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RILEY MOUNTAIN ENGINEERING, LLC

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P. O. Box 610

Llano, Texas 78643

June 20, 2018

Mr. Herb Darling
Burnet County Flood Plain Administrator
220 S. Pierce Street
Burnet, TX 78611

also by email: inspect@burnetcountytexas.org

RE: Isle on Inks Lake Development

Dear Mr. Darling:

I have reviewed the memorandum from Mr. Charles Kaough, PE, the subsequent memorandum from Mr. Brad Shaw, PE, and the site plan from Mr. Shaw (these items are attached for reference).

Based on the project description provided in the documents referenced above, the design engineers offer the following description of the proposed project:

The proposed development will lie within the floodway of Inks Lake. Within the floodway area, the project will include earthwork excavation sufficient to fully mitigate any potential loss of flood storage.

HEC-RAS model studies show that the cumulative effect of the proposed structures and excavation will result in no increase in water surface elevations (no rise) within the studied area. The model studies performed include the following steps:

- 1. The current effective model for the study area was used as a base model.*
- 2. Corrections/additions were made to the base model to more accurately reflect current topography to create an existing conditions model.*
- 3. A copy of the existing conditions model was made to create a proposed conditions model, which was then updated to include geometry reflecting the proposed development and structures.*
- 4. A comparison of results between the existing conditions model and the proposed conditions model shows no water surface increase because of the proposed development, which includes excavation to elevation 892 feet.*

After reviewing the documentation referenced above, along with the HEC-RAS model provided, I concur with the conclusions reached by Mr. Kaough and Mr. Shaw, which are:

The proposed improvements, including excavation to elevation 892 feet, will create no increase in water surface elevations. This condition meets the basic requirement in Section E.1 of the current Burnet County Flood Damage Prevention Order.

As shown on the site plan by Mr. Shaw, the lowest floor of the proposed building will be at least one foot above the Base Flood Elevation, which satisfies the requirement in Section B.1 of the current Burnet County Flood Damage Prevention Order.

Other permit requirements may remain outstanding, which should be addressed separately. Final detailed design of the project will be the responsibility of the design engineers, and final construction drawings should clearly confirm the improvements reflected in the model study and also should adequately address the following issues:

1. Elevation data (an elevation certificate should be obtained),
2. Include structural components sufficient to resist collapse or overturning due to flow velocities, including the effects of accumulated debris, and,
3. Provide for anchorage sufficient to resist buoyancy and/or flotation.



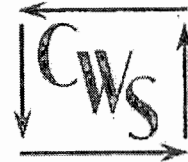
Cordially,

Riley Mountain Engineering, LLC
Firm Registration F-16223

A handwritten signature in black ink, appearing to read "John G. Fowler".

John G. Fowler, PE, CFM
Pres./CEO, Riley Mountain Engineering, LLC

Attachments: 8 additional pages as noted



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CHARLES KAOUGH, P.E.

3702 HOLT DR

AUSTIN, TX 78749,

PHONE 512-658-0858

MEMORANDUM

DATE: March 5, 2018

TO: Brad Shaw

Subject: Floodplain modeling for The Isle on Inks Lake Development



3/5/18

Background:

The Isle on Inks Lake is a proposed small development on the shore of Inks Lake, approximately 4,800 feet downstream of Buchanan Dam. This study estimates the hydraulic impact of the development on the floodplain as defined by FEMA and a recent (August 2017) flood analysis study by Freese and Nichols, Inc. for the LCRA. The study includes the base flood (100 Year event) and a Floodway study, done with the U.S. Army Corps of Engineers Hydrologic Engineering Center River Analysis System software (HEC-RAS). Version 5.0.3 was used for this study.

The effective model was modified to include conditions before and after the proposed development of the Isle on Inks Lake development is constructed. The results of this modified model are included in this report.

The Freese and Nichols model provides a new floodway boundary for Inks Lake, with the base flood elevations unchanged. The new floodway map (Figure 1 below) from the study shows the proposed development site within the floodway boundary. Floodway encroachments were included in the modified HEC-RAS model to assess the floodway mapping at the development.

The Freese model also included the Digital Terrain Model (DTM) for the reach which was used to modify the model for this study.

Description of Model Modification:

A copy of the Freese and Nichols HEC-RAS model was provided by the client. A new cross section was inserted into the model that passes through the tract of the new proposed development. Existing conditions for the new cross section were taken from the DTM in the HEC-RAS model, which is shown in Figure 2 with the cross section locations.

Figure 1: Floodway Map and Proposed Development Location

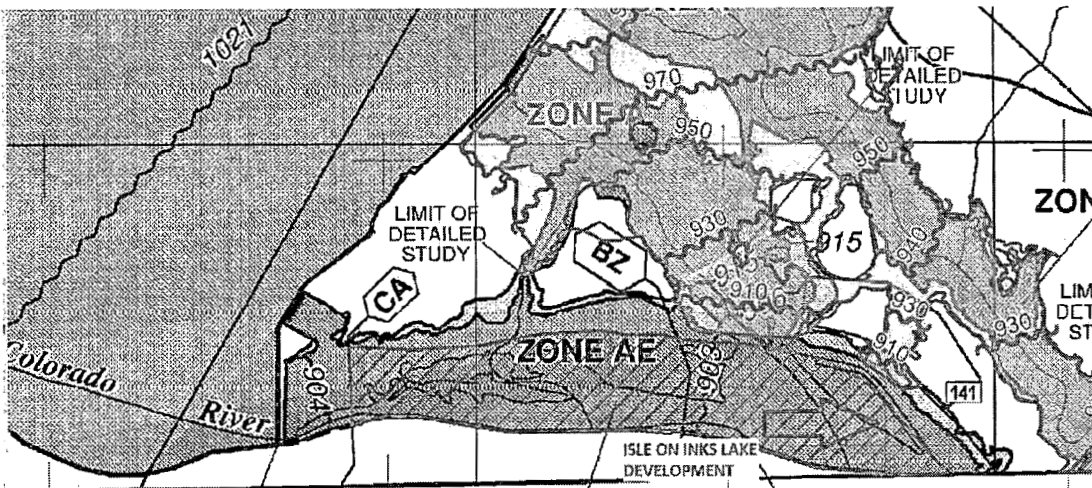
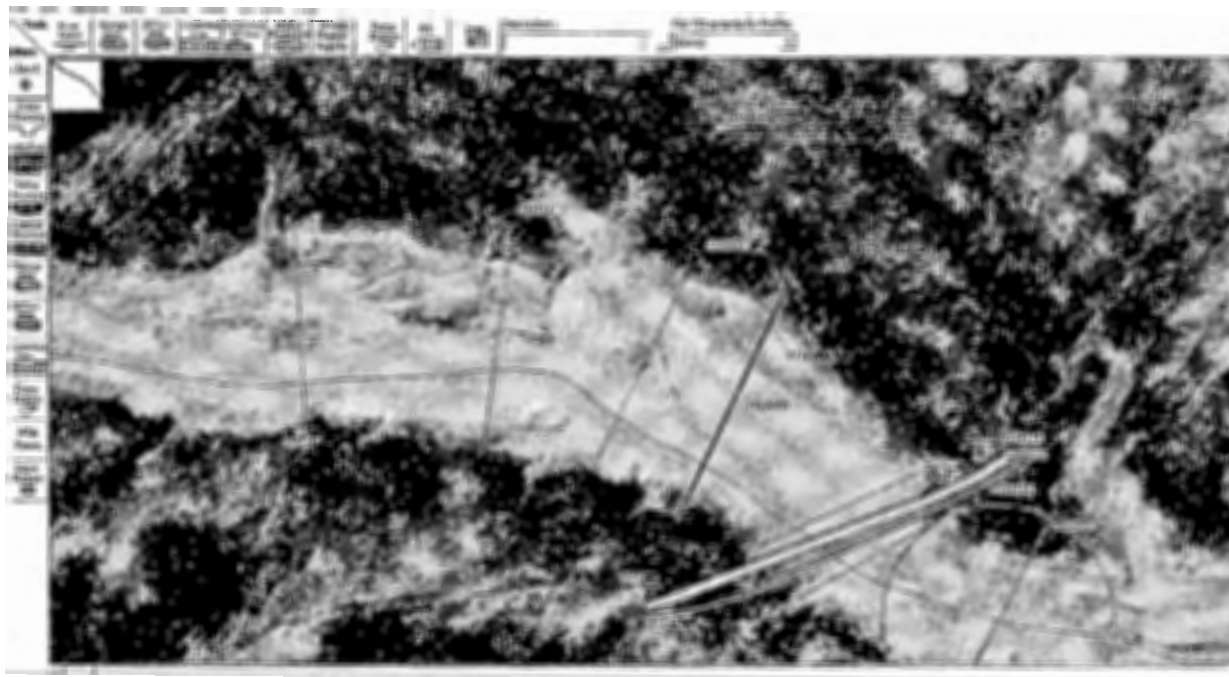
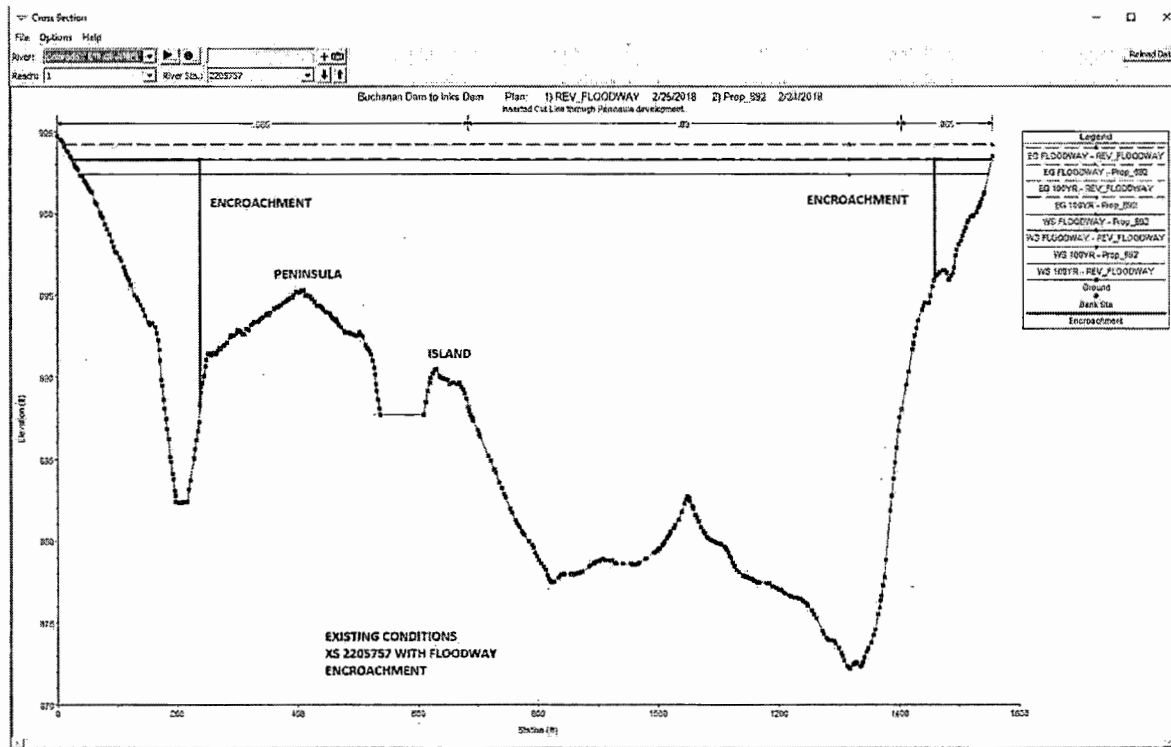


Figure 2: Digital Terrain Map and New Cross Section Location



The new cross section, 2205757, is shown in Figure 3. The proposed developed is located in the area labeled "Peninsula" in Figure 2 along with a small "Island" located adjacent 80 feet away.

Figure 3: New Cross Section Existing Conditions



Floodway encroachments were inserted into the new cross section based on the floodway locations shown on the new Freese and Nichols floodway map. Also, the upstream and downstream encroachments were taken into consideration to keep consistent with the existing model.

The **Proposed Conditions** cross section includes:

- New proposed grading for the peninsula;
- A 20-foot wide storage facility;
- Piers for the foundation on new structures;
- A small pier connecting the Peninsula and the island; and
- A small retaining wall and grading of the island to an elevation of 889.2.

The proposed conditions cross section is in Figure 4 below (graded to an average elevation of 892') and zoomed into the part that was modified to represent the proposed development.

Figure 5 shows the proposed condition cross section graded to an average elevation of 894'.

Figure 4: Modified Cross Section Showing Proposed Development at Avg. Elev. of 892'

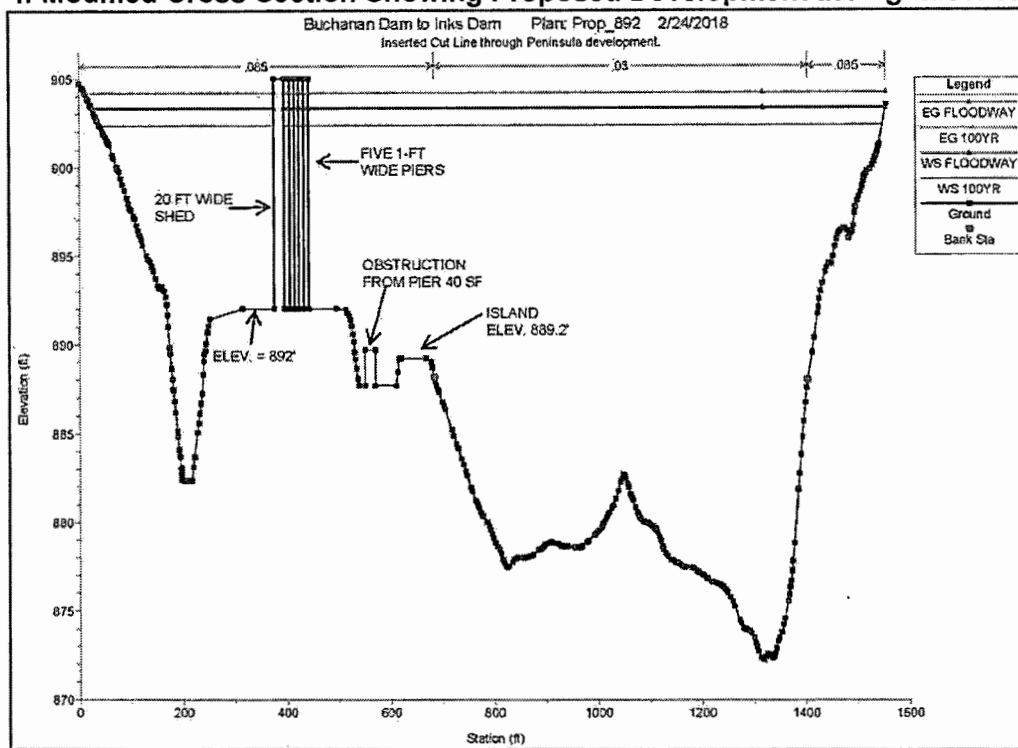
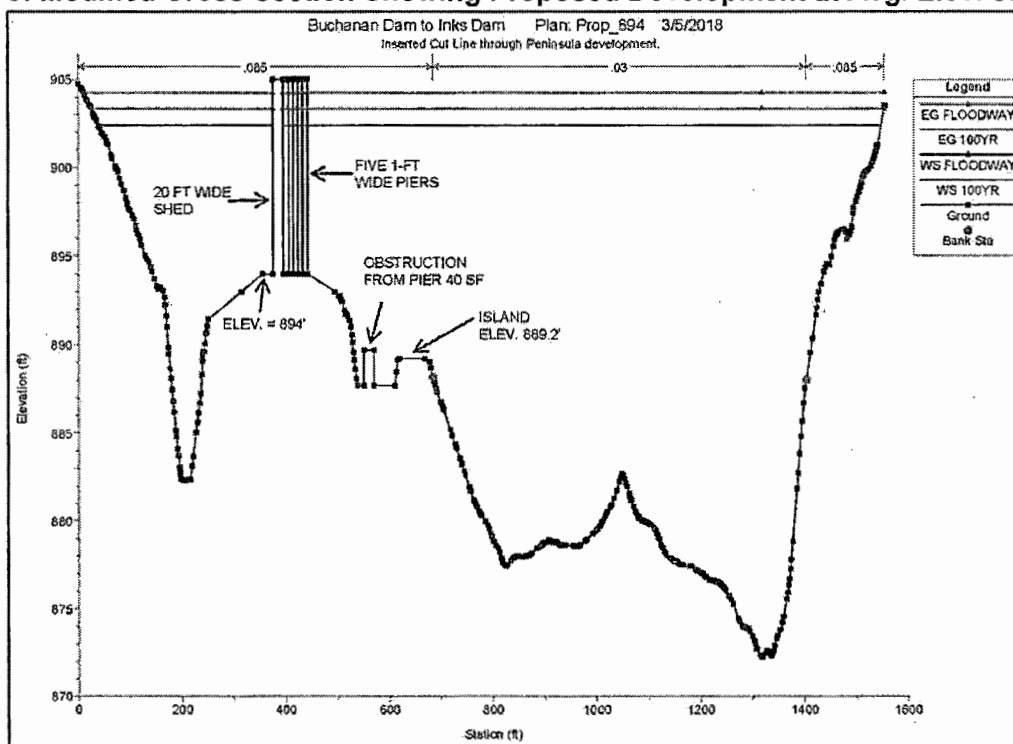


Figure 5: Modified Cross Section Showing Proposed Development at Avg. Elev. of 894'



RESULTS

Tables 1 and 2 below summarize the results of the floodplain modeling for the 100 Year event. The tables includes the Effective model elevations, the Revised Existing elevation (with section 2205757 inserted) and Proposed conditions.

Two conditions were modeled with different grading elevations of the peninsula 892' (Table 1) and 894' (Table 2).

Table 1: Summary of Impacts with Average Grading of 892'

Isle on Inks Lake				
100 YR Water Surface Elevations				
Cross Section	Existing	Revised Existing	Proposed	Impact*
	(ft)	(ft)	(ft)	(ft)
2210575	903.73	903.90	903.90	0.00
2208646	903.57	903.76	903.76	0.00
2207347	903.08	903.28	903.28	0.00
2206407	902.63	902.85	902.85	0.00
2205757	N/A	902.39	902.39	0.00
2204974	902.59	902.59	902.59	0.00
2204859	902.59	902.59	902.59	0.00
*Impact is Proposed minus Revised Existing				

Table 2: Summary of Impacts with Average Grading of 894'

Isle on Inks Lake				
100 YR Water Surface Elevations				
Cross Section	Existing	Revised Existing	Proposed	Impact*
	(ft)	(ft)	(ft)	(ft)
2210575	903.73	903.90	903.91	0.01
2208646	903.57	903.76	903.76	0.00
2207347	903.08	903.28	903.29	0.01
2206407	902.63	902.85	902.86	0.01
2205757	N/A	902.39	902.39	0.00
2204974	902.59	902.59	902.59	0.00
2204859	902.59	902.59	902.59	0.00
*Impact is Proposed minus Revised Existing				

Figure 6 below shows that the difference between the modeled 100-Year water surface elevation (WSE) and the floodway WSE at the new cross section (2205757) is approximately 1 foot. This demonstrates that the floodway encroachment results were consistent with the Freese and Nichols model.

Figure 6: HEC-RAS Floodway Output with Inserted Cross Section 2205757

HEC-RAS Plan: REV FLOODWAY River: Colorado Reach: 1												
Reach	River Sta.	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	2210575: Buchanan Dam	100YR	52000.00	882.00	903.90	898.84	906.09	0.001879	13.57	13471.08	911.66	0.53
1	2210575: Buchanan Dam	FLOODWAY	52000.00	882.00	904.73	898.79	906.77	0.001617	12.93	13708.86	820.00	0.50
1	2208646	100YR	52000.00	875.99	903.76	891.54	904.39	0.000315	7.24	26366.27	1413.23	0.26
1	2208646	FLOODWAY	52000.00	875.99	904.51	891.59	905.19	0.000312	7.36	25179.18	1210.00	0.26
1	2207347	100YR	52000.00	876.00	903.28	890.80	903.98	0.000303	7.31	26774.89	1593.25	0.26
1	2207347	FLOODWAY	52000.00	876.00	904.15	890.80	904.80	0.000270	7.06	26500.89	1300.00	0.25
1	2206407	100YR	52000.00	874.08	902.85		903.64	0.000379	7.87	29890.10	1649.81	0.29
1	2206407	FLOODWAY	52000.00	874.08	903.77		904.51	0.000335	7.58	29644.43	1410.00	0.27
1	2205757	100YR	52000.00	872.24	902.39		903.36	0.000410	8.23	24557.21	1510.66	0.30
1	2205757	FLOODWAY	52000.00	872.34	903.30		904.25	0.000374	8.06	23464.09	1222.00	0.29
1	2204974	100YR	52000.00	872.13	902.59		903.02	0.000147	5.30	30961.42	1468.06	0.18
1	2204974	FLOODWAY	52000.00	872.13	903.51		903.92	0.000135	5.19	29391.75	1085.00	0.18
1	2204859	100YR	52000.00	870.50	902.59	882.97	902.99	0.000127	5.10	31623.54	1422.21	0.17
1	2204859	FLOODWAY	52000.00	870.50	903.51	882.97	903.89	0.000116	4.99	30688.76	1080.00	0.16
1	2204800 SH 29 - New	Bridge										
1	2204742	100YR	52000.00	870.50	902.54		902.94	0.000127	5.10	31590.96	1347.37	0.17
1	2204742	FLOODWAY	52000.00	870.50	903.47		903.85	0.000119	4.99	30506.03	1070.00	0.16
1	2204694	100YR	52000.00	871.00	902.27	884.64	902.87	0.000200	6.31	26756.57	1307.57	0.21
1	2204694	FLOODWAY	52000.00	871.00	903.21	884.64	903.79	0.000182	6.15	25957.46	1010.00	0.20
1	2204652 SH 29 - Existing	Bridge										
1	2204648	100YR	52000.00	871.00	902.22		902.83	0.000202	6.33	26674.90	1306.77	0.21
1	2204648	FLOODWAY	52000.00	871.00	903.16		903.74	0.000184	6.17	25772.44	1000.00	0.21
1	2204505	100YR	52000.00	866.00	902.28		902.72	0.000135	5.37	29841.46	1231.55	0.18
1	2204505	FLOODWAY	52000.00	866.00	903.21		903.64	0.000123	5.25	29058.16	985.00	0.17
1	2203450	100YR	52000.00	867.28	902.02		902.54	0.000177	5.81	27123.34	1137.62	0.20

HIGHLAND LAKES ENGINEERING

BOX 1164
KINGSLAND, TEXAS 78639
Tel. : (830) 637-9584
TX REG. # F-9209

TO: Herb Darling

From: Brad Shaw

Subject: Isle on Inks Lake Floodway Review

Please see the attachment indicating modifications to the removal of soil at the proposed house site to the 892' elevation in order to project a "NO RISE" condition to the proposed FLOODWAY. The excavated material will be hauled off the site to a location outside the floodplain.

A letter of reply to the County Engineer's concerns from the Study Engineer that provided the HEC RAZ study is attached. It should be noted that originally, your office indicated that a less than 1' rise should be verified and now it seems a "NO RISE" is being required. We will forward the additions to the study when we receive them from the Study Engineer

I have also attached a new site plan proposal for the peninsula that will contain only one condo and up to 6 rv sites. Removal of soil to the 892' elevation to counter the effects of the house and dock is shown.

Please let me know if there is additional information needed. It should be noted that the primary study that established the proposed FLOODWAY (Freese-Nichols through LCRA) was used in determining the model projection through the proposed 1st house site. The determination of excavating (removing) soil to a 892' elevation was to offset the barriers created with the dock (bridge) and the house column supports.



