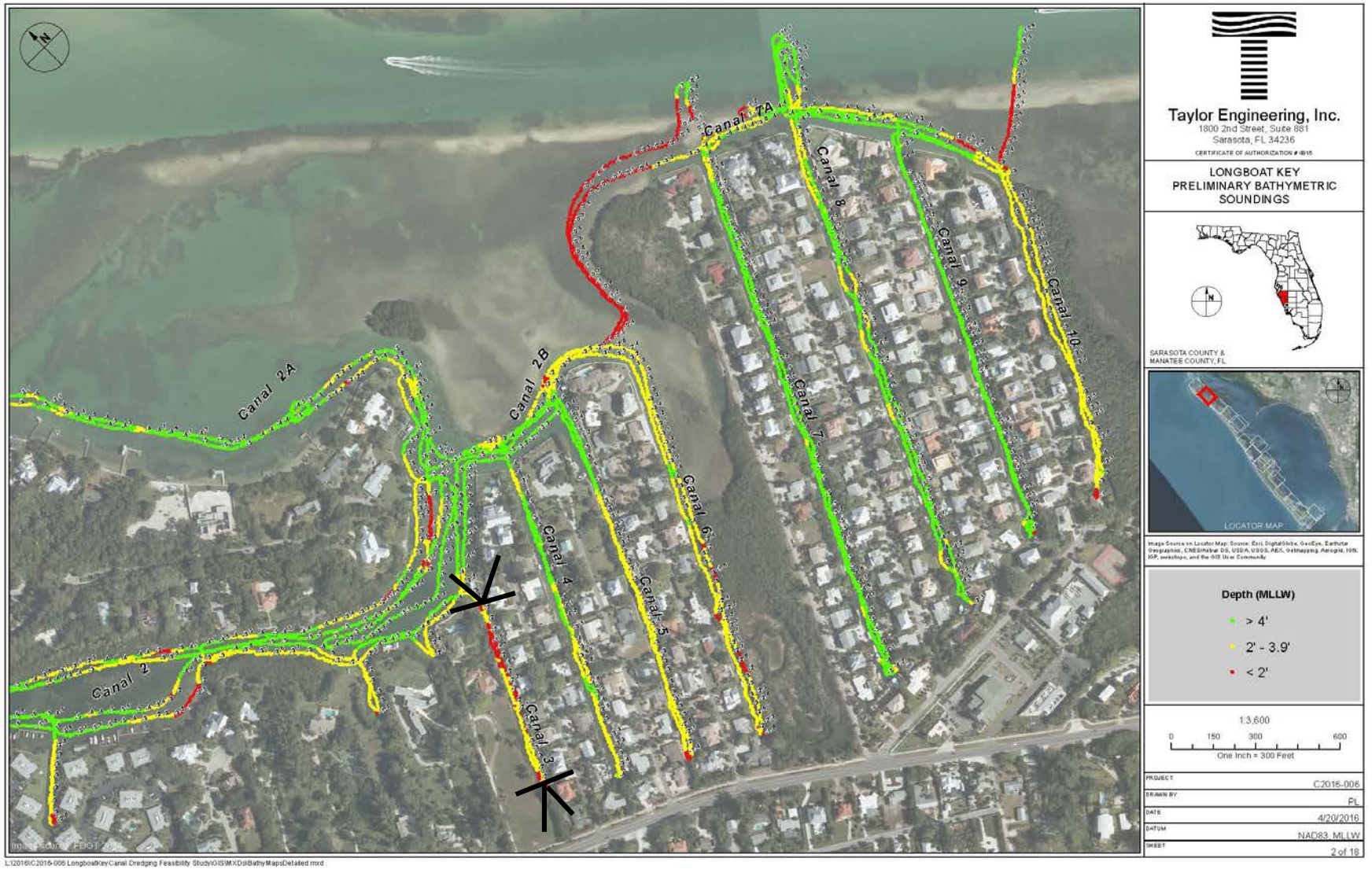
Conceptual Design - General Criteria

- Previously summarized data showed the average vessel drafts within County boating-sheds range between 2 and 3 ft
- Town direction (October 2016): use a depth of 3 ft below MLLW as a minimum ‘threshold’; which would result in adequate navigable depth for most vessels at all stages of the tide.
- Town guidance allowed us to refine prior analysis and focus on a priority program for these ‘hot spot’ canals; adjoining ‘yellow’ shoaled areas are included in the expanded analysis as areas of ‘restricted access’.

Conceptual Design – Estimating Restricted Limits

- The priority program identifies locations where:
  - Threshold conditions exist to the extent that dredging is proposed
  - Volume calculations assume that all dredge cut depths will be consistent with the full permitted or exempt depths for each canal
- The yellow canal areas included in the dredge volume in locations where:
  - The yellow areas are contiguous with red areas
  - The existing depths are less than -3 ft-MLLW or using subjective rationale such as connecting two similar but not contiguous areas where depths might be deeper than -3 ft
- Based on criteria developed, number of 'priority' canals was reduced from 49 to 16

Conceptual Design – Estimating Restricted Limits



L:\2016\C2016-006 LongboatKeyCanal Dredging Feasibility Study\GIS\MXD\BathyMapsDetailed.mxd

Conceptual Design – General Criteria

- Regulatory Exemptions, Permits….

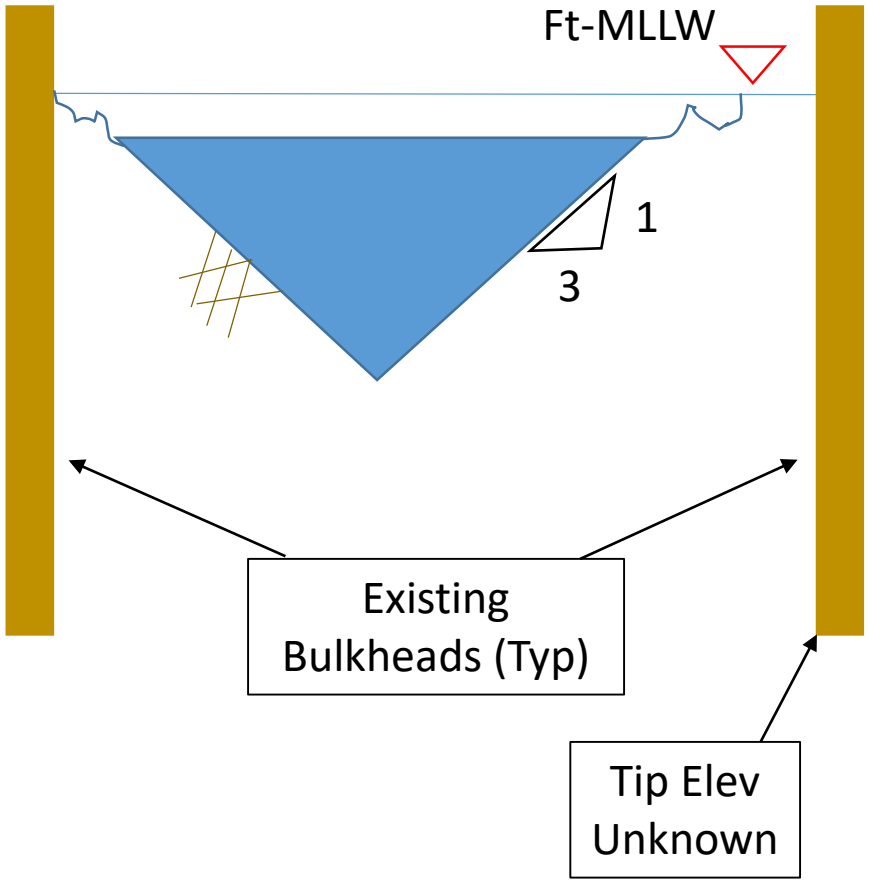
40D-4.051 Exemptions from Permitting.

The performance of maintenance dredging of existing manmade canals, channels, basins, berths […] to a depth of no more than 5 feet below mean low water.

Conceptual Design – General Criteria

Preliminary assumptions:

- Used permitted/exempt depths; assumed average canal widths (estimated from visual aerial interpretation)
- Typical 10 ft offset from each side (presence of existing structures bulkheads, docks, mooring piles)
- Triangular dredge cut with 1:3 side slopes to the permitted/exempt depth or less
- Top width between 12 and 30 ft for interior narrow channels
- Open water or access canals were limited to 50 ft widths



	Dimensions Per GIS & Aerial Imagery		Info from Town			Addendum Conceptual Design			
Canal Name	Total Canal Length (ft)	Avg Canal Width (ft)	Authorized Exempt Depth (ft-NGVD)	Permitted Depth (ft-NGVD)	No Permit - Assumed Dredge Depth	Adjusted Dredge Width (ft)	Average Cut Depth (ft)	Horizontal Dredge Limits (ft)	Volume (CY) - Triangular Cut
1	1996	50	-4.4			30	2.4	200	178
1a	1756	85			-5.4	30	3.4	1,500	1,889
2	2600	75		-5.4		30	3.4	200	252
3	885	35	-4.4			15	2.4	600	267
6	1428	40	-4.4			20	2.4	775	459
18	2154	40	-3.4			20	1.4	900	311
20p	849	35			-5.4	15	3.4	925	582
21p	2435	55			-5.4	35	3.4	900	1,322
21a	1368	50			-5.4	30	3.4	850	1,070
22a	1870	37	-5.4			20	3.4	1,200	1,007
31d	800	50			-5.4	30	3.4	350	441
32p	13280	40		-5.4		20	3.4	1,000	840
33a	1343	73			-5.4	50	3.4	950	1,994
49	1685	73		-5.4		50	3.4	450	944
55	2193	50			-5.4	50	3.4	300	630
55a	647	130			-5.4	50	3.4	450	944

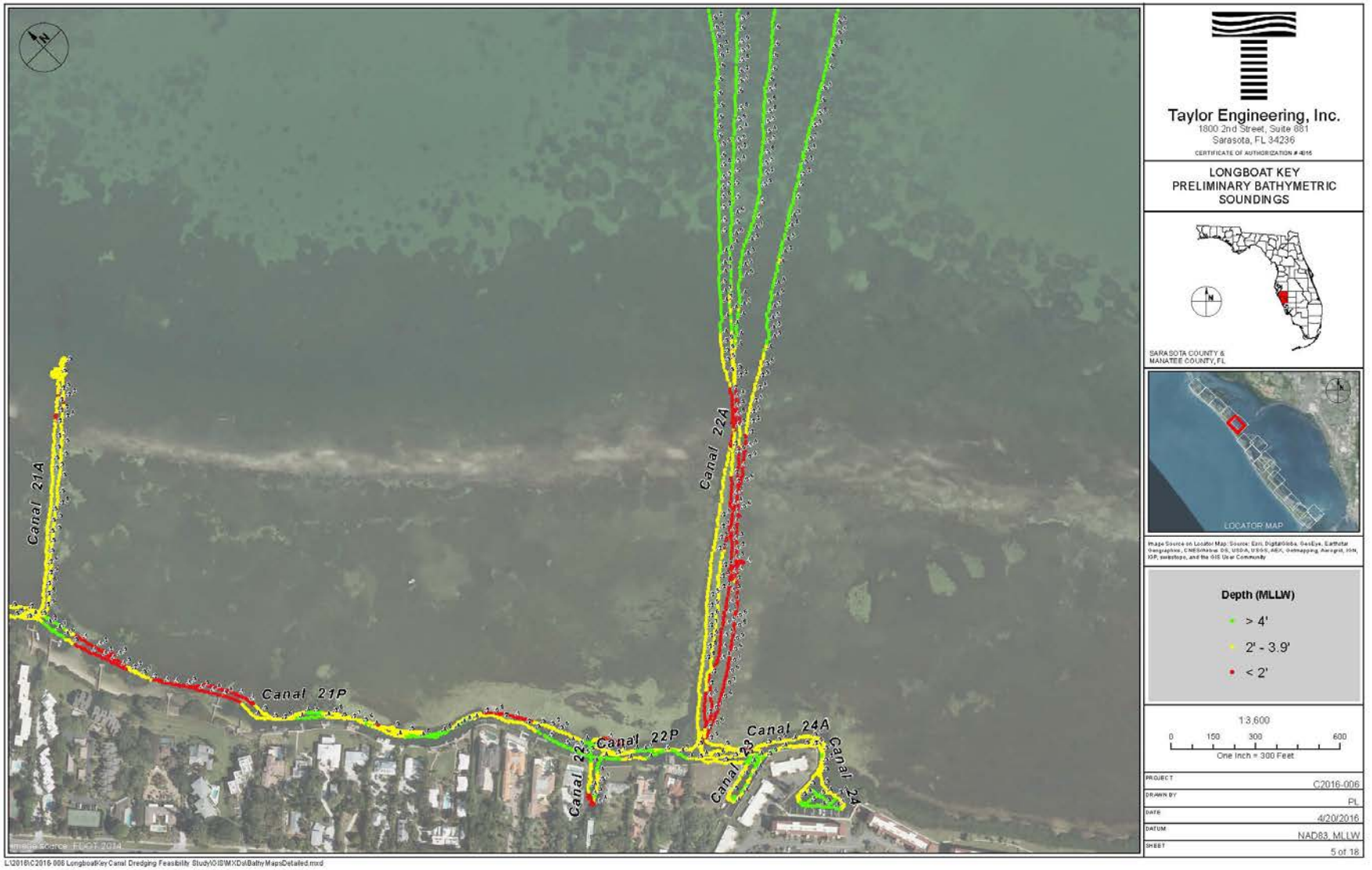
Total Volume: 13,131 CY

Total Canal Length: 11,550 FT

Conceptual Design Volumes

- Estimated shoal volume = 13,200 CY
- Conservative SF = 1.5 (50%) used to account for preliminary nature of bathy data, account for future shoaling, and conservative budgetary estimates
- Planning level conceptual design volume = 20,000 CY
- Dredge cut length = 11,550 linear feet or 2.2 track miles
- Three project 'regions' based on location:
  - North: Canals 1 to 6
  - Mid-Key: Canals 18 to 22a
  - South Key: Canals 31d to 55a

Example - Canal 22A (Access Canal)



Example – Canal 32P (Bay Isles Perimeter)

Potential Dredged Material Transfer Sites

Taylor Engineering prepared a list of potential sites including their estimated available space for each site:

- Initial desktop assessment of potential dredged material management sites - for handling, dewatering, and transferring the dredged material
- Conducted a subsequent preliminary field visit to evaluate the viability of each site and collect measurements to calculate approximate dredged material capacity
- Based on the limited space available for dewatering, use of geotextile tubes or holding containers is recommended instead of a traditional open-air, diked dewatering system. This type of approach also allows for the construction operations and dredged material to be less obtrusive.

Possible Temporary Transfer Sites

DMMA No.	Adjacent Canal	Location	Size/Approx Capacity		Area	
		Address or Cross-Streets	Width (ft)	Length (ft)	(sq ft)	(acre)
1	N/A	Old Gas Station at Broadway & GMD Intersection	60	85	5,100	0.12
2	2	Along Palm Rd/Cedar Intersection at Whitney Beach	21	>200	4,200	0.10
3	31d	Beach/Bay Access Park	42	76	3,192	0.07
4	55	Overlook Park - East side	20	500	10,000	0.23
		Overlook Park - West side	25	250	6,250	0.14
5	19	Durante Park (B/w St. Judes Dr & Gulf Bay Rd)	65	143	9,295	0.21
6	55	Ken Thompson Park	275	375	103,125	2.37
7	N/A	Bayfront Park	20	200	4,000	0.09

* Additional dredged material management/transfer sites might include Town Rights of Way

Permitting/Mitigation Assessment

- Permitting 16 Priority Canals:
  - Five canals 'exempt' – Existing man-made canals are typically considered 'exempt' by the regulatory agencies for maintenance that meets certain criteria contained in Section 40D-4.051 (FAC).
  - Three canals have been previously permitted
  - Eight canals have not been exempt or permitted (1a, 20p, 21p, 21a, 31d, 33a, 55, and 55a); an individual permit may be required in these cases.
- Mitigation Triggers:
  - Presence of natural resources – including seagrasses, oyster reefs, etc.
  - May result in some areas being ineligible to meet exemption criteria
  - Pro-active early input from regulatory agencies critical for program/project success

Canal 1a Greer Island Beneficial Use

TAYLOR ENGINEERING, INC.
Delivering Leading-Edge Solutions

Canal Volume under Canal Program: ~ 1900 CY

Canal 1a Greer Island Beneficial Use

- Expanded project
- Volume to include sand spit
- Mangrove mitigation
- Shoreline stabilization

Conceptual Estimated Project Costs

Town-wide Dredging Project Costs	
Estimated Dredge Volume:	20,000 CY
Estimated Construction Cost:	$600,000 to $1 Mil
Design & Engineering Fees*:	$150,000 to $200,000

- Engineering fees may vary depending on the regulatory permit and mitigation requirements
- Includes canal 1a (1900 CY)

Canal 1a/Greer Island Beneficial Use (Stand alone)	
Estimated Dredge Volume:	5,000 to 25,000 CY
Est. Construction Cost:	$400,000 to $1mil
Mitigation Costs:	TBD
Design & Engineering Fees*:	$75,0000 to $150,000

* Includes permitting

- Order of magnitude costs
- Engineering assessment not complete
- Engineering fees may vary depending on the regulatory permit and mitigation requirements. Mitigation requirements unknown at this point

Next Steps…

Proposed Schedule for Town-wide Dredging Project:

1. Comprehensive bathymetric survey of priority (red and related yellow) canals – **Summer 2017**
2. Develop funding scenarios (WCIND, Surtax, Canal Fund, or other options). Funding source based on comprehensive survey result – **Summer 2017**
3. Verify limits of natural resources (must be conducted within June-Sept window) – **Summer 2017**
4. Start preliminary design – **Fall 2017**
5. Prepare/Submit permit applications and regulatory coordination – **Fall 2017**
6. Regulatory approval/Final design – **Spring 2018**
7. Construction timeframe – **Summer/Fall 2018**

Project schedule may vary for Canal 1a/Greer Island disposal alternative – dependent upon permitting.

THANK YOU

Questions?

End of Agenda Item