

# **BISCAYNE POINTE SUBDIVISION DRAINAGE EVALUATION**

**For**

**Biscayne Pointe Homeowners Association  
Navarre, Florida**

---

**Cecil L. Jernigan, Jr.  
FL PE #34272**

---

**Date**

**August 31, 2015  
FEI Project # 140055**

**SUBMITTED BY:**



**FABRE ENGINEERING & SURVEYING  
ENGINEERS ♦ PLANNERS ♦ SURVEYORS**

**LB. #0006679**

**EB. #0007215**

**119 GREGORY SQUARE ♦ PENSACOLA, FLORIDA 32502-4915 ♦ PH #433-6438 ♦ FAX #434-7842**

# BISCAYNE POINTE SUBDIVISION

## DRAINAGE EVALUATION

### INTRODUCTION

Biscayne Pointe subdivision was developed in the early 1990's in phases. While the subdivision is private, the developer, Pullam Realty, says the subdivision was designed to meet all county codes in place at that time. The original drainage system had small "v" ditches adjacent to the roads that conveyed flow to five retention basins or a pipe outlet to the wetland. Four of the retention ponds outlet directly into the wetland. The fifth pond outlets into a drainage easement through an occupied lot and then into the street. Runoff eventually flows to the outlet pipe at the southeast corner of the Biscayne Boulevard loop. This storm drainage system met the Santa Rosa County Land Development Code at that time.

Modifications to the original drainage system by homeowners as part of their landscaping have made the original drainage system ineffective and now runoff flows along the streets to reach the retention ponds. Lack of adequate maintenance has reduced the capacity of the retention ponds to store runoff and discharge the excess flow to the wetlands. Sediment from Hurricane Ivan blocked the Biscayne Boulevard loop outfall pipe so a pumped discharge was put in to remove ponded water from this area. Additional development north of the subdivision has increased the offsite flow coming into the subdivision.

### HYDRAULIC ANALYSIS

Flow enters the subdivision at three points and either travels through the wetland that crosses the subdivision or flows to the pumped outlet at the southeast corner of Biscayne Boulevard. To reduce flooding, the flow paths for the overland flow need to be improved and the outlets from the streets to the wetlands need to be improved.

Flow that comes from the FDOT right-of-way on the east side of the entrance road through two 36 inch diameter reinforced concrete pipes under Highway 98 goes under Vandiver Drive and continues through the wetland to the outlet at Santa Rosa Sound. While this flow may overtop Vandiver Drive occasionally, it is of short duration and does not cause serious problems for the homeowners.

Flow also enters the subdivision from the FDOT right-of-way from a box culvert and two circular culverts under Highway 98 just west of the entrance to the subdivision. The drainage area north of Highway 98 is now almost fully developed and flow is considerably more than when the subdivision was constructed. The 3' by 10' box culvert under Highway 98 has a capacity of approximately 288 cfs without overtopping the road. The two 36-inch culverts have a capacity of approximately 128 cfs. The total inflow from Highway 98 is approximately 416 cfs. The flow then travels through the wetland to the 3-30 inch pipes under Biscayne Boulevard. These three pipes have a capacity of approximately 140 cfs (approximately 47 cfs each) without overtopping the road. After crossing Biscayne Boulevard, flow continues through the wetland to the outlet at Santa Rosa Sound. Hydraulic calculations are shown in Appendix D.

Flow can enter along the west boundary of the subdivision as overland surface flow from the adjacent vacant parcel. The flow tends to accumulate at the west end of the Pine Ranch Drive cul-de-sac and then flow into the Retention Pond at the southeast corner of the curve. When the Retention Pond reaches capacity, the overflow is overland to the south and then east along the roadway. There is a 20 foot drainage easement through the adjacent occupied lot to the south. The flow then travels east along the roadway until it reaches the pumped outfall. Cleaning the drainage easement and improving it would improve conditions on Pine Ranch Drive but the overflow will exit onto Lilge Drive then flow down Biscayne Boulevard to the pumped outlet at the southeast corner of the Biscayne Boulevard loop, potentially making conditions worse there. Additionally, some of the flow is diverted north along Pine Ranch Drive and then east along Hansel drive, then along Biscayne Boulevard until it reaches one of the detention ponds or the pumped outlet.

## **MAINTENANCE**

The inlets and outlets to several of the retention ponds need maintenance to restore the design capacity of the ponds. Cleaning Retention Ponds 1, 2 and 5, and their outlets as was done with Retention Pond 4, to restore full capacity will improve stormwater flow exiting the pond to the adjacent wetland, thereby reducing flooding in the subdivision. Cleaning and improving the inlets to the retention ponds will allow flow to exit the streets quicker. Restoration of the detention ponds back to their design capacity will improve drainage and reduce flooding. Upgrading the outlet weirs with a concrete surface will improve flow through the ponds by lowering the friction loss due to vegetation and will be a permanent improvement that will reduce continued periodic maintenance to keep the full flow capacity of the outlet structure. Entrance channels and inlet pipes to the retention ponds need to be cleaned and maintained periodically to insure full flow capacity. The easier it is to get flow from the street into the retention ponds and then outlet the flow to the wetland, the more flood reduction will be achieved.

Cleaning accumulated sediment out of Retention Pond 3 would increase its capacity. Improving the outlet would provide some flood reduction to lots to the north and east of the retention pond but would increase flows to the lots along Lilge Circle to the south.

## **POTENTIAL IMPROVEMENTS**

The depth of flooding at the existing north Biscayne Boulevard crossing can be reduced by adding another 30-inch pipe which would increase the capacity by an additional 47 cfs (a 33% increase in capacity). The pipe cost for this upgrade is not expensive, approximately \$5000.00 but the installation costs will be expensive. Installation will require roadway demolition, dewatering, foundation preparation, earth backfill, pavement repair and temporary detour construction and removal. These costs could exceed \$25,000.00, making the total cost over \$30,000.00. This work would need to be permitted by Santa Rosa County and the State of Florida. The location of the proposed improvements is shown in Appendix B.

Upgrading the Biscayne Boulevard crossing to an Aluminum Box Culvert could potentially increase the flow capacity by 50% to 75% but would involve closing the road for several days during the installation. Details on the Contech Aluminum Box Culvert alternative for the north Biscayne Boulevard crossing are included in Appendix C. You could expect the total cost to be more than double the Contech cost of \$30,000.00 to cover demolition, unloading and storage of the materials, dewatering, foundation preparation, earth backfill, roadway repair and temporary detour construction and removal, making the total cost to be over \$60,000.00. Upgrading the culvert capacity will reduce the frequency of roadway overtopping at the culvert location but will not reduce flood elevations at other locations in the subdivision. This work would need to be permitted by Santa Rosa County and the State of Florida.

The right-of-way for the subdivision streets is 50 feet and there is an additional 5 foot utility easement on each side. The pavement is approximately 26 feet wide so there is approximately 17 feet on each side of the pavement to install drainage improvements. A surface drainage system of swales similar to what existed when the subdivision was built would provide additional depth for drainage and a small amount of flow capacity to reduce upstream flooding. Re-establishment of this surface drainage system would improve the upstream flooding and drainage problems slightly but would be limited due to the small size of the culverts under the roads.

Enlarging Retention Pond 3 on Pine Ranch Drive by extending it into the adjacent lot to the west on Pine Ranch Drive would also provide additional flood relief. This would provide flood relief to the lots to the east of the Retention Pond as well as to the south along Lilge Circle. The estimated construction cost to enlarge the pond into the next lot is \$10,000. There would also be the additional cost to purchase the lot.

Constructing a small open "v" ditch all the way to Santa Rosa Sound along the east boundary of the property to the west would provide flood protection but would require an easement from the western property owners. The "v" ditch should start just north of Hansel Drive. The "v" ditch will eliminate flow from smaller storms entering the subdivision and reduce the amount of flow entering the subdivision from the larger storms. A "v" ditch with an 18 foot top width and side slopes of six feet horizontal to 1 foot vertical, 1.5 feet deep, will divert flow along the east boundary of the west property to Santa Rosa Sound and be easy to maintain. The ditch would have to be regularly maintained to insure it has full flow capacity when a rain event happens. The estimated construction cost to extend the ditch just north of Hansel Drive, a length of 1,050 feet, is \$12,600. An easement would also be needed to cross the vacant lot at the end of Hansel Drive to access the work area and do maintenance or alternately an access easement to the "v" ditch from the property to the west.

An alternative to this would be to obtain easements along the west boundary of each of the Biscayne Pointe lots if there is adequate room to install the "v" ditch.

Constructing a small "v" ditch from Biscayne Boulevard to the wetlands along the utility easement on the Biscayne Boulevard loop could divert some of the flow from the street to the wetland, lessening the flooding impact at the pump station at the southeast corner of the loop. The estimated cost for this 150 foot ditch is \$1800.

Adding a small outlet pipe near the bottom of pond 3 along the drainage easement then under the road and along the Langford property line to Santa Rosa Sound would only slightly reduce flood conditions adjacent to Pond 3 and along Biscayne Boulevard to the pumped outlet. Adding the outlet pipe would speed up emptying the pond after each rainfall event but a 12 inch pipe would only carry about 2.3 cfs, not enough flow to reduce flood depths significantly. The estimated construction costs for a 12 inch pipe, 700 feet long is \$28,000.00. This would change the pond from a retention pond to a detention pond and possibly Santa Rosa County or FDEP may not permit the change. This work would need to be permitted by Santa Rosa County and the State of Florida.

Adding an outlet structure in Pond 3 to maintain its function as a retention pond and then constructing a 36 inch pipe to Santa Rosa Sound would reduce flood impacts along Lilge Circle and the Biscayne Boulevard loop. A 36 inch diameter plastic drainage pipe would carry 39 cfs and is estimated to cost \$77,000.00. This work would need to be permitted by Santa Rosa County and the State of Florida.

Increasing the existing pump capacity at the southeast corner of the Biscayne Boulevard loop would at least reduce the time that the area around the pump is flooded, but it may not reduce the height of the flood pool. The height may be controlled by the ability of the flood water to flow overland to the wetland.

Re-establishing the ability of the abandoned culvert at the southeast corner of the Biscayne Boulevard loop to convey runoff should be examined. Cleaning out the sediment from the pipe and excavating a small outlet channel to the existing outlet channel should provide additional flood stage reduction to the Biscayne Boulevard loop. This would eliminate the need for the pump outlet. While this alternative would need to be shown to Santa Rosa County and the State of Florida Regulatory agencies for clarification, it should be maintenance and not require a permit.

## **RECOMMENDATIONS**

All of the potential improvements will provide some level of flood reduction to part of the subdivision. Implementation of multiple improvements will provide additional flood reduction with each added alternative implemented.

The first priority should be to improve the maintenance of the existing ponds. Keeping the existing ponds at full design capacity will reduce flooding in most areas of the subdivision.

We would recommend the "v" ditch along the western boundary of the subdivision as the best alternative to reduce flooding if you can get an easement from the adjacent landowner. This would remove flow from the subdivision and reduce flood elevations along Hansel Drive, the south end of Pine Ranch Drive, Lilge Circle and the Biscayne Boulevard loop. The cost of the easements will be the major factor in this being cost effective. This alternative would have the most impact on reducing flood elevations in the south part of the subdivision by diverting the flow directly to Santa Rosa Sound instead of following across and through the subdivision.

The next best alternative would be the 36 inch pipe outlet from Retention Pond 3 to Santa Rosa Sound. This provides a positive outfall from the pond to Santa Rosa Sound and would remove some surface flow along Lilge Circle and the Biscayne Boulevard loop, reducing flood elevations at these locations. Keeping Pond 3 as a Retention Pond would make it easier to permit the pipe outlet to Santa Rosa Sound.

Enlarging Retention Pond 3 will provide additional volume to reduce overflows from Retention Pond 3 and will provide flood reduction if the pipe outlet is not installed and additional flood reduction if the pipe outlet is installed.

Constructing the “v” ditch from the Biscayne Boulevard loop to the wetlands will provide a small amount of flood reduction along the Biscayne Boulevard loop by diverting flow from the roadway to the wetland.

Re-establishing flow to the blocked culvert on the Biscayne Boulevard loop, thereby providing a positive outfall for flow, would eliminate flooding for many of the smaller flood events and reduce flooding for the larger events at this location. The free flowing outfall pipe should provide lower flood elevations than the pumped outlet.

Increasing the capacity of the Biscayne Boulevard crossing will reduce the frequency that the flow overtops the road and will reduce future maintenance costs associated with the flow over the road but will not impact flood elevations anywhere else in the subdivision. This increase in capacity would reduce the chance of the roadway overtopping and washing out the road, isolating the homeowners south of the crossing.

### Summary of Recommended Improvements in Order of Priority

<b>ITEM</b>	<b>COST</b>
1. Improve Maintenance of Existing Retention Ponds	\$2,000.00 per year
2. Install “v” ditch along Western Boundary	\$12,600.00
3. 36” Outlet Pipe for Retention Pond 3	\$77,000.00
4. Biscayne Boulevard Loop “v” Ditch	\$1,800.00
5. Re-establish flow in Abandoned Culvert	Unknown
6. Enlarge Retention Pond 3	\$10,000.00 plus Lot Cost
7. Increase Capacity of Biscayne Boulevard Crossing	\$25,000.00 plus

## APPENDIX A











FABRE ENGINEERING INC. ENGINEERS \* PLANNERS \* SURVEYORS  
 119 GREGORY SQUARE \* PENSACOLA, FLORIDA 32501-4915 \* TEL: (850) 433-6438 \* FAX: (850) 434-7842  
 L.B. NO. 0006679 \* E.B. NO. 0007215



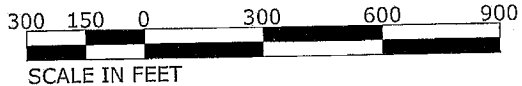
SANTA ROSA SOUND

SANTA ROSA SOUND

**LEGEND:**

-  RETENTION POND
-  20' DRAINAGE EASEMENT
-  20' UTILITY EASEMENT
-  INLET
-  CULVERT
-  PUMP STATION

**GRAPHIC SCALE:**



THIS DRAWING IS THE PROPERTY OF FABRE ENGINEERING, INC. AND IS NOT TO BE REPRODUCED IN WHOLE OR PART, IT IS NOT TO BE USED ON ANY OTHER PROJECT AND IS TO BE RETURNED UPON REQUEST. BAR IS ONE INCH ON ORIGINAL. DRAWING 0 1" IF NOT, ADJUST SCALE ACCORDINGLY.

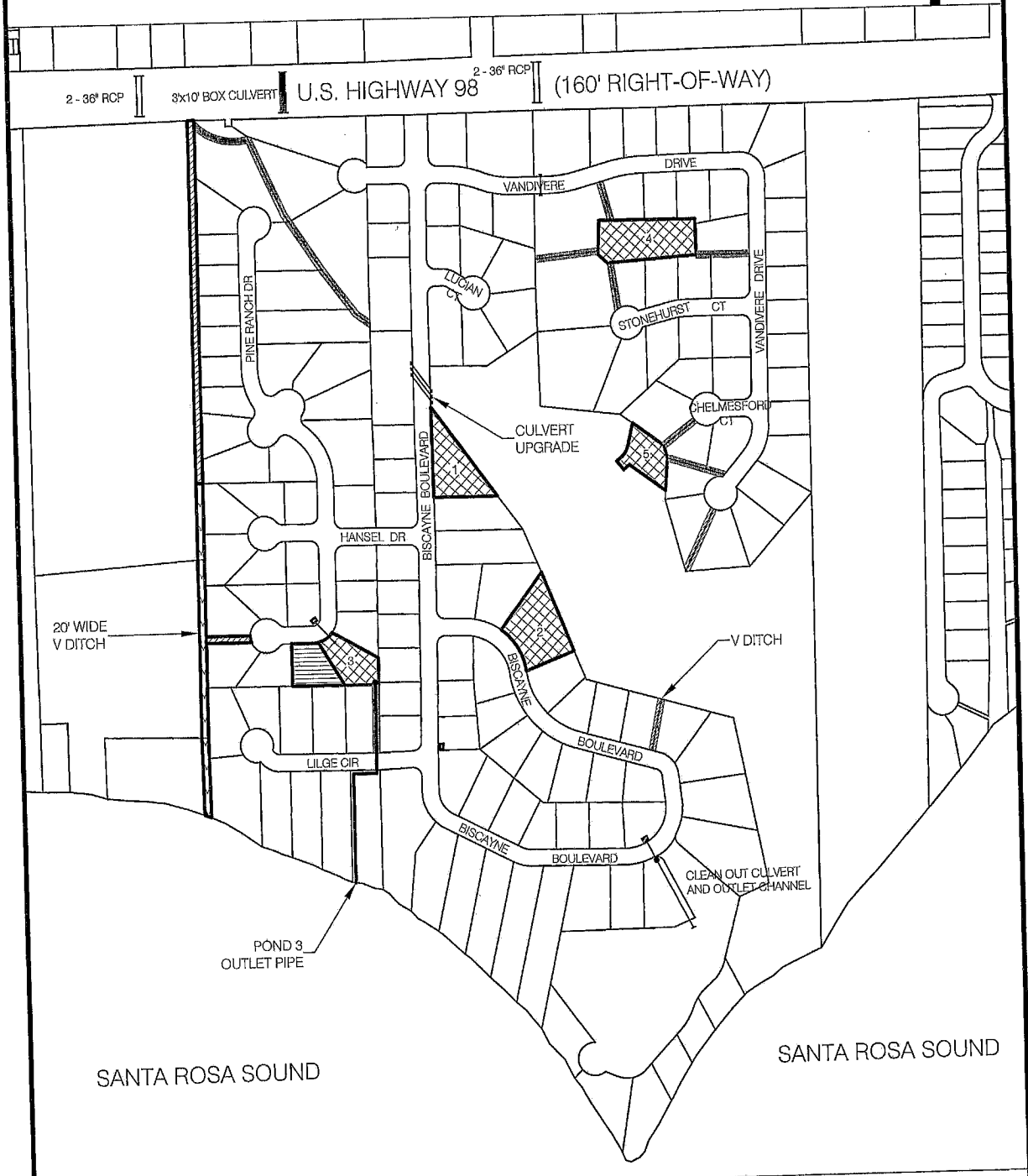
SCALE: 1"=300'	FILE:	DRAWN BY: JMC	DATE:
JOB NUMBER: 140055		CHECKED BY: CLJ	MARCH 24, 2015

**EXHIBIT "A"**

## APPENDIX B



FABRE ENGINEERING INC. ENGINEERS \* PLANNERS \* SURVEYORS  
 119 GREGORY SQUARE \* PENSACOLA, FLORIDA 32501-4915 \* TEL: (850) 433-6438 \* FAX: (850) 434-7842  
 L.B. NO. 0006679 \* E.B. NO. 0007215



SANTA ROSA SOUND

SANTA ROSA SOUND

**LEGEND:**

- RETENTION POND
- 20' DRAINAGE EASEMENT
- 20' UTILITY EASEMENT
- INLET
- CULVERT UPGRADE
- PUMP STATION

**PROPOSED IMPROVEMENTS:**

- ACCESS EASEMENT
- V DITCH
- ENLARGE POND 3
- POND 3 OUTLET PIPE

**GRAPHIC SCALE:**

300 150 0 300 600 900  
 SCALE IN FEET

THIS DRAWING IS THE PROPERTY OF FABRE ENGINEERING, INC. AND IS NOT TO BE REPRODUCED IN WHOLE OR PART, IT IS NOT TO BE USED ON ANY OTHER PROJECT AND IS TO BE RETURNED UPON REQUEST. BAR IS ONE INCH ON ORIGINAL DRAWING. \* IF NOT, ADJUST SCALE ACCORDINGLY.

SCALE: 1"=300' FILE:	DRAWN BY: JMC	DATE:
JOB NUMBER: 140055	CHECKED BY: CLJ	MARCH 24, 2015

**EXHIBIT "B"**

## APPENDIX C

Quote # QUO-186462-HY6W1X					
Date	4/1/2015	Account Name	Brown Construction of NW Florida, Inc.	Reply-To	
Quote #	QUO-186462-HY6W1X	Contact Name	Brown Construction of NW Florida, Inc.	Contech Rep.	Robert Adamson
Revision #	1	Phone	(850) 473-9039	Address	311 Magnolia, Suite 121, Fairhope, AL, 36532
Project Name	Bliscayne Point Bridge Replacement	Fax		Phone	251-928-3537
Project #	503293	Email		Fax	
Project City/State	Santa Rosa Beach, FL			Email	RAdamson@conteches.com

Contech's offer to sell the products described in this quotation is expressly conditioned upon Buyer's assent to the Contech Conditions of Sale ("Contech COS") included herewith and/or viewable at [www.conteches.com/cos](http://www.conteches.com/cos). A valid tax exemption certificate must be issued to Contech or sales tax will be added.

Item #	Description	Pieces	Quantity	Extended Unit Price	Unit	Unit Total
	Box Culvert Aluminum - with the following specifications: Span / Rise / Structure #: 9'-2" Span x 3'-3" Rise (2) Shell Designation: L1 Bottom Centerline Length: 36 Foundation: Full Invert Toewalls: 2 Aluminum Toewalls Loading: HL-93 Min HOC: 1.4 Max HOC: 4 Inlet End Treatment: AL Headwall Outlet End Treatment: AL Headwall Wing Wall #1 Length (feet): 6 Wing Wall #2 Length (feet): 6 Wing Wall #3 Length (feet): 6 Wing Wall #4 Length (feet): 6 A soil bearing pressure of 4000 PSF must be achieved for the full invert structure quoted.		36.00	\$832.63	EA	\$29,974.68
<b>Total</b>						\$29,974.68
(Tax not Included)						<b>Net Total</b> \$29,974.68

**Standard Notes**

1. All orders must be shipped within 30 days of manufacture or a storage charge applies equal to a maximum of 5% per month of the selling price of the stored material.

2. Allowable unloading time for delivery trucks is two (2) hours. Demurrage charges of \$75.00 per hour thereafter will be added.

3. Assembly pricing includes the following work by Contech: 1. Assemble the structural plate structure(s) quoted herein on a foundation prepared and properly shaped in accordance with the project plans and specifications and Contech's guidelines. If applicable base channels, receiving channels or slotted footings must be properly located and set by others and the concrete must have achieved an appropriate strength level prior to work by Contech. 2. Assembly by Contech is by non-union/non-prevailing wage labor. If either or both are a requirement for this project, contact Contech for a modified price. 3. Applicable use taxes for assembly service are included. 4. Insurance to be furnished by Seller to cover work on this proposal shall consist of comprehensive general liability and automobile liability insurance with a combined single limit of \$1,000,000 for each occurrence, and worker's compensation insurance as required by state law. Other insurance or payment, material, or performance bond provisions are not included in this proposal. If these or other types of coverages are required, contact Contech for pricing and availability. The following work is not a part of this offer and is to be performed by others at no cost to Contech: 1. Demolition and removal of existing structures necessary to accomplish the work. 2. Receive and unload all items described herein at a staging area immediately adjacent to the structure location and be responsible for its security until erected. 3. Furnish and construct any and all earthwork including material, labor, equipment, soils testing, density testing, supervision, etc. Note that the structural adequacy of the foundation is to be determined by others than Contech. 4. Furnish and construct any and all appurtenances such as headwalls, wingwalls, cut-off walls, footings (including base channels, receiving channels or formed keyway), slope collars, curbs, shoring, paving, gablons, guardrail, etc., as may be required. 5. Any and all dewatering, stream diversion, cofferdams, etc., to provide a dry and accessible field erection work site. 6. Provide access for Contech assembly crew to both sides of the structure, within 30-feet of the centerline, for the entire length of the structure for use by rubber tired assembly equipment. 7. Any and all permits, inspection fees (other than those noted herein), flagmen, barricades, utility protection, or any traffic safety control methods or devices. 8. Provide a staging area immediately adjacent to the location of the structure of suitable size to provide for storage and subassembly of the structure. 9. Furnish and place all backfill material in accordance with the project plans and specifications or governing state department of transportation standards and Contech guidelines. 10. Provide work areas that are in full compliance with both local regulations and with the U.S. Department of Labor, Occupational Safety and Health Administration regulations in every respect. It is expressly understood that Contech will refuse to accept work areas, which in our sole opinion could result in a violation of OSHA requirements, and that Contech will not be liable for delays or expenses resulting from this action. 11. Structure foundations that are ready for assembly of structures on the date of commencement of work that is requested (and agreed upon by Contech). Once the assembly crew is on site, delays in commencement of assembly will result in additional charges to the Buyer. 12. State, county or municipal taxes are not included.

4. Construction loadings typically exceed the intended post-construction live load used for design. Contact your Contech representative for specific guidelines and limitations based on the construction live loads anticipated.

Quote # QUO-186462-HY6W1X

**Standard Notes**

5. One or more of the products quoted herein is nonstandard and not returnable. A down payment equal to 1/3 of the item(s) total is required and must be received prior to commencement of any performance by Contech.
6. The estimated manufacturing lead time for this material is 3-4 weeks from the receipt of approved submittal documents.
7. This material will be manufactured for this particular project and is not subject to cancellation. See Section 19 of the Contech COS.
8. This quotation expires 30 days from the date shown. Prices are firm for shipment within 90 days of the date of quotation and are subject to a maximum escalation of 8% for each 30 days thereafter.

**Scope Of Work**

**Aluminum Box Culvert**

Aluminum Box Culvert pricing includes plate layout drawings, unassembled materials including corrugated aluminum structural plates, reinforcing ribs, and sufficient bolts and nuts. Anchor bolts, headwalls, wingwalls, special fabrications for non square ends and fittings with associated hardware of any kind are not included unless specifically priced herein.

PAYMENT TERMS ARE 1/2% - 10, NET 30 DAYS FROM DATE OF INVOICE UNLESS MATERIAL IS OTHERWISE NOTED AS NON-STANDARD ABOVE. IF NON-STANDARD, PAYMENT TERMS ARE 1/3 AT ORDER ACCEPTANCE AND PRIOR TO START OF PRODUCTION, 2/3 NET 30 DAYS FROM DATE OF INVOICE. THIS OFFER IS SUBJECT TO CREDIT APPROVAL. PRICES QUOTED APPLY ONLY TO THE REFERENCED PROJECT AND ARE IN EFFECT FOR 30 DAYS FROM THE DATE OF QUOTATION. SELLER RESERVES THE RIGHT TO ADJUST PRICES AFTER 30 DAYS FROM THE DATE OF QUOTATION BUT THE CONTECH COS REMAIN APPLICABLE. PRICES ARE BASED ON ESTIMATED QUANTITIES SHOWN. IF A DIFFERENT QUANTITY IS PURCHASED, CONTECH RESERVES THE RIGHT TO ADJUST THE PRICES. THIS QUOTATION CONTAINS THE ENTIRE AGREEMENT WITH RESPECT TO PURCHASE AND SALE OF PRODUCTS DESCRIBED AND SUPERSEDES ALL PREVIOUS COMMUNICATIONS, BUYER'S SIGNATURE BELOW, DIRECTION TO MANUFACTURE, OR ACCEPTANCE OF DELIVERY OF GOODS DESCRIBED ABOVE, SHALL BE DEEMED AN ACCEPTANCE OF THE CONTECH COS. SELLER EXPRESSLY REJECTS ANY OTHER TERMS AND CONDITIONS. PRICES ARE F.O.B. ORIGIN WITH FREIGHT ALLOWED TO THE JOBSITE WITH UNLOADING BY OTHERS AT A TRUCK ACCESSIBLE LOCATION. THIS QUOTATION IS ISSUED BY CONTECH ENGINEERED SOLUTIONS LLC FOR ITSELF AND/OR ON BEHALF OF ONE OR MORE OF ITS SUBSIDIARIES, INCLUDING BUT NOT LIMITED TO KEYSTONE RETAINING WALL SYSTEMS LLC.

Acceptance		Contech Engineered Solutions LLC	
WE HEREBY ORDER THE DESCRIBED MATERIAL SUBJECT TO ALL TERMS AND CONDITIONS OF THIS QUOTATION AND IN THE Contech COS INCLUDED HEREWITH AND VIEWABLE AT <a href="http://www.conteches.com/cos">www.conteches.com/cos</a>		By	Robert Adamson
Company		(O)	251-928-3537
By		(F)	
Title		(Cell)	
Date		Title	

Quote # QUO-186462-HY6W1X

**Contech - CONDITIONS OF SALE**

1. **ACCEPTANCE.** This quotation is an offer to sell to potential customer(s). BUYER'S RIGHT TO ACCEPT THIS OFFER IS LIMITED TO BUYER'S ASSENT TO THE TERMS AND CONDITIONS PRINTED HEREON AND THE ATTACHED OR ACCOMPANYING QUOTE, AND NO TERMS ADDITIONAL TO OR DIFFERENT FROM THOSE IN THIS OFFER ARE BINDING ON SELLER. THERE ARE NO UNDERSTANDINGS, TERMS, CONDITIONS OR WARRANTIES NOT FULLY EXPRESSED HEREIN.
2. **LIMITED WARRANTIES.** Seller warrants that it can convey good title to the products sold under this contract and that they are free of liens and encumbrances. Seller also warrants that the products sold under this contract are substantially free from defects in material and workmanship for a period of one year after the date of delivery. There are no express or implied warranties with respect to products sold hereunder which are misused, abused or used in conjunction with mechanical equipment improperly designed, used or maintained, or which are used, supplied for use or made available for use in any nuclear application of which Seller has not been notified in writing by Buyer at the time of order for the products sold hereunder. SELLER MAKES NO OTHER WARRANTY WHATSOEVER, EXPRESS OR IMPLIED. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND ALL IMPLIED WARRANTIES OF FITNESS FOR ANY PARTICULAR PURPOSE ARE DISCLAIMED BY SELLER AND EXCLUDED FROM THIS CONTRACT.
3. **LIMITATION OF BUYER'S REMEDIES AND SELLER'S LIABILITY.** Seller's liability hereunder shall be limited to the obligation to repair or replace only those products proven to have been defective in material or workmanship at the time of delivery, or allow credit, at its option. Seller's total cumulative liability in any way arising from or pertaining to any product or service sold or required to be sold under this contract shall NOT in any case exceed the purchase price paid by Buyer for such products or services. IN NO EVENT SHALL SELLER HAVE ANY LIABILITY FOR COMMERCIAL LOSS, LOST PROFITS, CLAIMS FOR LABOR, OR CONSEQUENTIAL, SPECIAL, PUNITIVE OR INCIDENTAL DAMAGES OF ANY TYPE, WHETHER BUYER'S CLAIM BE BASED IN CONTRACT, TORT, WARRANTY, STRICT LIABILITY, NEGLIGENCE, OR OTHERWISE. IT IS EXPRESSLY AGREED THAT BUYER'S REMEDIES EXPRESSED IN THIS PARAGRAPH ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES.
4. **LIMITATION OF BUYER'S REMEDIES AND SELLER'S LIABILITY FOR FAILURE OR DELAY IN DELIVERY.** NO DELIVERY DATES ARE GUARANTEED. BUYER'S SOLE AND EXCLUSIVE REMEDIES AND SELLER'S ONLY LIABILITY FOR ANY DELAY IN DELIVERY SHALL BE LIMITED AS SET FORTH IN PARAGRAPH 3 OF THIS CONTRACT.
5. **FORCE MAJEURE.** In any event and in addition to all other limitations stated herein, Seller shall not be liable for any act, omission, result or consequence, including but not limited to any delay in delivery or performance, which is (i) due to any act of God, the performance of any government order, any order bearing priority rating or order placed under any allocation program (mandatory or voluntary) established pursuant to law, local labor shortage, fire, flood or other casualty, governmental regulation or requirement, shortage or failure or raw material, supply, fuel, power or transportation, breakdown of equipment, or any cause beyond Seller's reasonable control whether of similar or dissimilar nature to those above enumerated, or (ii) due to any strike, labor dispute, or difference with workers, regardless of whether or not Seller is capable of settling any such labor problem.
6. **BUYER'S OBLIGATION TO PASS ON LIMITATION OR WARRANTIES AND REMEDIES.** In order to protect Seller against claims by Buyer's buyer, if Buyer resells any of the products purchased under this agreement, Buyer shall include the language contained in paragraphs 2 and 3 of this agreement, dealing with Seller's limitations of warranties and remedies, in an enforceable agreement with Buyer's buyer, or otherwise include language in an enforceable agreement with its buyer that makes Seller's limitation of warranties and remedies binding on its buyer. Buyer shall also include a provision in its agreement with its buyer applying Ohio law to any claims its buyer might assert against Seller with respect to products manufactured by Seller, and requiring its buyer to bring any such action against Seller either in federal district court in Cincinnati, Ohio or the common pleas court for Butler County, Ohio. Buyer shall defend, indemnify and hold Seller harmless from any and all claims, causes of action, damages, losses or expenses (including reasonable attorneys' fees) that Seller incurs by reason of Buyer's failure to comply with this paragraph.
7. **PASSAGE OF TITLE.** Title to the products sold hereunder shall pass upon delivery to the carrier at the point of shipment. Neither Buyer nor the consignee shall have the right to divert or reassign such shipment to any destination other than specified in the bill of lading without permission of the Seller. Unless otherwise agreed Seller reserves the right to select the mode of transportation.
8. **PAYMENTS AND LATE CHARGES ON PAST DUE ACCOUNTS.** Buyer represents that Buyer is solvent and can and will pay for the products sold to Buyer in accordance with the terms hereof. If Buyer shall fail to comply with any provision or to make payments in accordance with the terms of this contract or any other contract between Buyer and Seller, Seller may at its option defer shipments or, without waiving any other rights it may have, terminate this contract. All deliveries shall be subject to the approval of Seller's Credit Department. Seller reserves the right, before making any delivery, to require payment in cash or security for payment, and if Buyer fails to comply with such requirement, Seller may terminate this contract. A late charge of 1-1/2% monthly (18% annual rate) or the maximum allowed by state law, if less, will be imposed on all past due accounts, and Buyer is responsible for all costs of collection including without limitation reasonable attorneys' fees and court costs.
9. **TRANSPORTATION CHARGES.** Delivered prices or prices involving competitive transportation adjustments shall be subject to appropriate adjustment to reflect changes in transportation charges.
10. **CLAIMS BY BUYER.** Buyer shall thoroughly inspect products sold under this contract immediately upon receipt to verify conformance with the specifications of the contract. Buyer must notify Seller of claims for failure or delay in delivery within 30 days after the scheduled delivery date. Buyer must notify Seller of any claims for nonconforming or defective products within 30 days after the nonconformity or defect was or should have been discovered. In addition, Seller must be given an opportunity to investigate the claim before Buyer disposes of the material, or else Buyer's claim will be barred. Seller shall incur no liability for damage, shortages, or other cause alleged to have occurred or existed at or prior to delivery to the carrier unless the Buyer shall have entered full details thereof on its receipt to the carrier.
11. **MECHANICAL PROPERTIES; CHEMICAL ANALYSES.** Data referring to mechanical properties or chemical analysis are the result of tests performed on specimens obtained from specific locations of the product(s) in accordance with prescribed sampling procedures; any warranty thereof is limited to the values obtained at such locations and by such procedures. There is no warranty with respect to values of the materials at other locations.
12. **PATENTS.** Seller shall indemnify Buyer against attorneys' fees and any damages or costs awarded against Buyer in the event any legal proceeding is brought against Buyer by a third person claiming the material delivered hereunder in itself constitutes an infringement of any U.S. patent, provided Buyer gives Seller prompt notice of any such suit being brought, gives Seller the opportunity to defend any such suit, and cooperates with Seller with respect to any such defense; unless the material is made in accordance with material designs, or specifications required by Buyer, in which case Buyer shall similarly indemnify Seller.
13. **PERMISSIBLE VARIATIONS.** The products sold hereunder shall be subject to Seller's standard manufacturing variations, tolerances and classifications.
14. **TECHNICAL ADVICE.** Buyer represents that it has made its own independent determination that the products it is purchasing under this contract meet the design requirements of Buyer's project and are suitable for Buyer's intended application. Buyer further represents that it has not relied in any respect on any written or oral statements or advice from Seller, other than the standard product specifications set forth in the most recent edition of Seller's published product brochures, in making that determination.
15. **TAXES.** No taxes imposed with respect of the sale of the products or services sold hereunder are included in any quotation by Seller. All applicable taxes shall be added and paid by Buyer in addition to the purchase price.
16. **BUYER'S RIGHT OF TERMINATION.** Buyer may terminate this contract in whole or in part upon notice in writing to Seller. Seller shall thereupon cease work and transfer to Buyer title to all completed and partially completed products and to any raw materials or supplies acquired by Seller especially for the purpose of performing this contract, and Buyer shall pay Seller the sum of the following:  
(1) the contract price for all products which have been completed prior to termination;  
(2) the cost to Seller of the material or work in process as shown on the books of Seller in accordance with the accounting practice consistently maintained by Seller plus a reasonable profit thereon, but in no event more than the contract price;  
(3) the cost f.o.b. Seller's plant of materials and supplies acquired especially for the purpose of performing this contract; and  
(4) reasonable cancellation charges, if any, paid by Seller on account of any commitment(s) made hereunder.
17. **SELLER'S RIGHT OF TERMINATION.** In addition to the other rights of termination provided for in this contract, and if this contract is made pursuant to any governmental rule or regulation, plan, order or other directive, upon the directive, effected or impeded, termination thereof, Seller shall have the option of cancelling this contract in whole or in part.
18. **WAIVER.** Failure or inability of either party to enforce any right hereunder shall not waive any right in respect to any other or future rights or occurrences.
19. **DELIVERY.** Unless otherwise agreed to in writing by the Seller, the Buyer hereby agrees to take delivery of the materials on this order within the later of thirty (30) days after the wanted date shown on the face of the order or within thirty (30) days after notification, oral or written, that the materials are ready for shipment. In the event that the Buyer does not arrange to take delivery of the materials in accordance with this Contract, Seller, at Seller's option, may:  
(a) invoice the Buyer for the materials less freight if applicable; store the material in Seller's yard for a period not to exceed sixty (60) days from the date of invoice; charge a storage fee not to exceed 5% per month or fraction thereof of the selling price of the stored materials; add any applicable price increases listed on the face of the order; charge for any repair work to protective coatings harmed by weathering while such material is being stored; and charge applicable freight when shipment to the Buyer is made. Materials remaining in storage after sixty (60) days from the invoice date shall become the property of the Seller for disposition at the Seller's discretion. In that event, Buyer shall be liable for the invoice price of the materials, but shall be liable for the storage fee and any repair work to protective coatings; or  
(b) cancel the order and invoice the Buyer for cancellation charges, which shall be 25% of the selling price of the materials if the materials are standard, in-stock material, or the full selling price if the materials are special or nonstandard in nature and were especially fabricated for the Buyer.
20. **PERIOD OF LIMITATIONS.** Buyer and Seller agree that any action by Buyer against Seller relating to this contract or the products sold hereunder, including, without limitation, any action for breach of contract or warranty, or otherwise in connection with the products sold under this contract, must be commenced by Buyer against Seller within one year after the cause of action therefore accrues or one year of delivery of the products sold hereunder, if less.
21. **CONFLICTING PROVISIONS OFFERED BY BUYER.** Any terms and conditions of any purchase order or other instrument issued by the Buyer, in connection with the subject matter of this document, which are in addition to or inconsistent with the terms and conditions expressed herein, will not be binding on Seller in any matter whatsoever unless accepted by Seller in writing.
22. **SEVERABILITY.** In case any provision of this contract shall be declared invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired.
23. **APPLICABLE LAW.** This contract shall be governed by, and construed and enforced in accordance with, the laws of Ohio. Buyer and Seller specifically agree that any legal action brought relating to this contract shall be brought and tried exclusively in the federal district court in Cincinnati, Ohio, or, in the absence of jurisdiction, the Butler County Court of Common Pleas in Hamilton, Ohio.

REV. 03/15

## APPENDIX D



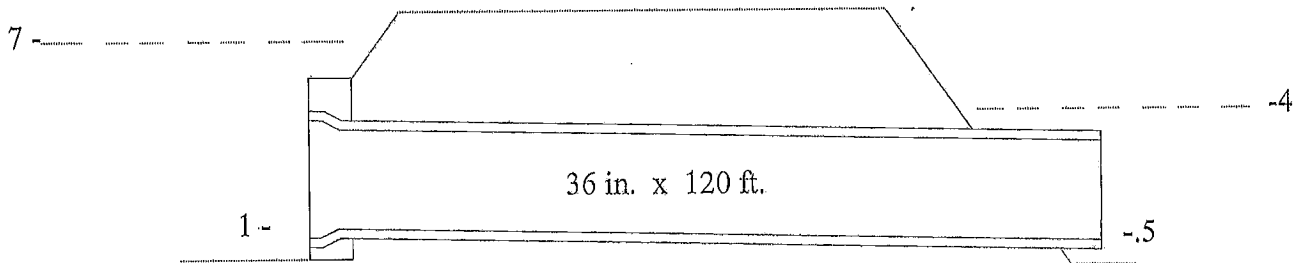
## Culvert Evaluation

Participant: Biscayne Pointe sub  
Location: HWY 98  
County: County, FL  
Designer: clj  
Date: 11/10/2014

Checker: \_\_\_\_\_  
Date: \_\_\_\_\_

Hydraulics Formula, Version 2.2.1

west 36 inch  
US 98



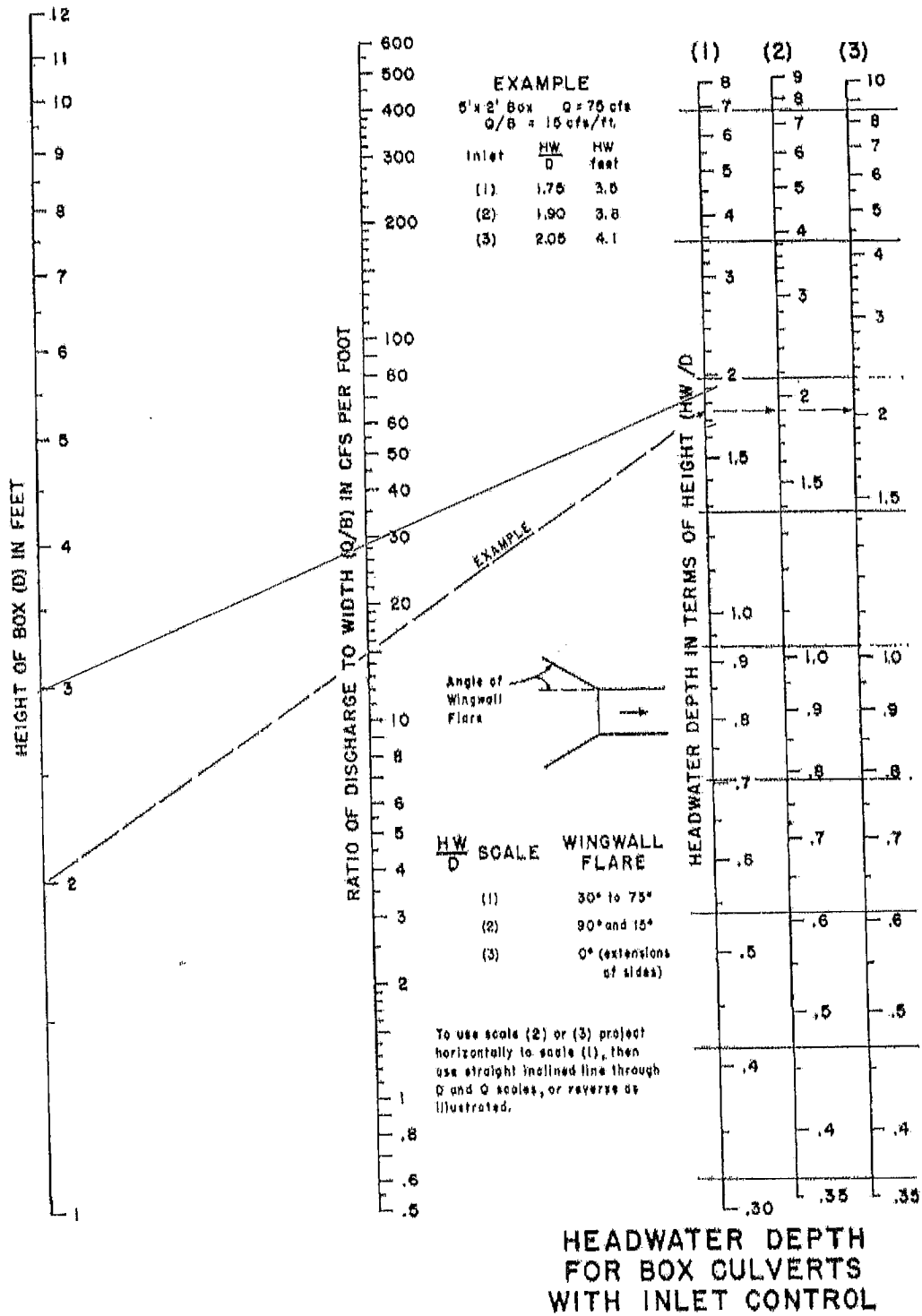
'n' value: .015  
Length: 120 ft.  
Diameter: 36 in.  
Headwall - groove edge ;  $K_e = .19$

Capacity = 64.1 cfs

Outlet Controls Flow

Elevation of Headwater: 7  
Elevation of Inlet: 1  
Elevation of Tailwater: 4  
Elevation of Outlet: .5

# CHART 8B



BUREAU OF PUBLIC ROADS JAN. 1963

$Q = 28.8 \times 10 = 288$  CFS  
 BOX CULVERT UNDER US 98

## Culvert Evaluation

Participant: Biscayne Pointe Sub

Location: Biscayne Blvd

County: County, FL

Designer: clj

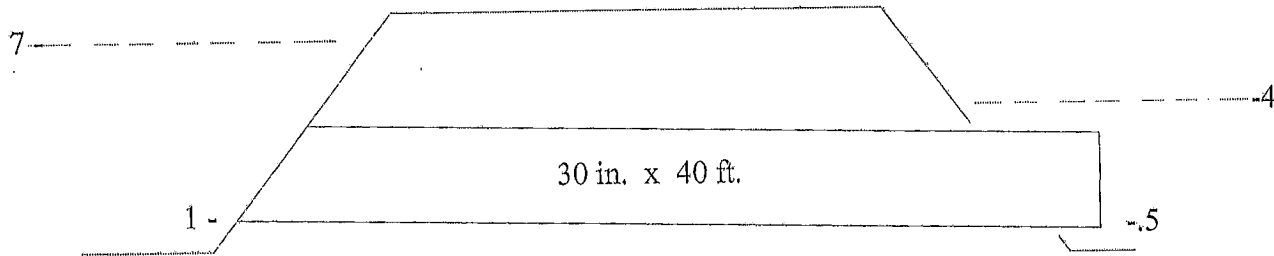
Date: 11/10/2014

Checker: \_\_\_\_\_

Date: \_\_\_\_\_

Hydraulics Formula, Version 2.2.1

entrance road



'n' value: .015

Length: 40 ft.

Diameter: 30 in.

Miter / square / 2:1 slope ;  $K_e = .62$

Capacity = 46.6 cfs

Inlet Controls Flow

Elevation of Headwater: 7

Elevation of Inlet: 1

Elevation of Tailwater: 4

Elevation of Outlet: .5

## Pipe Flow Formula Solution

Participant: Biscayne Pointe

Location: Pond 3 Outlet

County: County, FL

Designer: clj

Date: 08/10/2015

Checker: \_\_\_\_\_

Date: \_\_\_\_\_

Hydraulics Formula, Version 2.2.1

Pond to Sound

Mannings Coefficient (n): .015

Entrance Coefficient (Ke): 0.65

Diameter of Pipe: 12 in.

Head on Pipe: 4 ft.

Length of Pipe: 625 ft.

Pipe Capacity: 2.4 cfs

Pipe Velocity: 3.0 ft/sec

Friction Coefficient (Kp): 0.0417

Max allocable fall in pipe when  
outlet is not submerged: 3.8 ft.

## Pipe Flow Formula Solution

Participant: Biscayne Pointe  
Location: Pond 3 Outlet  
County: County, FL  
Designer: clj  
Date: 08/10/2015

Checker: \_\_\_\_\_  
Date: \_\_\_\_\_

Hydraulics Formula, Version 2.2.1

### Pond to Sound

Mannings Coefficient (n): .015  
Entrance Coefficient (Ke): 0.65  
Diameter of Pipe: 36 in.  
Head on Pipe: 4 ft.  
Length of Pipe: 700 ft.

Pipe Capacity: 39.2 cfs  
Pipe Velocity: 5.5 ft/sec

Friction Coefficient (Kp): 0.0096  
Max allocable fall in pipe when  
outlet is not submerged: 3.2 ft.