Hansen and Associates, Inc.
Consulting Engineers & Land Surveyors

February 25, 2013

Weber County Engineering
2380 Washington Blvd., Suite 240
Ogden, Utah 84401

Attn: Mike Tuttle

Re: The Sanctuary Weber County Engineering Review Comments

Dear Mike:

We received your response dated February 19th that addressed Matt's email to you regarding the final approval of the improvements at The Sanctuary. I am not sure why we are having such a difficult time getting through some of these issues. Your responses seem to suggest that the developer, Tim Charlwood, the contractors and/or HAI are taking short cuts with respect to the construction of this project when in fact, it is just the opposite. Tim has invested a considerable amount of money to develop this six lot subdivision. Tim has built a roadway through some very difficult and challenging terrain. Jared Anderson, Weber County Engineer stated previously that he appreciated the work Tim has done on the project and that he believes that it could be a benchmark for other projects to follow in mountainous regions. That is the key issue here, roads being built through a mountainous region which have created very difficult and challenging situations. The process has been a tedious one at best. Tim has gone through two different excavation contractors to assure that the project is built per plans and specifications and Weber County's requirements. In a perfect world, it may be possible to exactly build a roadway to fit that of design. That which goes on paper does not always work on the ground. What is on paper is not always the best solution to a problem encountered during construction. It is our experience and expertise along with that of the contractors like Geneva Construction and Post Paving that we rely on to assist in engineering solutions therefore allowing one to build the best possible roadway.

Each new issue that you have brought up has been addressed and answered accordingly. One important item to remember with this development is that the main road accessing the property is to be a private road. With respect to this private road, Weber County allowed Tim to change the surface course width of the roadway from the required 24 feet wide to 20 feet wide to match that of the Green Hills Subdivision. So from the beginning, this roadway has not exactly matched Weber County's Standard Rural Roadway Section.

In response to your last email:

Retaining wall and road shift:

You state that you do not "believe the county standard was met". I assume you are referring to the roadway section built along the retaining wall. The county's rural road standard for minor and/or private roadways does not address a situation requiring a retaining wall on the up hill slope. There is very limited real estate for the roadway to be built through this section. The shoulders are four feet wide. This section narrows up at the beginning of the first wall and at the end of the second wall. At its narrowest point, the distance from the edge of paving to the wall is 7 feet at each end. The four foot wide 4:1 slope to the swale has been built per the county standard for over 90% of this section along the wall. This wall section accounts for 10% of the overall length of roadway. That accounts for 1% of the overall length of the private road. The fill material required at the base of the wall has narrowed a small portion of this section. From engineering prospective, does this narrowed section really create a roadway hazard? Common sense and engineering experience tells us, absolutely not. AASHTO criteria for lateral clearance states

that "the minimum lateral clearance from the edge of the traveled way to the face of the protective barrier should be the normal shoulder width". In this case, that would be 4 feet.

Pipe Size:

The pipe that was removed from our plans at the entrance to the subdivision, "just past the Green Hills Subdivision cul-de-sac". - We honestly do not know how or when that pipe ended up on our plans. We are of the opinion that a previous engineer here at HAI made a gut decision with respect to installing the new 30" rather than taking the proper engineering approach. Matt's calculations of the drainage to the north of this proposed pipe show that the existing 15" exceeds the capacity required to meet the storm runoff criteria. Therefore the 30" pipe was removed from our plans. (See attached exhibit and calculations).

On the 36" pipe, Matt, in his response to you stated that the slope of the 36" pipe was 5.86% and has a modeled capacity of 161 CFS where a peak flow of 50 CFS is required. (Attached find Matt's sketch of the pipe and the calculation printout).

The pipe that was added to is the existing 6" diameter land drain shown on page 3 of 10. This pipe was installed many years ago by a previous owner. Geneva felt it necessary to extend this existing 6" diameter land drain pipe a few additional feet to get it in a better alignment with the constructed borrow.

Check Dams:

Again, Geneva Rock was employed to build the check dams per plan and specification. They have stated that they did just that. Beyond that, a bond is to be posted by the developer which is a guarantee to cover items that have not been constructed per specification or that might possibly fail during the guarantee period. We can only trust that a company with the reputation that Geneva Rock has, have done all of that which they were hired to do with the care and expertise that has granted them such a reputation. We find no reason to doubt their word. Along with that, Tim has provided multiple pictures that have been submitted that document the check dam construction.

I actually take offense to your last statement which was: "Would HAI provide a notarized letter stating that they have inspected the improvements, and that they were done per plan? Also could it state that they would take responsibility for anything that ended up not being constructed correctly?"

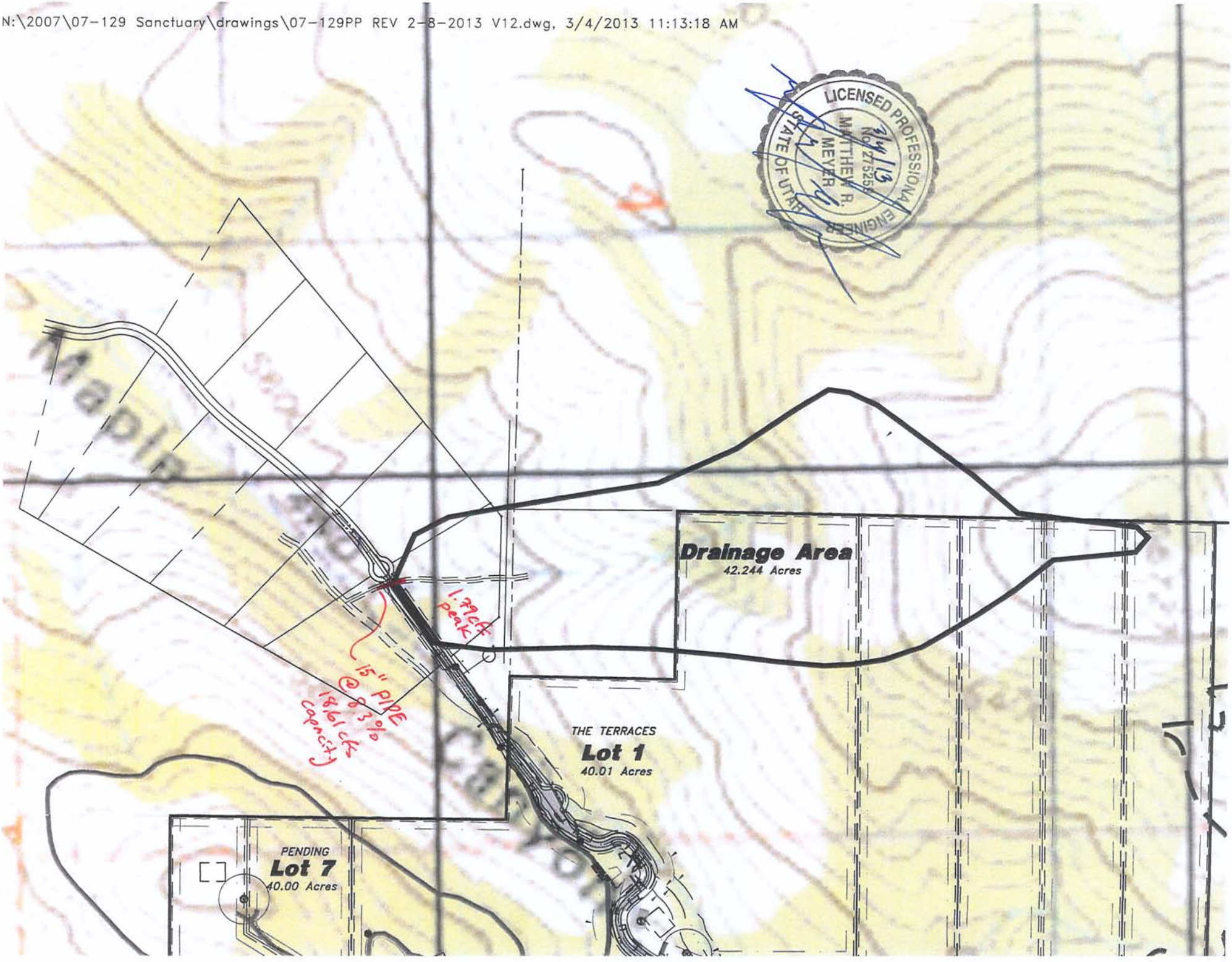
Surely you are not serious. You challenge our integrity as do you that of the developer, Geneva Rock and Post Construction. Is this a new requirement of the county? Has Weber County ever required such from any engineer on any project in the past? And finally, what exactly then is the purpose of the guarantee required of the developer by the county? It appears to me that you are suggesting that we have not taken a professional approach or that we are not being truthful and that we are attempting to slip something past the county.

It is time to bring these issues to a resolution and I think the only possible way is to have another sit down meeting with you, Jared, Ernest, Sean, Tim and HAI. If you will work out the arrangement for this meeting with Tim and the other county officials, we will adjust our schedules accordingly to attend this meeting.

Respectfully;
Hansen and Associates, Inc.

K. Greg Hansen, Pres, P.L.S.
Job No. 007-129
Cc/ Tim Charlwood - Developer
Jared Anderson - Weber County Engineer
Sean Wilkinson – Weber County Planner
Ernest Rowley – Weber County Surveyor/Recorder

N:\2007\07-129 Sanctuary\drawings\07-129PP REV 2-8-2013 V12.dwg, 3/4/2013 11:13:18 AM



Worksheet
Worksheet for Circular Channel

Project Description	
Worksheet	culv 1
Flow Element	Circular Channe
Method	Manning's Form
Solve For	Full Flow Capac

Input Data		
Mannings Coeffic	0.013	
Slope	083000	ft/ft
Diameter	15	in

Results		
Depth	1.25	ft
Discharge	18.61	cfs
Flow Area	1.2	ft²
Wetted Perime	3.93	ft
Top Width	0.00	ft
Critical Depth	1.24	ft
Percent Full	100.0	%
Critical Slope	078325	ft/ft
Velocity	15.16	ft/s
Velocity Head	3.57	ft
Specific Energ	4.82	ft
Froude Numbe	0.00	
Maximum Disc	20.02	cfs
Discharge Full	18.61	cfs
Slope Full	083000	ft/ft
Flow Type	N/A	

Hansen & Associates Inc
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

MASTER DESIGN STORM SUMMARY

Network Storm Collection: 07-129

Return Event	Total Depth in	Rainfall Type	RNF ID
10h6	1.8700	Synthetic Curve	0-10 1stQ 50%

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
DETENT 3		AREA	10	20665		2.7000	1.79		
*OUT 10		JCT	10	20665		2.7000	1.79		
POND 80	IN	POND	10	20665		2.7000	1.79		
POND 80	OUT	POND	10	20665		2.7000	1.79		

File.... N:\2007\07-129 Sanctuary\Hydrology\
Title... Project Date: 9/28/2010
Project Engineer: MJB
Project Title: 07-129 Sanctuary
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = 07-129

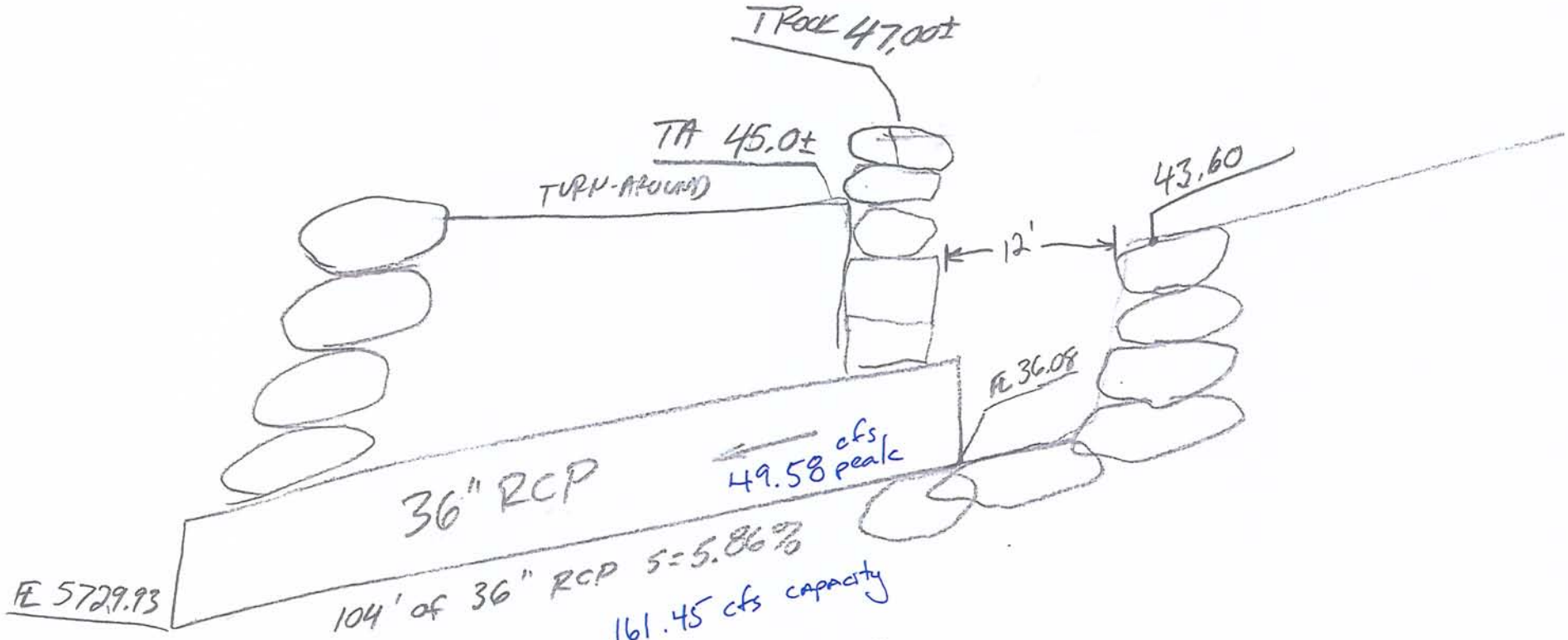
Storm Tag Name = 10h6

Data Type, File, ID = Synthetic Storm 0-10 1stQ 50%
Storm Frequency = 10 yr
Total Rainfall Depth= 1.8700 in
Duration Multiplier = 6
Resulting Duration = 6.0000 hrs
Resulting Start Time= .0000 hrs Step= .3000 hrs End= 6.0000 hrs

File.... N:\2007\07-129 Sanctuary\Hydrology\STUDY 15 IN OUTLET.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
North DB at Entrance	67	42.240			67.00
COMPOSITE AREA & WEIGHTED CN --->		42.240			67.00 (67)



LICENSED PROFESSIONAL ENGINEER
No. 275259
MATTHEW R. MEYER
STATE OF UTAH
9/11/13

Nick Hurst
Indoor Air Flows

Worksheet
Worksheet for Circular Channel

Project Description	
Worksheet	Circular Channel
Flow Element	Circular Channel
Method	Manning's Formu
Solve For	Full Flow Capacit

Input Data		
Mannings Coeffic	0.013	
Slope	058600	ft/ft
Diameter	36	in

Results		
Depth	3.00	ft
Discharge	161.45	cfs
Flow Area	7.1	ft²
Wetted Perime	9.42	ft
Top Width	0.00	ft
Critical Depth	2.98	ft
Percent Full	100.0	%
Critical Slope	055128	ft/ft
Velocity	22.84	ft/s
Velocity Head	8.11	ft
Specific Energ	11.11	ft
Froude Numbe	0.00	
Maximum Disc	173.67	cfs
Discharge Full	161.45	cfs
Slope Full	058600	ft/ft
Flow Type	N/A	

peak discharge = 49.34 cfs (see included sections of stormwater calcs)

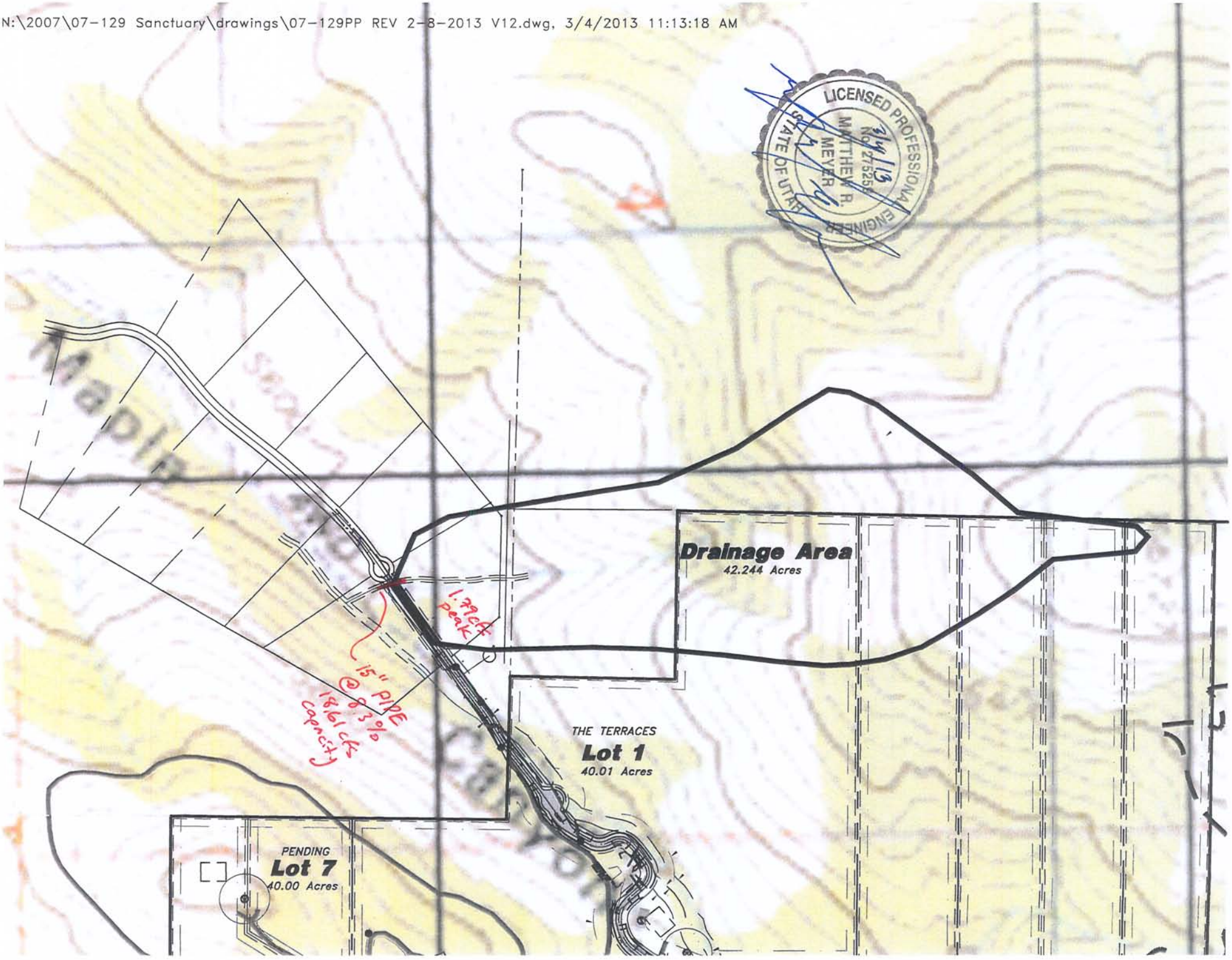
Hansen & Associates Inc
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
ON 12	AREA	10	.479		2.7150	1.80		
ON 13	AREA	10	.099		2.6850	.37		
ON 2	AREA	10	.260		2.7000	.98		
ON 3	AREA	10	.215		5.9850	.93		
ON 4	AREA	10	.482		2.7300	1.78		
ON 5	AREA	10	.402		2.7000	1.44		
ON 6	AREA	10	.115		2.7000	.44		
ON 7	AREA	10	.260		2.7000	.99		
ON 8	AREA	10	.082		2.7000	.31		
ON 9	AREA	10	.763		1.5150	2.90		
*OUT 10	JCT	10	14.490		2.7150	49.34		
*OUT 20	JCT	10	1.394		2.7000	5.03		
*OUT 30	JCT	10	.933		1.5150	3.55		
*OUT 40	JCT	10	.041		2.6700	.15		
POND 10 IN	POND	10	.622		2.7150	2.29		
POND 10 OUT	POND	10	.622		2.7150	2.29		
POND 20 IN	POND	10	1.337		2.7000	4.76		
POND 20 OUT	POND	10	1.337		2.7000	4.76		

N:\2007\07-129 Sanctuary\drawings\07-129PP REV 2-8-2013 V12.dwg, 3/4/2013 11:13:18 AM



Worksheet
Worksheet for Circular Channel

Project Description	
Worksheet	culv 1
Flow Element	Circular Channe
Method	Manning's Form
Solve For	Full Flow Capac

Input Data		
Mannings Coeffic	0.013	
Slope	083000	ft/ft
Diameter	15	in

Results		
Depth	1.25	ft
Discharge	18.61	cfs
Flow Area	1.2	ft²
Wetted Perime	3.93	ft
Top Width	0.00	ft
Critical Depth	1.24	ft
Percent Full	100.0	%
Critical Slope	078325	ft/ft
Velocity	15.16	ft/s
Velocity Head	3.57	ft
Specific Energ	4.82	ft
Froude Numbe	0.00	
Maximum Disc	20.02	cfs
Discharge Full	18.61	cfs
Slope Full	083000	ft/ft
Flow Type	N/A	

Hansen & Associates Inc
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

MASTER DESIGN STORM SUMMARY

Network Storm Collection: 07-129

Return Event	Total Depth in	Rainfall Type	RNF ID
10h6	1.8700	Synthetic Curve	0-10 1stQ 50%

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
DETENT 3		AREA	10	20665		2.7000	1.79		
*OUT 10		JCT	10	20665		2.7000	1.79		
POND 80	IN	POND	10	20665		2.7000	1.79		
POND 80	OUT	POND	10	20665		2.7000	1.79		

File.... N:\2007\07-129 Sanctuary\Hydrology\
Title... Project Date: 9/28/2010
Project Engineer: MJB
Project Title: 07-129 Sanctuary
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = 07-129

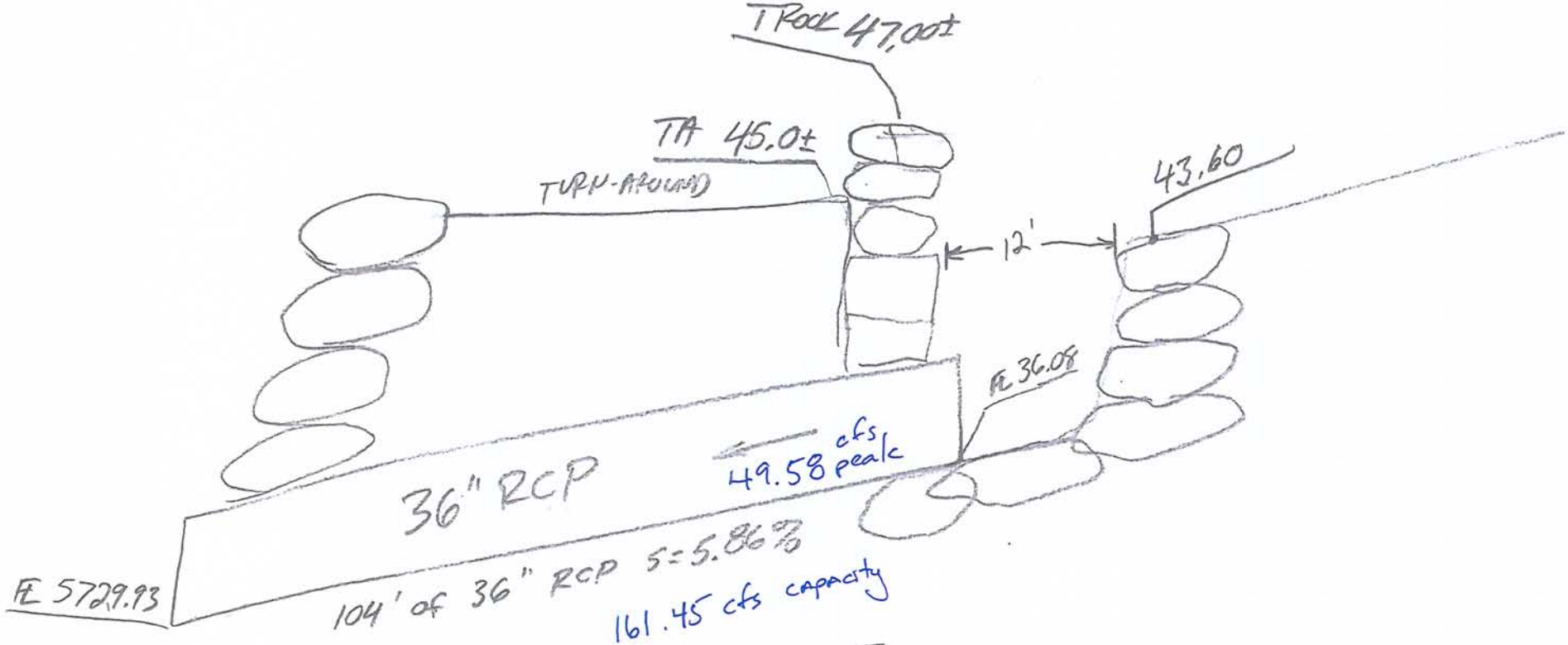
Storm Tag Name = 10h6

Data Type, File, ID = Synthetic Storm 0-10 1stQ 50%
Storm Frequency = 10 yr
Total Rainfall Depth= 1.8700 in
Duration Multiplier = 6
Resulting Duration = 6.0000 hrs
Resulting Start Time= .0000 hrs Step= .3000 hrs End= 6.0000 hrs

File.... N:\2007\07-129 Sanctuary\Hydrology\STUDY 15 IN OUTLET.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
North DB at Entrance	67	42.240			67.00
COMPOSITE AREA & WEIGHTED CN --->		42.240			67.00 (67)



LICENSED PROFESSIONAL ENGINEER
No. 275259
MATTHEW R. MEYER
STATE OF UTAH
4/1/13

Nick Hurst
Indoor Air Flows

Worksheet
Worksheet for Circular Channel

Project Description	
Worksheet	Circular Channel
Flow Element	Circular Channel
Method	Manning's Formu
Solve For	Full Flow Capacit

Input Data		
Mannings Coeffic	0.013	
Slope	058600	ft/ft
Diameter	36	in

Results		
Depth	3.00	ft
Discharge	161.45	cfs
Flow Area	7.1	ft²
Wetted Perime	9.42	ft
Top Width	0.00	ft
Critical Depth	2.98	ft
Percent Full	100.0	%
Critical Slope	055128	ft/ft
Velocity	22.84	ft/s
Velocity Head	8.11	ft
Specific Energ	11.11	ft
Froude Numbe	0.00	
Maximum Disc	173.67	cfs
Discharge Full	161.45	cfs
Slope Full	058600	ft/ft
Flow Type	N/A	

peak discharge = 49.34 cfs (see included section of stormwater calcs)

Hansen & Associates Inc
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
ON 12	AREA	10	.479		2.7150	1.80		
ON 13	AREA	10	.099		2.6850	.37		
ON 2	AREA	10	.260		2.7000	.98		
ON 3	AREA	10	.215		5.9850	.93		
ON 4	AREA	10	.482		2.7300	1.78		
ON 5	AREA	10	.402		2.7000	1.44		
ON 6	AREA	10	.115		2.7000	.44		
ON 7	AREA	10	.260		2.7000	.99		
ON 8	AREA	10	.082		2.7000	.31		
ON 9	AREA	10	.763		1.5150	2.90		
*OUT 10	JCT	10	14.490		2.7150	49.34		
*OUT 20	JCT	10	1.394		2.7000	5.03		
*OUT 30	JCT	10	.933		1.5150	3.55		
*OUT 40	JCT	10	.041		2.6700	.15		
POND 10 IN	POND	10	.622		2.7150	2.29		
POND 10 OUT	POND	10	.622		2.7150	2.29		
POND 20 IN	POND	10	1.337		2.7000	4.76		
POND 20 OUT	POND	10	1.337		2.7000	4.76		

015H14112505
$1.06
03/04/13
Mailed From 84302
HASLER

HANSEN & ASSOCIATES INC.
Consulting Engineers & Land Surveyors
538 North Main
Brigham City, Utah 84302

TO:

Weber County Engineering
2380 Washington Blvd. Ste. 240
Ogden, UT 84401

Attn: Mike Tuttle