THRASHER

ARCHITECTURE
ENGINEERING
FIELD SERVICES

September 25, 2019

Kevin Coyne
Douglas Grayson
GC&P Development LLC
99 Aaron Woods
Wheeling, WV 26003

Via E-mail: *kcoyne.gcpd@gmail.com*

RE: ***Geotechnical Summary***
196 Rear Bethany Park
City of Wheeling, Ohio County, WV
TTG Project No.: 101-030-3273

Gentleman:

At the request of GC&P, The Thrasher Group (TTG) has prepared the following summary of our understanding of the geotechnical conditions at the development area. In general, this summary includes a brief description of the geotechnical conditions expected to be encountered during excavation at the site to create the proposed development pad and associated improvements. It is our understanding that this letter will be provided to the City of Wheeling, WV.

Propose

TTG has compiled this summary based on available geologic and geotechnical information as well as previously prepared concept site and grading plans and provides general characterizations of the material that can be expected to be encountered during excavation to create the development pad.

Field Evaluations

Various field evaluations completed at the site included three (3) boring holes drilled along the axis of the ridge (as indicted on attached Sheet C1), excavation of test pits at various locations, and extensive visual inspections of the entire development site. Bore holes were logged. Recorded bore hole log information is summarized in the attached Appendix 1 – Lithology Column at GC&P and Appendix 2 – GC&P Core Log 2015.

General Discussion

The approximate average elevation of the development pad is expected to be 950' above mean sea level (AMSL). The "excavation zone" is from approximate elevation 1150' to elevation 950'. The average cut in the "excavation zone" necessary to create the development pad is less than 100 feet. In creating the development pad, a portion of the excavated material will be placed at lower elevations as controlled fill and a portion of the excavated material will be exported from the site. Photo No. 1 through Photo No. 3 (indicative of the type of material that can be expected to be encountered in the excavation

zone) illustrate rock outcroppings. These outcroppings are readily visible throughout the development site between the approximate elevations 1150' to 950'.

Available geologic information indicates the likelihood of encountering various forms of rock and shale in this zone. Test pit evaluations completed below elevation 950' indicate the presence of deep overburden before encountering rock and shale zones. These findings are consistent with visual site inspections where rock covers large sections of the surface along the ridgeline, and zones of various forms of rock and shale are present at the surface.

TTG has performed a volumetric calculation of the material proposed to be exported from the site from 1150' to 950' excavation zone compared the total volume of the site including the largely undisturbed material remaining in the 950'-760' zone. Based on these calculations, TTG has determined that the volume of material proposed for export represent only about 15 % of the total volume of material at the development site. (See exhibit EX-1.)

As discussed above, Appendix 1 and Appendix 2 summarize bore hole and test pit log data and provide a characterization of the material contained in the excavation zone. Based on this information, it is anticipated that underlying subsurface material below the excavation zone will be sound and stable. Further, it is anticipated that extraordinary measures will likely not be necessary to support structures planned for the development area.

Sincerely,

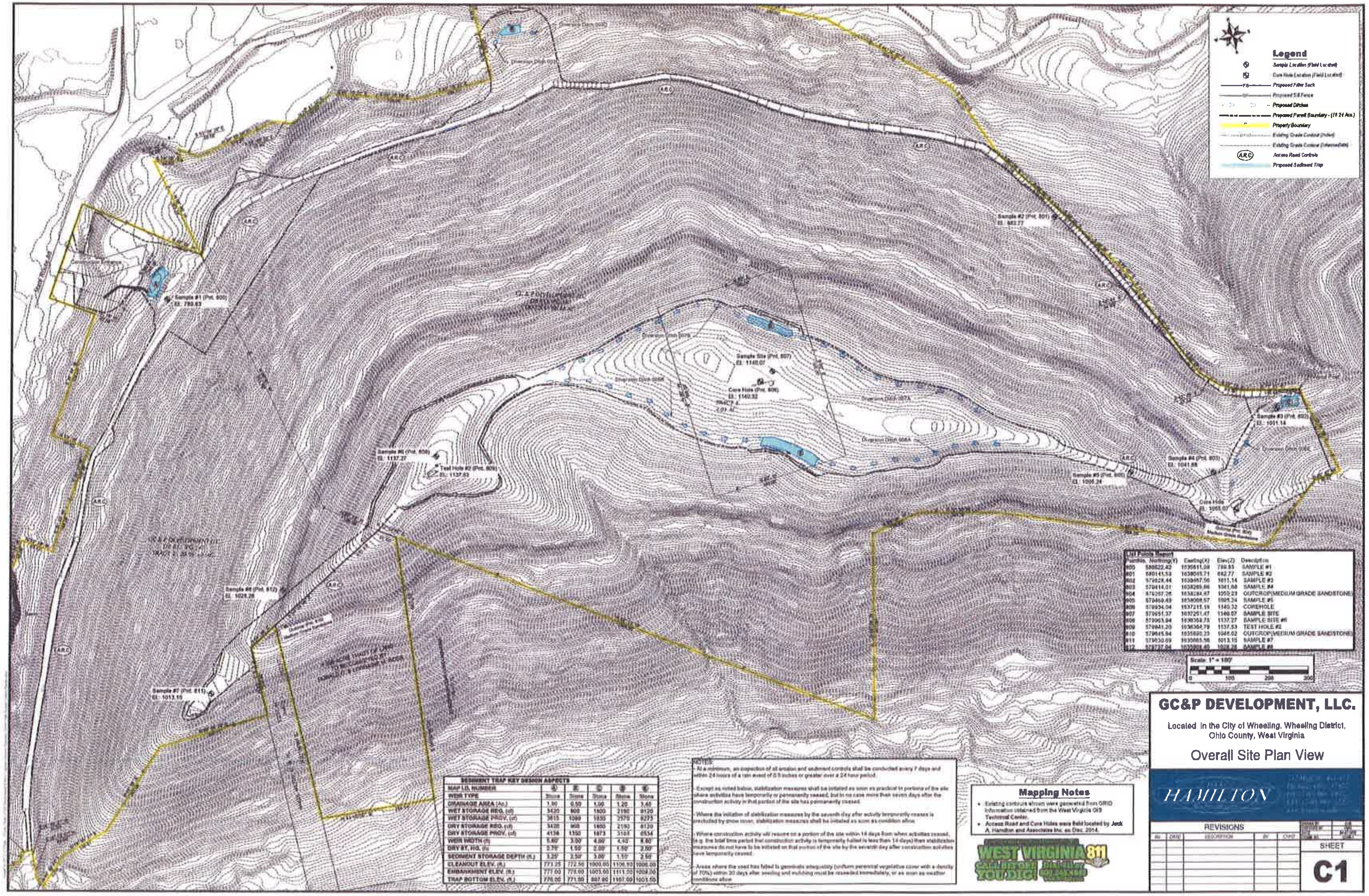
THE THRASHER GROUP, INC.

William R. Watson
Project Manager

Photo No. 1 – Rock outcrop at approximate elevation 1110' on southern slope. Photo taken looking north.

Photo No. 2 – Rock outcrop at approximate elevation 1050' on southern slope. Photo taken looking north.

Photo No. 3 – Rock outcrop at approximate elevation 1000' on southern slope. Photo taken looking north.



Pnt No.	Northing(Y)	Easting(X)	Elev(Z)	Description
800	580822.42	1636811.09	789.93	SAMPLE #1
801	580141.53	1638045.71	882.77	SAMPLE #2
802	579826.44	1639457.56	1011.14	SAMPLE #3
803	579414.01	1638289.86	1041.68	SAMPLE #4
804	579267.26	1638284.87	1050.23	OUTCROP(MEDIUM GRADE SANDSTONE)
805	579460.49	1638008.57	1095.24	SAMPLE #5
806	579934.04	1637215.19	1140.32	COREHOLE
807	579951.37	1637251.47	1149.07	SAMPLE SITE
808	579963.94	1636359.75	1137.27	SAMPLE SITE #6
809	579941.20	1636364.79	1137.53	TEST HOLE #2
810	579645.94	1635890.23	1046.62	OUTCROP(MEDIUM GRADE SANDSTONE)
811	579630.69	1635065.56	1013.15	SAMPLE #7
812	579737.04	[illegible]	1028.28	SAMPLE #8

SEDIMENT TRAP KEY DESIGN ASPECTS

MAP I.D. NUMBER	A	B	C	D	E
WEIR TYPE	Stone	Stone	Stone	Stone	Stone
DRAINAGE AREA (Ac.)	1.30	0.50	1.00	1.20	3.40
WET STORAGE REQ. (cf)	3420	900	1800	2190	6120
WET STORAGE PROV. (cf)	3815	1088	1830	2570	6273
DRY STORAGE REQ. (cf)	3420	900	1800	2190	6120
DRY STORAGE PROV. (cf)	4136	1350	1873	3103	6534
WEIR WIDTH (ft)	5.60'	3.00'	4.00'	4.40'	8.60'
DRY ST. HG. (ft)	3.75'	1.50'	2.00'	1.50'	2.50'
SEDIMENT STORAGE DEPTH (ft.)	3.25'	2.50'	3.00'	1.55'	2.50'
CLEANOUT ELEV. (ft.)	773.25	772.50	1000.00	1108.50	1006.00
EMBANKMENT ELEV. (ft.)	777.00	779.00	1003.00	1111.00	1009.00
TRAP BOTTOM ELEV. (ft.)	770.00	771.00	997.00	1107.00	1003.50

NOTES:

- At a minimum, an inspection of all erosion and sediment controls shall be conducted every 7 days and within 24 hours of a rain event of 0.5 inches or greater over a 24 hour period.
- Except as noted below, stabilization measures shall be initiated as soon as practical in portions of the site where activities have temporarily or permanently ceased, but in no case more than seven days after the construction activity in that portion of the site has permanently ceased.
- Where the initiation of stabilization measures by the seventh day after activity temporarily ceases is precluded by snow cover, stabilization measures shall be initiated as soon as condition allow.
- Where construction activity will resume on a portion of the site within 14 days from when activities ceased, (e.g. the total time period that construction activity is temporarily halted is less than 14 days) then stabilization measures do not have to be initiated on that portion of the site by the seventh day after construction activities have temporarily ceased.
- Areas where the seed has failed to germinate adequately (uniform perennial vegetative cover with a density of 70%) within 30 days after seeding and mulching must be reseeded immediately, or as soon as weather conditions allow.

Mapping Notes

- Existing contours shown were generated from GRID information obtained from the West Virginia GIS Technical Center.
- Access Road and Core Holes were field located by Jack A. Hamilton and Associates Inc. on Dec. 2014.

WEST VIRGINIA 811
CALL BEFORE YOU DIG!

GC&P DEVELOPMENT, LLC.

Located in the City of Wheeling, Wheeling District, Ohio County, West Virginia

Overall Site Plan View

HAMILTON

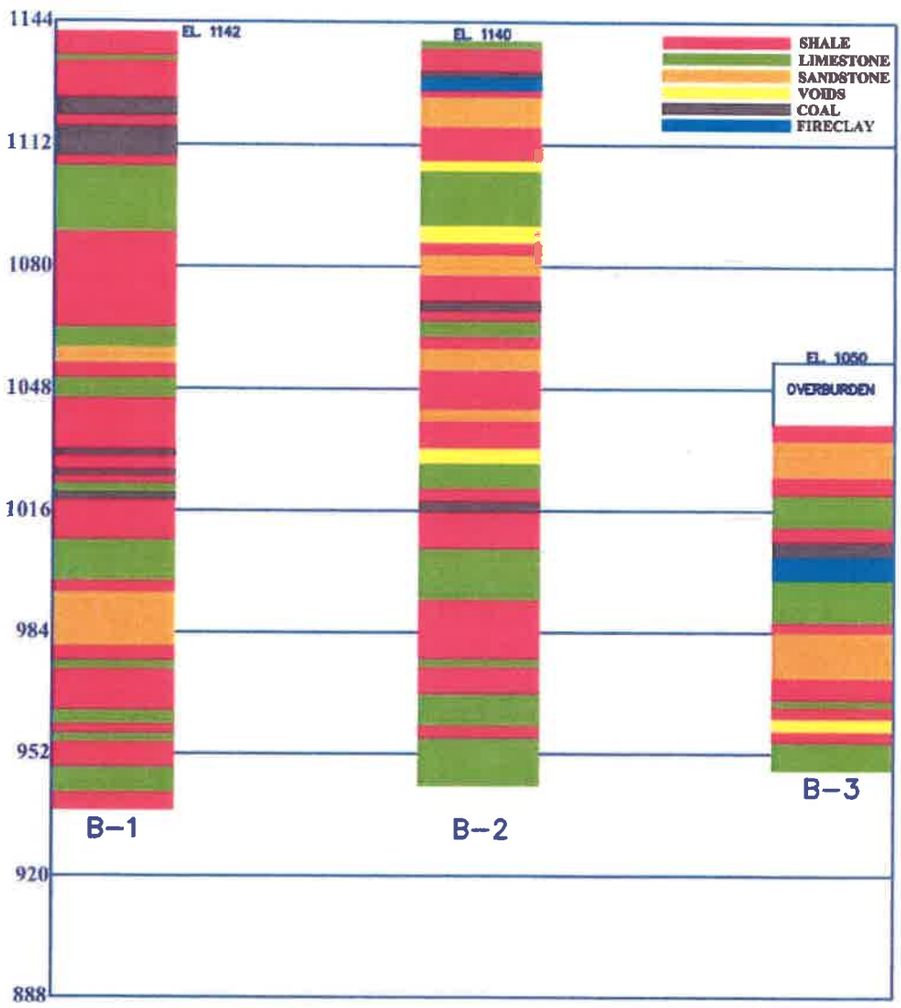
REVISIONS

NO.	DATE	DESCRIPTION	BY	CHK'D

SHEET

C1

APPENDIX 1- Lithologic Column at GC&P



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http://www.gustavson.com gustavson@gustavson.com

APPENDIX 2: GC-P CORE LOG 2015

BHID	LITH3	from	to	TopEl	BotEl	% recovered	COMMENTS
B-1	LIMESTONE	0	2	1136	1134	100	LIGHT GRAY WEATHERED LIMESTONE
B-1	SHALE	2	9	1134	1127	100	WEATHERED SHALE WITH HARDER INCLUSIONS
B-1	COAL	9	10.5	1127	1126	100	COAL
B-1	SILT	10.5	13	1126	1123	100	BROWN SANDY SILT
B-1	SHALE	13	15	1123	1121	100	LIGHT BROWN WATER-IMPACTED SANDY SHALE
B-1	SANDSTONE	15	23	1121	1113	100	LIGHT GRAY WEATHERED SANDSTONE
B-1	SHALE	23	27.5	1113	1109	100	MEDIUM-GRAY WEATHERED SHALE
B-1	SH-CAR	27.5	30.8	1109	1105	100	DARK GRAY SHALE
B-1	WASH-OUT	30.8	33	1105	1103	0	POSSIBLE SHALE (WASH-OUT)
B-1	LIMESTONE	33	43	1103	1093	100	GRAY LIMESTONE
B-1	LIMESTONE	43	50	1093	1086	100	LIGHT GRAY FRACTURED WATER-IMPACTED LIMESTONE
B-1	WASH-OUT	50	53	1086	1083	0	POSSIBLE SHALE (WASH-OUT)
B-1	WASH-OUT	53	53.7	1083	1082	0	SAME
B-1	SH-CAL	53.7	58	1082	1078	100	LIGHT GRAY SHALE
B-1	SANDSTONE	58	61	1078	1075	100	LIGHT GRAY SHALEY SANDSTONE
B-1	SH-CAL	61	63	1075	1073	100	LIGHT GRAY SHALE
B-1	SHALE	63	71	1073	1065	100	SAME
B-1	SH-CAR	71	71.6	1065	1064	100	BLACK SHALE
B-1	COAL	71.6	72.1	1064	1064	0	COAL (WASH-OUT)
B-1	SH-CAR	72.1	73	1064	1063	100	BLACK SHALE
B-1	SH-CAR	73	73.5	1063	1063	100	SAME
B-1	LIMESTONE	73.5	78.9	1063	1057	100	MEDIUM-GRAY LIMESTONE
B-1	SH-CAL	78.9	81	1057	1055	57.14	LIGHT GRAY SHALE (SOME WASH-OUT)
B-1	SANDSTONE	81	83	1055	1053	100	LIGHT GRAY SANDSTONE
B-1	SANDSTONE	83	87	1053	1049	100	LIGHT GRAYISH-BROWN SANDSTONE
B-1	SH-CAL	87	93	1049	1043	100	LIGHT GRAY SANDY SHALE
B-1	SH-CAL	93	97	1043	1039	100	LIGHT GRAY SANDY SHALE
B-1	SANDSTONE	97	101	1039	1035	100	LIGHT GRAY SANDSTONE
B-1	SH-CAL	101	103	1035	1033	100	LIGHT GRAY SANDY SHALE
B-1	SH-CAL	103	111	1033	1025	100	LIGHT GRAY FRACTURED SHALE
B-1	WASH OUT	111	113	1025	1023	0	WASH-OUT (POSSIBLE SHALE)
B-1	LIMESTONE	113	119	1023	1017	100	DARK GRAY LIMESTONE
B-1	SH-CAR	119	121.5	1017	1015	100	DARK GRAY SHALE
B-1	COAL	121.5	123	1015	1013	100	COAL
B-1	COAL	123	124	1013	1012	100	COAL
B-1	SH-CAR	124	126	1012	1010	100	DARK GRAY SHALE
B-1	SH-CAR	126	133	1010	1003	100	DARK GRAY SHALE
B-1	LIMESTONE	133	143	1003	993	100	DARK TO LIGHT-GRAY LIMESTONE
B-1	LIMESTONE	143	148	993	988	100	MEDIUM-GRAY LIMESTONE
B-1	SH-CAL	148	153	988	983	100	LIGHT GRAY SHALE
B-1	SH-CAL	153	163	983	973	95	LIGHT GRAY SHALE (6 IN. WASH-OUT)
B-1	SH-CAL	163	165	973	971	100	LIGHT GRAY SHALE
B-1	LIMESTONE	165	167	971	969	100	MEDIUM-GRAY LIMESTONE
B-1	SH-CAL	167	173	969	963	100	MEDIUM GRAY SHALE
B-1	SH-CAL	173	174	963	962	100	SAME
B-1	LIMESTONE	174	183	962	953	100	MEDIUM-GRAY LIMESTONE
B-1	SH-CAL	183	186	953	950	100	LIGHT GRAY SHALE
B-1	LIMESTONE	186	193	950	943	100	LIGHT GRAY LIMESTONE
B-1	LIMESTONE	193	198	943	938	100	SAME
B-2	SHALE	0	5	1141	1136		BROWN CLAYEY WEATHERED SHALE W/ROCK FRAGMENTS
B-2	LIMESTONE	5	6	1136	1135	100	LIGHT GRAY WEATHERED LIMESTONE
B-2	SHALE	6	15	1135	1126	0	WEATHERED SHALE-9FT. WASH-OUT
B-2	SH-CAL	15	18	1126	1123	100	LIGHT GRAY WEATHERED SHALE

BHID	LITH3	from	to	TopEl	BotEl	% recovered	COMMENTS
B-2	SH-CAL	18	21	1123	1120	100	LIGHT GRAY WEATHERED SHALE
B-2	SHALE	21	23	1120	1118	100	SAME
B-2	SANDSTONE	23	24	1118	1117	100	LIGHT GRAY WEATHERED SANDSTONE
B-2	SHALE	24	27.4	1117	1113	100	LIGHT GRAY WEATHERED SHALE
B-2	COAL	27.4	30	1113	1111	100	COAL
B-2	FIRECLAY	30	31	1111	1110	100	LIGHT GRAY FIRECLAY AND WEATHERED SHALE
B-2	SH-CAR	31	31.3	1110	1110	100	DARK GRAY SHALE
B-2	COAL	31.3	32.5	1110	1108	83.3333	COAL (LOST 0.2 FT.)
B-2	SHALE	32.5	36.7	1108	1104	100	DARK GRAY SHALE
B-2	LIMESTONE	36.7	41	1104	1100	100	MEDIUM-GRAY LIMESTONE
B-2	LIMESTONE	41	51	1100	1090	100	LIGHT-GRAY LIMESTONE
B-2	LIMESTONE	51	54	1090	1087	100	SAME
B-2	SH-CAL	54	55	1087	1086	100	LIGHT GRAY SHALE
B-2	SHALE	55	61	1086	1080	0	WEATHERED SHALE (WASH-OUT)
B-2	SHALE	61	64	1080	1077	0	SAME
B-2	SHALE	64	71	1077	1070	100	LIGHT GRAY FRACTURED AND WATER-IMPACTED SHALE
B-2	SHALE	71	73	1070	1068	100	MEDIUM-GRAY SHALE
B-2	SHALE	73	75.5	1068	1065	0	WASH-OUT (SOFT WEATHERED SHALE)
B-2	LIMESTONE	75.5	81	1065	1060	100	LIGHT GRAY LIMESTONE
B-2	LIMESTONE	81	83	1060	1058	100	SAME
B-2	SANDSTONE	83	88	1058	1053	100	LIGHT GRAY SANDSTONE
B-2	SH-CAL	88	91	1053	1050	100	LIGHT GRAY SHALE
B-2	SH-CAL	91	92.5	1050	1048	100	MOTTLED LIGHT GRAY SHALE
B-2	LIMESTONE	92.5	96	1048	1045	100	LIGHT GRAY LIMESTONE
B-2	SH-CAL	96	103	1045	1038	100	LIGHT GRAY SHALE
B-2	SH-CAL	103	113	1038	1028	100	SAME
B-2	COAL	113	114.5	1028	1026	100	COAL
B-2	SHALE	114.5	118	1026	1023	100	BLACK SHALE
B-2	COAL	118	118.5	1023	1022	100	COAL
B-2	SH-CAL	118.5	120	1022	1021	100	LIGHT GRAY SHALE
B-2	LIMESTONE	120	123	1021	1018	100	DARK GRAY LIMESTONE
B-2	SH-CAR	123	123.6	1018	1017	100	DARK GRAY BRinLE SHALE
B-2	COAL	123.6	124.6	1017	1016	100	COAL
B-2	SH-CAR	124.6	126.4	1016	1014	100	BLACK SHALE WITH COAL INCLUSIONS
B-2	SH-CAL	126.4	132.6	1014	1008	100	LIGHT GRAY SHALE
B-2	LIMESTONE	132.6	133	1008	1008	100	LIGHT GRAY LIMESTONE
B-2	LIMESTONE	133	143	1008	997.8	100	SAME
B-2	LIMESTONE	143	145	997.8	995.8	100	SAME
B-2	SH-CAL	145	149	995.8	991.8	100	LIGHT GRAY SHALE
B-2	SANDSTONE	149	153	991.8	987.8	100	LIGHT GRAY SANDSTONE
B-2	SANDSTONE	153	163	987.8	977.8	100	SAME
B-2	SH-CAL	163	168	977.8	972.8	100	LIGHT GRAY SANDY SHALE
B-2	LIMESTONE	168	169	972.8	971.8	100	LIGHT GRAY SHALEY LIMESTONE
B-2	SH-CAL	169	173	971.8	967.8	100	LIGHT GRAY SHALE
B-2	SH-CAL	173	179	967.8	961.8	100	SAME
B-2	LIMESTONE	179	183	961.8	957.8	100	LIGHT GRAY FRACTURED LIMESTONE
B-2	SH-CAL	183	184.5	957.8	956.3	100	LIGHT GRAY SHALE
B-2	LIMESTONE	184.5	187.5	956.3	953.3	100	LIGHT GRAY LIMESTONE
B-2	SH-CAL	187.5	191.5	953.3	949.3	100	LIGHT GRAY SHALE
B-2	LIMESTONE	191.5	193	949.3	947.8	100	LIGHT GRAY LIMESTONE
B-2	LIMESTONE	193	199	947.8	941.8	100	LIGHT GRAY LIMESTONE
B-2	LIMESTONE	199	203	941.8	937.8	100	LIGHT GRAY SHALE
B-3	OVERBURDEN	0	6	1055	1049	0	BROWN SILTY CLAYEY WEATHERED SHALE

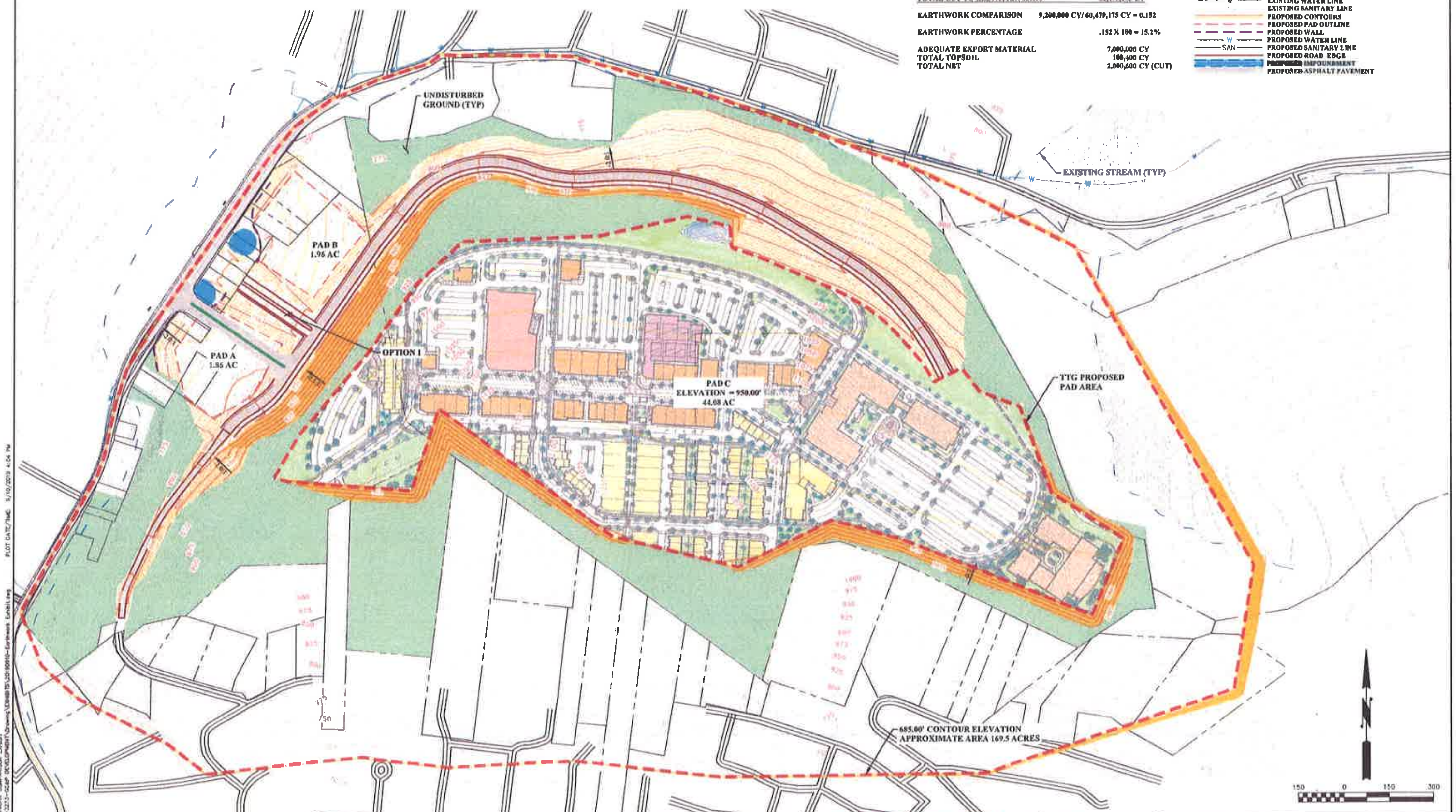
BHID	LITH3	from	to	TopEl	BotEl	% recovered	COMMENTS
B-3	OVERBURDEN	6	10	1049	1045	0	LIGHT BROWN AND GRAY SANDY CLAYEY WEATHERED SHALE
B-3	OVERBURDEN	10	13	1045	1042	41.67	LIGHT BROWN SANDY CLAY AND WEATHERED SHALE
B-3	SHALE	13	17.2	1042	1038	35.71	SAME
B-3	SANDSTONE	17.2	23	1038	1032	100	BROWN SANDSTONE
B-3	SANDSTONE	23	27	1032	1028	100	LIGHT BROWN SANDSTONE
B-3	SH-CAR	27	31	1028	1024	100	DARK GRAY WEATHERED AND WATER-IMPACTED SHALE
B-3	LIMESTONE	31	33	1024	1022	100	DARK GRAY LIMESTONE
B-3	LIMESTONE	33	37	1022	1018	100	SAME
B-3	SH-CAR	37	39	1018	1016	100	DARK GRAY SHALE AND FIRECLAY WITH COAL STREAKINGS
B-3	COAL	39	42.2	1016	1013	93.75	COAL
B-3	FIRECLAY	42.2	43	1013	1012	100	BLACK SHALE AND FIRECLAY
B-3	FIRECLAY	43	47	1012	1008	100	BLACK SHALE AND FIRECLAY
B-3	LIMESTONE	47	53	1008	1002	100	MEDIUM-GRAY FRACTURED LIMESTONE
B-3	LIMESTONE	53	63	1002	992.1	100	MEDIUM-GRAY LIMESTONE
B-3	SHALE	63	67	992.1	988.1	100	MEDIUM-GRAY WEATHERED SHALE
B-3	SANDSTONE	67	73	988.1	982.1	100	LIGHT GRAY SANDSTONE
B-3	SANDSTONE	73	79	982.1	976.1	100	SAME
B-3	SH-CAR	79	83	976.1	972.1	100	DARK GRAY SHALE
B-3	SH-CAR	83	84.4	972.1	970.7	100	SAME
B-3	LIMESTONE	84.4	86.4	970.7	968.7	100	LIGHT GRAY LIMESTONE
B-3	SH-CAR	86.4	88	968.7	967.1	100	DARK GRAY SHALE WITH COAL STREAKINGS
B-3	WASH-OUT	88	89.8	967.1	965.3	0	WASH-OUT (POSSIBLE SOME COAL)
B-3	SH-CAL	89.8	93	965.3	962.1	100	LIGHT GRAY SANDY SHALE
B-3	SH-CAL	93	95	962.1	960.1	100	SAME
B-3	LIMESTONE	95	103	960.1	952.1	100	MED-GRAY FRACTURED LIMESTONE (END OF BORING)

EARTHWORK SUMMARY

TOTAL CUT TO PAD SUB-GRADE	9,200,000 CY
TOTAL FILL TO PAD SUB-GRADE	90,000 CY
TOTAL CUT TO ELEVATION 685.00'	60,479,175 CY
EARTHWORK COMPARISON	9,200,000 CY/ 60,479,175 CY = 0.152
EARTHWORK PERCENTAGE	.152 X 100 = 15.2%
ADEQUATE EXPORT MATERIAL	7,000,000 CY
TOTAL TOPSOIL	100,400 CY
TOTAL NET	2,000,600 CY (CUT)

PLAN LEGEND

- CITY LIMIT BOUNDARY LINE
- EXISTING CONTOURS
- EXISTING ROAD EDGE
- EXISTING PROPERTY LINE
- EXISTING WATER LINE
- EXISTING SANITARY LINE
- PROPOSED CONTOURS
- PROPOSED PAD OUTLINE
- PROPOSED WALL
- PROPOSED WATER LINE
- PROPOSED SANITARY LINE
- PROPOSED ROAD EDGE
- PROPOSED IMPOUNDMENT
- PROPOSED ASPHALT PAVEMENT



NO.	BY	DATE	DESCRIPTION

EXHIBIT
NOT FOR CONSTRUCTION
SEPTEMBER 10, 2019

SCALE: AS SHOWN
DRAWN: DATE:
CHECKED: DATE:
APPROVED: DATE:
SURVEY DATE:
SURVEY BY:
FIELD BOOK No.:

THRASHER
THE THRASHER GROUP, INC.
600 WHITE OAKS BLVD, BRIDGEPORT, WV 26330
PHONE (304) 624-4108
FAX (304) 624-7831

PHASE No.
CONTRACT No.
PROJECT No. 1-01-030-3273

GC&P DEVELOPMENT
COUNTY ROUTE 88
WHEELING, OHIO COUNTY, WV
EARTHWORK COMPARISON

SHEET No. EX-1