LEE'S SUMMIT
MISSOURI

DESIGN AND CONSTRUCTION MANUAL DESIGN MODIFICATION REQUEST

PROJECT NAME: LSR7 Middle School #4 – Bailey Road

PREMISE ADDRESS: 1001 SE Bailey Road, Lee's Summit, MO, 64081

PERMIT NUMBER: PL2020134

OWNER'S NAME: SCHOOL DISTRICT 7 REORGANIZED

TO: The City Engineer

In accordance with the Lee's Summit Design and Construction Manual (DCM) Section 1002.A, I wish to apply for a modification to one or more specification (s). The following articulates my request for your review and action. (NOTE: Cite specific code sections and engineering justification and drawings.)

See Attached

SUBMITTED BY:
NAME: Olsson (Terry M. Parsons)
ADDRESS: 7301 W. 133rd Street, Ste 200
CITY, STATE, ZIP: Overland Park, KS, 66213
Email: tparsons@olsson.com

( ) OWNER (X) OWNER'S AGENT
Tel.# 913-634-0903

SIGNATURE: Digitally signed by Terry M. Parsons Date: 2020.10.09 15:36:26-05'00'

FORWARDING MANAGER: Kent D. Monter, PE RECOMMENDATION (X) APPROVAL ( ) DENIAL

SIGNATURE: Kent Monter Digitally signed by Kent Monter Reason: I have reviewed this document Date: 2020.11.03 09:46:50-06'00' DATE: 03 November 2020

GEORGE BINGER III, P.E. – CITY ENGINEER: (X) APPROVED ( ) DENIED

SIGNATURE: BINGER.GEORGE.MONTGOMER.III.1144326616 Digitally signed by BINGER.GEORGE.MONTGOMER.III.1144326616 Date: 2020.11.04 12:20:41 -06'00' DATE:

COMMENTS

A COPY MUST BE ATTACHED TO THE APPROVED PLANS

Narrative for

DESIGN AND CONSTRUCTION MANUAL DESIGN

MODIFICATION REQUEST

In accordance with the Lee's Summit Design and Construction Manual (DCM) Section 1002.A, I wish to apply for a modification to one or more specification (s). The following articulates my request for your review and action. (NOTE: Cite specific code sections and engineering justification and drawings.)

5605.3 Stream Preservation and Buffer Zones – we are requesting a waiver/modification to this section to encroach on the prescribed stream buffer widths in specific areas as identified on the attached drawings. Our encroachment is needed due to the nature of the site being narrow in the east/west direction and meeting the program requirements for all of the components needed on site by the school district. The grade of the site falls from west to east towards the existing streamway. Again, with the narrow site it is difficult grade out the site for buildings, fields, and parking and not have the slope embankment encroach into the buffer.

According to the requirements of Section 5605.3, a total of 2.08 acres should be dedicated to the stream setback. To accommodate the improvements noted above a total of 0.74 acres will have to be removed from the 1.34 acres. Per Exhibit 1 in this submittal. An additional 0.76 acres will be added to the easement. This results in 2.10 acres of permanent stream setback dedication.

There will also be 2 permanent energy dissipation structures (riprap outfall protection and ditch checks) installed at Station 17+66 and Station 22+40 to prevent erosion from the outfalls of Detention Basins EDD-1 and EDD-2. The dissipation structures will be located within the permanent stream setback area.

To accommodate this request Olsson has prepared a design memorandum and Natural Channel Assessment according to Section 5605.4 of the LS DCM to demonstrate the minimal impact the development has on the stream setback.

The memorandum and exhibits are attached to this submittal.

olsson

City of Lee's Summit, MO
220 SE Green Street
Lee's Summit, MO 64063

October 9, 2020

Re: LSR7 Middle School #4 Stream Buffer Variance - PL2020209
Stream Assessment Design Memorandum

This memorandum for the waiver request on LSR7 Middle School #4 to perform construction activities within the proposed stream buffer for the site.

To support the waiver request Olsson has performed a Stream Assessment to demonstrate that the proposed construction activities within the stream buffer will not adversely affect the natural condition of the existing stream. The stream assessment was performed in accordance with Section 5605 of the APWA KC Metro Design Criteria and Specifications. Information for the steam assessment was based on field survey data and field site visits by Olsson.

Section 5605.4a Plan-Form Analysis
The existing stream information and the plan-form analysis have been shown are the attached Stream Assessment Drawings. The Plan-Form Ratio lies with the typical range with the exception of meander length/full bank width.

This could be explained in the outfall from the enclosed storm system coming under Bailey Road. The north end of the stream where the outfall is located shows a lower sinuosity than the south end of the stream. There two concrete flumes or checks (Sta. 13+05, Sta. 23+80) constructed in the stream. The checks are immediately downstream of locations where natural swales enter the channel. Finally, a structure has been constructed in the stream at the south end of the property. The structure consists of riprap bank protection on each side of the stream and concrete channel walls. These structures would tend to anchor the stream in its current location.

Based on the plan-form analysis, general steam corridor limits have been shown on the Stream Assessment Plans. The stream corridor limits show that the proposed construction will not interfere with the natural meandering of the stream.

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Section 5605.4b – Energy Management

In regard to the flow in the stream, an analysis was made of the pre and post construction peak runoff values for the site. The existing peak flow rates were compared to post construction flow rates for the areas that were flowing to the proposed detention basins on the site. Both undetained and detained peak flow rates were included. See Table 1 below.

LEE'S SUMMIT MIDDLE SCHOOL #4
TABLE 1 - PRE AND POST CONSTRUCTION PEAK RUNOFF FOR DETENTION AREAS ON SITE

	Area	Stom Event	Existing Runoff	Proposed Peak Runoff (Undetained)	Proposed Peak Runoff (Detained)
			cfs	cfs	cfs
EDD-1	3.5	2-Yr	3.7	5.7	1.6
		10-Yr	5.6	8.6	4.2
		25-Yr	6.2	9.5	6.3
		100-Yr	8.1	12.5	9.9
EDD-2	8.2	2-Yr	7.6	10.9	3.7
		10-Yr	17.9	25.5	14.0
		25-Yr	19.8	28.4	17.1
		100-Yr	26.3	37.5	24.1
EDD-3	22.6	2-Yr	26.9	38.4	11.1
		10-Yr	63.5	90.7	35.9
		25-Yr	70.7	101.0	44.5
		100-Yr	93.7	133.8	63.0

An analysis was then performed on the pre and post construction flows in the stream itself. The area north of Bailey Road is a fully developed residential area. The proposed middle school development will affect the flow quantities because of the detention basins on site. The net change in these flow rates were used to calculate the post construction flow rates for the stream. As for the area to east of the stream it is assumed that detention will be implemented per city standards when that property is developed.

To evaluate the hydraulic grade line (HGL) and energy grade line (EGL) the existing and proposed flows were evaluated at the six cross sections identified in the Plan Form Analysis. This information was used to calculate the HGL's and EGL's for the indicated storm at each cross section. The analysis indicates minimal variations in the HGL's and EGL's with a maximum 3-inch rise in the 10-Year Storm HGL at Section 22+40. As the stream exits the south property line HGL's are lower for the entire range of storm events.

LEE'S SUMMIT MIDDLE SCHOOL #4
TABLE 2 - PRE AND POST CONSTRUCTION HYDRAULIC AND ENERGY GRADE LINES IN STREAM

		2-Year				10-Year				25-Year				100-Year			
Sta	Cond	Q	HGL	V	EGL	Q	HGL	V	EGL	Q	HGL	V	EGL	Q	HGL	V	EGL
		cfs	ft	fps	ft	cfs	ft	fps	ft	cfs	ft	fps	ft	cfs	ft	fps	ft
26+75	Pre	129.06	1010.14	3.01	1010.28	183.68	1010.42	3.03	1010.56	215.58	1010.53	3.12	1010.68	332.59	1010.83	3.46	1011.02
	Post	129.06	1010.14	3.01	1010.28	183.68	1010.42	3.03	1010.56	215.58	1010.53	3.12	1010.68	332.59	1010.83	3.46	1011.02
	Delta (ft)		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
22+40	Pre	146.47	1002.50	3.99	1002.75	210.34	1002.86	4.36	1002.86	247.63	1003.04	4.54	1003.36	382.66	1003.58	5.05	1003.98
	Post	144.37	1002.49	3.95	1002.73	208.94	1002.85	4.35	1003.14	247.83	1003.05	4.52	1003.37	384.46	1003.59	5.06	1003.99
	Delta (ft)		-0.01		-0.02		-0.01		0.28		0.01		0.01		0.01		0.01
17+66	Pre	186.16	998.15	5.40	998.60	267.90	998.99	5.24	999.42	315.62	999.42	4.99	999.81	487.92	1000.20	5.04	1000.59
	Post	190.06	998.24	5.33	998.68	271.80	999.02	5.26	998.68	312.92	999.39	5.01	999.78	485.72	1000.19	5.04	1000.58
	Delta		0.09		0.08		0.03		-0.74		-0.03		-0.03		-0.01		-0.01
9+10	Pre	198.81	988.24	4.15	988.51	288.08	988.63	4.55	988.95	340.20	988.83	4.73	989.18	526.59	989.40	5.29	989.83
	Post	202.71	988.27	4.14	988.54	291.98	988.65	4.55	988.97	337.50	988.81	4.73	989.16	524.39	989.38	5.29	989.81
	Delta (ft)		0.03		0.03		0.02		0.02		-0.02		-0.02		-0.02		-0.02
3+35	Pre	216.20	982.43	4.82	982.78	314.53	982.92	5.31	983.36	371.95	983.17	5.52	983.65	576.15	983.91	6.16	984.50
	Post	200.40	982.32	4.74	982.67	298.73	982.85	5.23	983.27	345.75	982.87	5.23	983.27	545.45	983.81	6.08	984.38
	Delta (ft)		-0.11		-0.11		-0.07		-0.09		-0.30		-0.38		-0.10		-0.12
1+61	Pre	276.54	982.18	5.27	982.61	403.76	982.79	5.81	983.31	478.08	983.08	6.07	983.65	741.06	983.95	6.77	984.66
	Post	260.74	982.09	5.22	982.51	387.96	982.71	5.75	983.22	451.88	982.98	5.97	983.53	710.36	983.86	6.70	984.57
	Delta (ft)		-0.09		-0.10		-0.08		-0.09		-0.10		-0.12		-0.09		-0.09

Section 5605.4c – Sediment Transport Continuity

An analysis was performed to calculate the applied shear stress on the channel surface of the stream, based on the pre and post construction peak flows calculated previously. The results are shown in Table3.

As with the HGL analysis, the variance in applied shear stress is minimal. Pre construction and post construction shear stress values were compared. The percentage increase or decrease is shown in Table 4.

The post construction applied shear stress was also compared to critical shear stress for the bed material. This ratio is shown in Table 5. It indicates the bed material is stable, with the exception of Station 22+40 in the 100-year storm.

LEE'S SUMMIT MIDDLE SCHOOL #4

PRE AND POST CONSTRUCTION SHEAR STRESS ANALYSIS IN STREAM

(SEDIMENT TRANSPORT)

TABLE 3 - AVERAGE APPLIED SHEAR STRESS

Storm Event		10-Year				25-Year				100-Year			
Sta	Cond	Q	R	S	To	Q	R	S	To	Q	R	S	To
		cfs	ft2/ft	ft/ft	psf	cfs	ft2/ft	ft/ft	psf	cfs	ft2/ft	ft/ft	psf
26+75	Pre	183.68	0.82	0.007	0.36	215.58	0.84	0.007	0.37	332.59	0.99	0.007	0.43
	Post	183.68	0.82	0.007	0.36	215.58	0.84	0.007	0.37	332.59	0.99	0.007	0.43
22+40	Pre	210.34	1.39	0.007	0.61	247.63	1.48	0.007	0.65	382.66	1.74	0.007	0.76
	Post	208.94	1.38	0.007	0.60	247.83	1.48	0.007	0.65	384.46	1.75	0.007	0.76
17+66	Pre	267.90	1.84	0.005	0.57	315.62	1.71	0.005	0.53	487.92	1.73	0.005	0.54
	Post	271.80	1.84	0.005	0.57	312.92	1.71	0.005	0.53	485.72	1.73	0.005	0.54
9+10	Pre	288.08	1.57	0.006	0.59	340.20	1.57	0.006	0.59	526.59	1.86	0.006	0.70
	Post	291.98	1.49	0.006	0.56	337.50	1.57	0.006	0.59	524.39	1.85	0.006	0.69
3+35	Pre	314.53	1.86	0.005	0.58	371.95	1.99	0.005	0.62	576.15	2.34	0.005	0.73
	Post	298.73	1.83	0.005	0.57	345.75	1.94	0.005	0.60	545.45	2.29	0.005	0.72
1+61	Pre	403.76	2.14	0.004	0.53	478.08	2.28	0.004	0.57	741.06	2.68	0.004	0.67
	Post	387.96	2.10	0.004	0.53	451.88	2.23	0.004	0.56	710.36	2.64	0.004	0.66

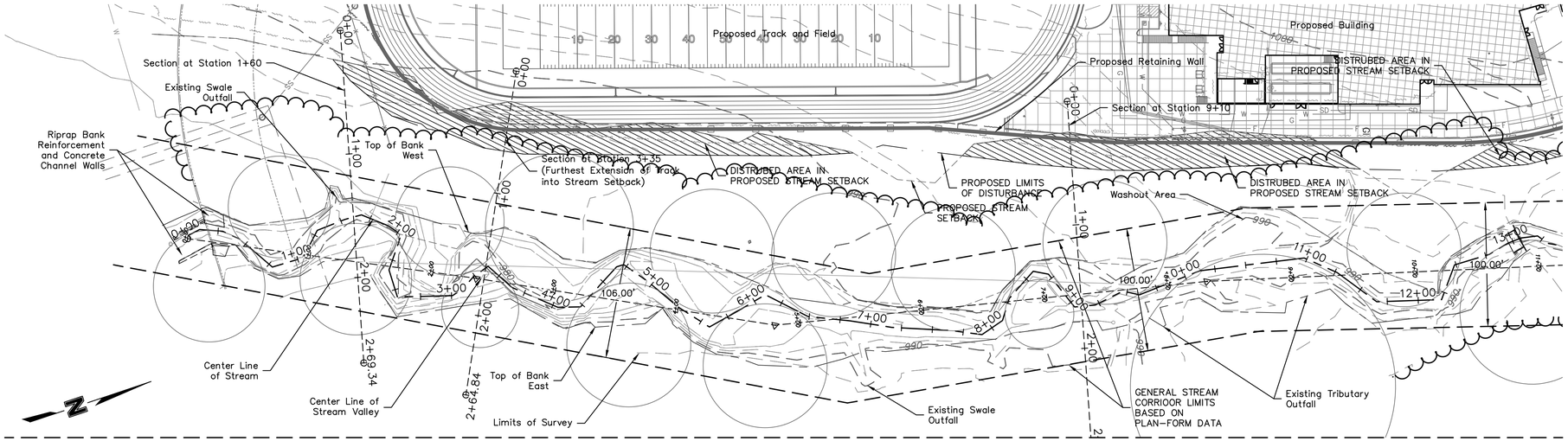
TABLE 4 - PRE VS POST APPLIED STRESS

Sta	10-Yr	25-Yr	100-Yr
26+75	0.0%	0.0%	0.0%
22+40	-0.4%	0.3%	0.3%
17+66	0.2%	0.1%	-0.1%
9+10	-5.3%	-0.3%	-0.3%
3+35	-1.8%	-2.7%	-2.1%
1+61	-1.6%	-2.1%	-1.6%

TABLE 5 - RATIO To vs Tc (POST CONSTRUCTUION)

Sta	Channel Material	Tc	10-Yr	25-Yr	100-Yr
26+75	Course Gravel	0.670	0.53	0.55	0.65
22+40	Course Gravel	0.670	0.90	0.97	1.14
17+66	Course Gravel	0.670	0.86	0.80	0.81
9+10	Silts to Cobbles	0.800	0.70	0.73	0.87
3+35	Silts to Cobbles	0.800	0.71	0.75	0.89
1+61	Silts to Cobbles	0.800	0.66	0.70	0.82

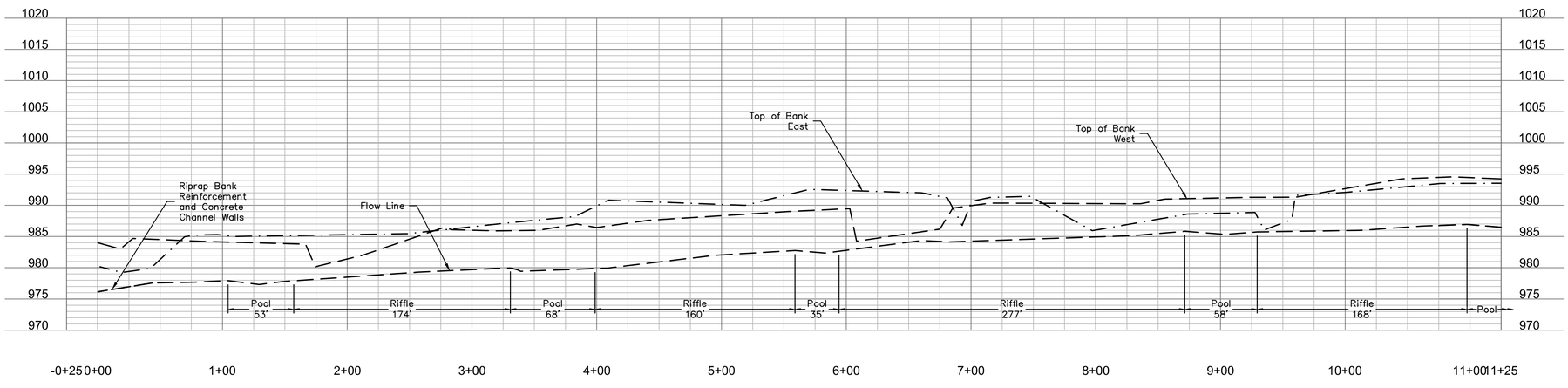
In conclusion, the purpose of the stream setback is to ensure there is sufficient space for the stream to meander in a natural manner. The Plan-Form Analysis demonstrates that the proposed construction will not interfere with the natural movement of the stream channel. The HGL and shear stress analysis also demonstrate minimal impact. In addition, the proposed construction will also not cause any channel constrictions within the flow level of the 100-year storm.



Stream Plan-Form Data

Sinuosity Channel Length/Valley Length	2700÷2400=1.13
Average Bank Full Width (Wb)	34 ft
Average Rc	72 ft
Rc/Wb	2.1
Average Pool/Riffle Spacing	221 ft
Riffle Spacing/Wb	6.5
Average Wavelength	132 ft
Wavelength/Wb	3.9
Average Meander Amplitude	28 ft
Meander Length/Wb	8.7

STREAM CENTERLINE (-0+25 - 11+25)



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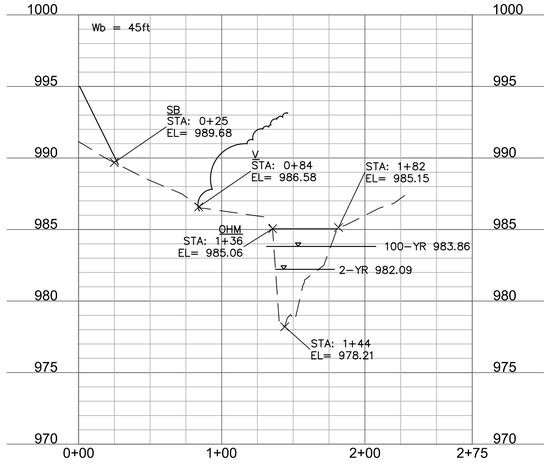
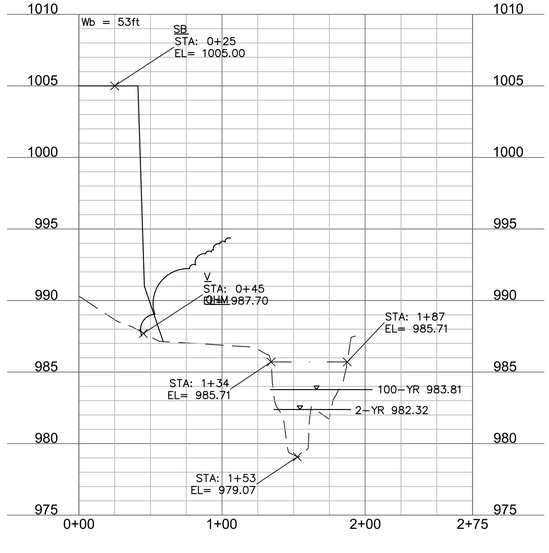


STATION 3+35 (0+00 - 2+75)



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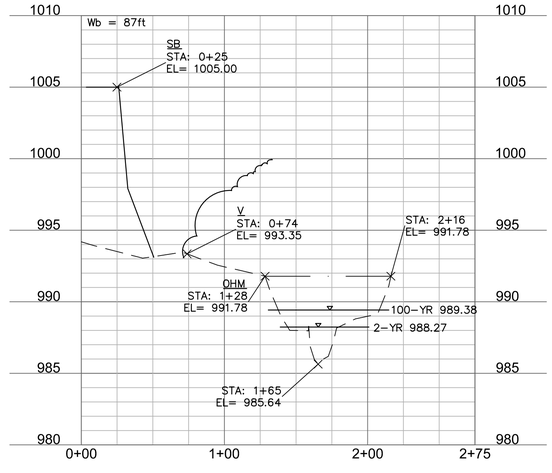
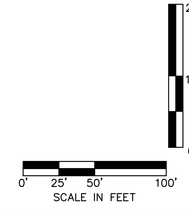


LEGEND

SB EDGE OF SETBACK

V EDGE OF VEGETATION

OHM ORDINARY HIGHWATER MARK



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STATE OF MISSOURI
TERRY M. PARSONS
NUMBER PE-2010010505
PROFESSIONAL ENGINEER
10/05/2020

REV. NO.	DATE	REVISIONS DESCRIPTION	BY

REVISIONS

STREAMWAY CENTERLINE PROFILE NATURAL CHANNEL ASSESSMENT

LEE'S SUMMIT MIDDLE SCHOOL NO. 4

2020

LEE'S SUMMIT, MISSOURI

drawn by: TP
checked by: ENG
approved by: ENG
QA/QC by: ENG
project no.: 020-0103
drawing no.: ABC.DWG
date: 08.07.2020

SHEET 1 of 3

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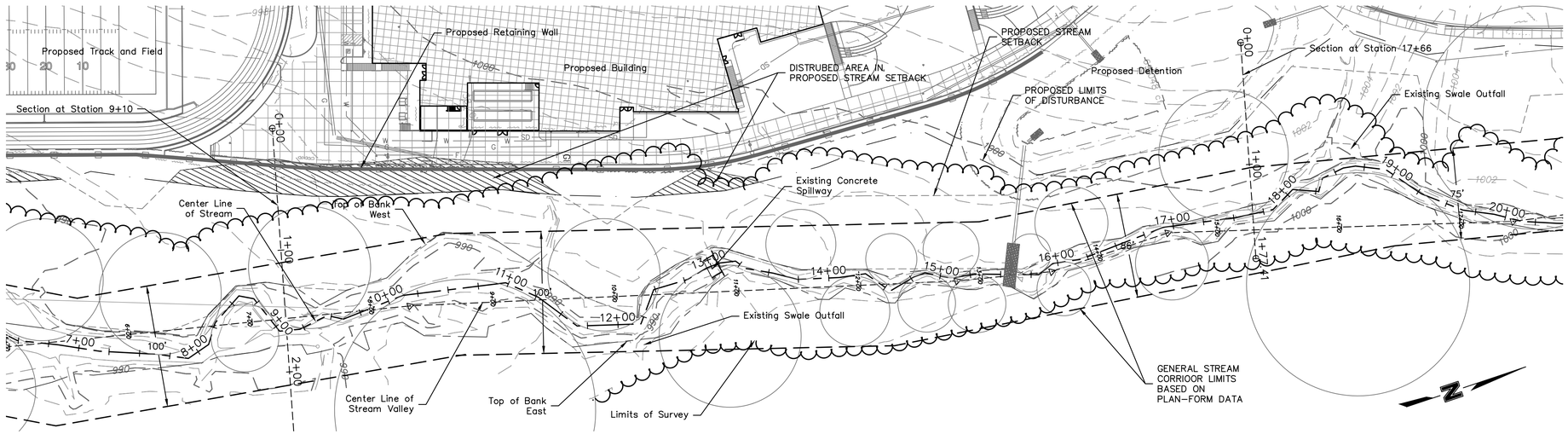
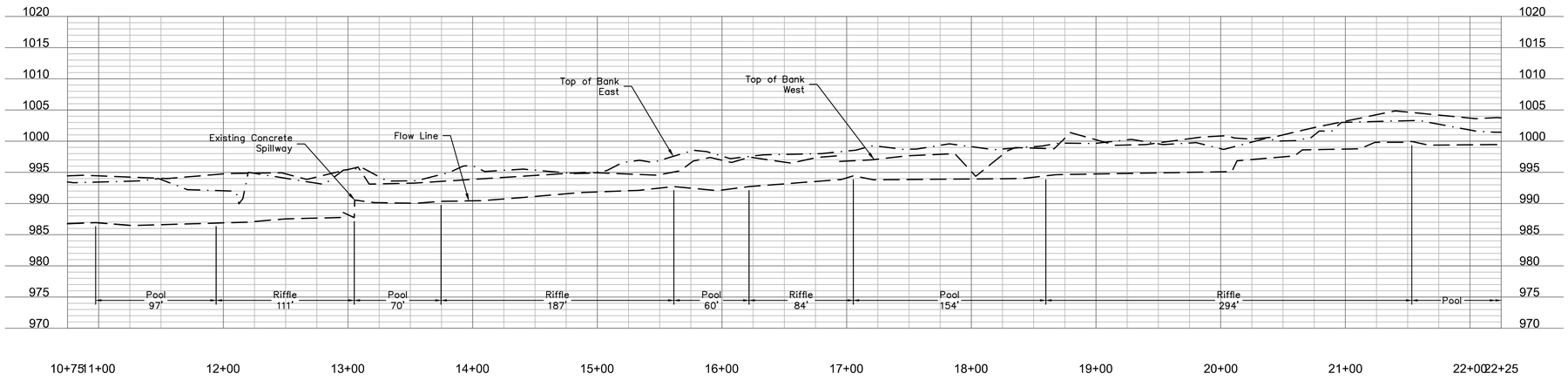


STREAM CENTERLINE (10+75 - 22+25)



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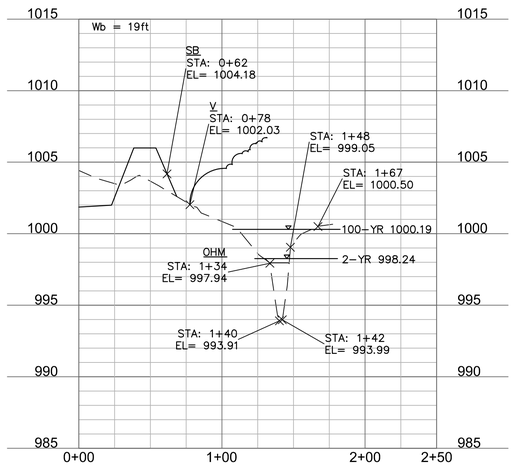

LEGEND

SB EDGE OF SETBACK

V EDGE OF VEGETATION

OHM ORDINARY HIGHWATER MARK

20' 10' 5' 0'

0' 25' 50' 100'

SCALE IN FEET

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LEE'S SUMMIT MIDDLE SCHOOL NO. 4

LEE'S SUMMIT, MISSOURI

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SHEET
2 of 3

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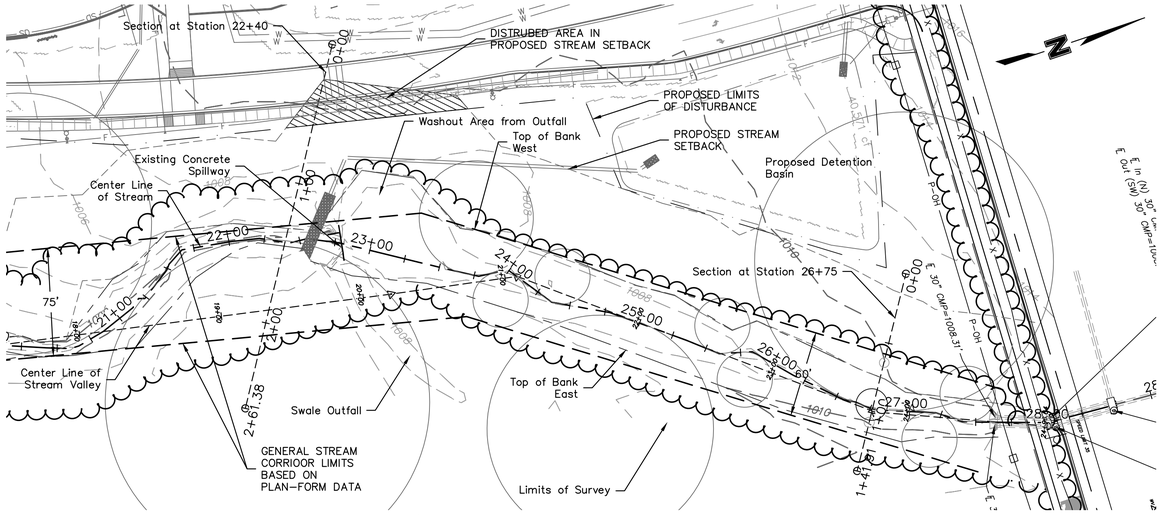
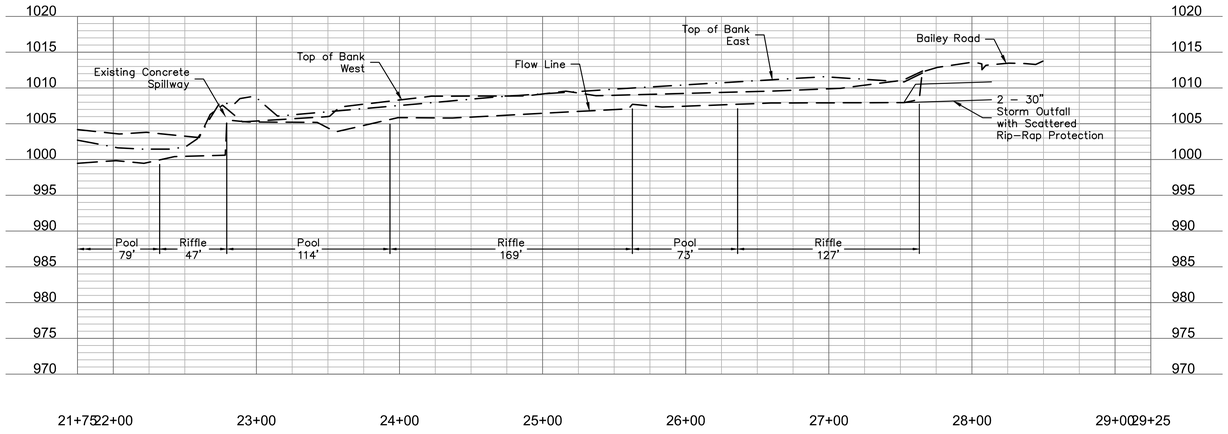


STREAM CENTERLINE (21+75 - 29+25)



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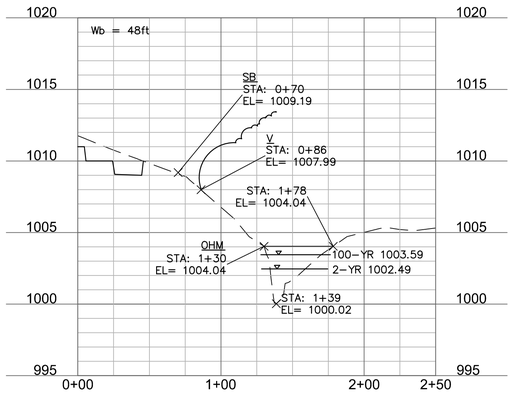

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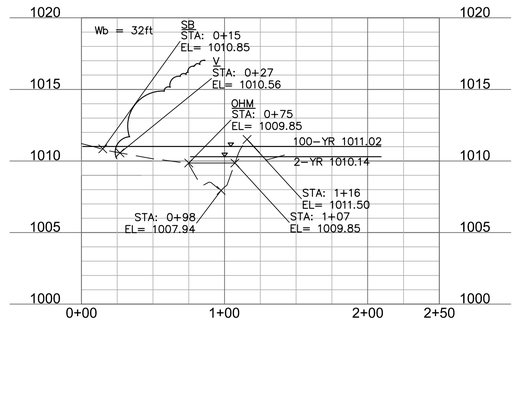

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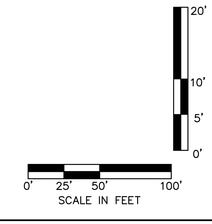

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3 of 3

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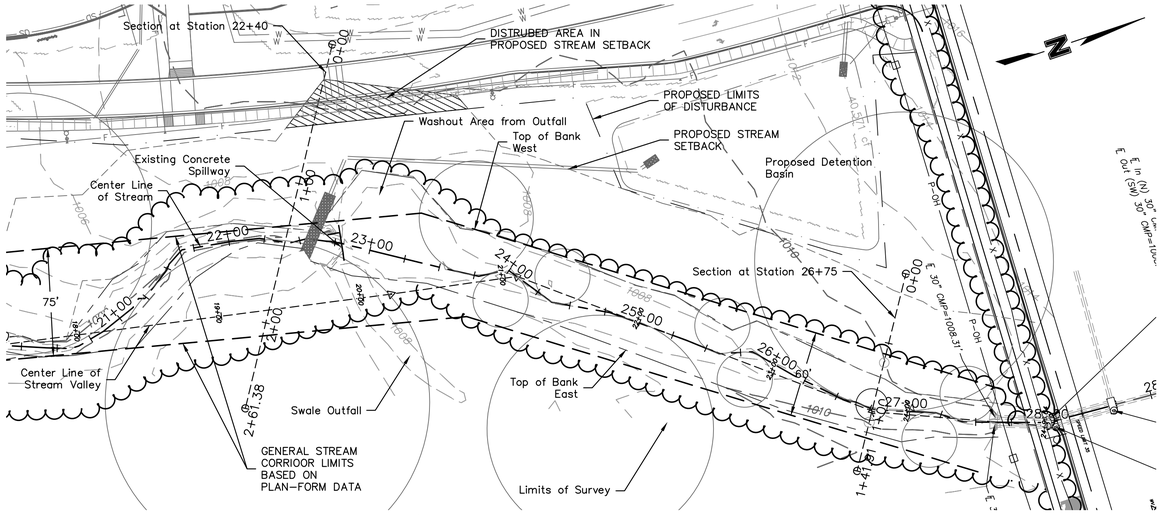
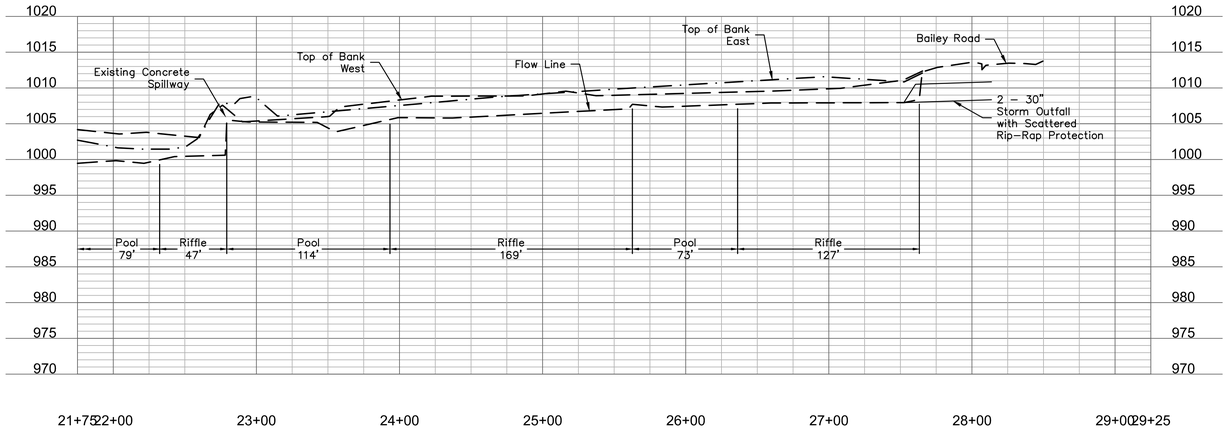
C_PTBLK_0200103



STREAM CENTERLINE (21+75 - 29+25)



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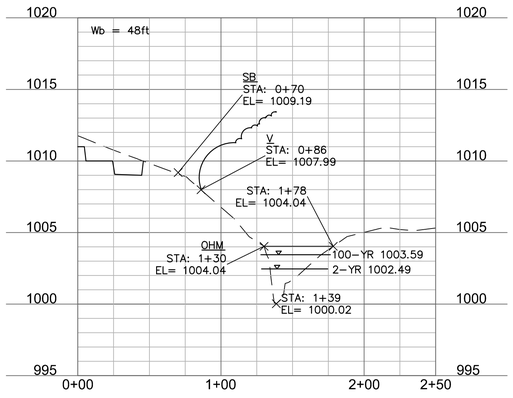

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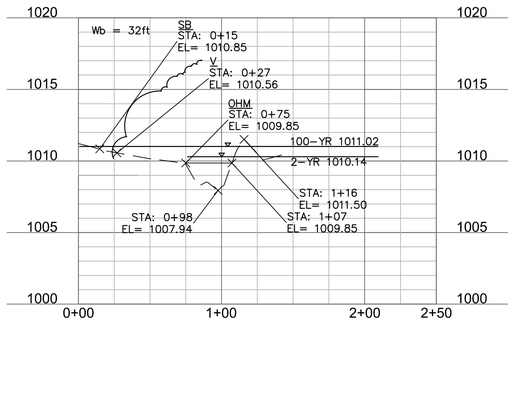
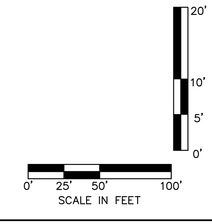


LEGEND

SB EDGE OF SETBACK

V EDGE OF VEGETATION

OHM ORDINARY HIGHWATER MARK



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STATE OF MISSOURI
TERRY M. PARSONS
NUMBER PE-2010010505
PROFESSIONAL ENGINEER
10/15/2020

REV. NO.	DATE	REVISIONS DESCRIPTION	BY

REVISIONS

STREAMWAY CENTERLINE PROFILE
NATURAL CHANNEL ASSESSMENT

LEE'S SUMMIT MIDDLE SCHOOL NO. 4

LEE'S SUMMIT, MISSOURI

2020

drawn by:	TP
checked by:	ENG
approved by:	ENG
QA/QC by:	ENG
project no.:	020-0103
drawing no.:	ABC.DWG
date:	08.07.2020

SHEET
3 of 3

DWG: F:\2020\0001-0500\020-0103\40-Design\AutoCAD\Final Plans\Sheets\GNCV\STORMWATER\C_STR01_0200103.dwg USER: tparsons
DATE: Oct 09, 2020 1:50pm XREFS: C_STREAM_0200103 C_PBASE_0200103 C_XBASE_0200103
C_PTBLK_0200103

LEE'S SUMMIT MIDDLE SCHOOL #4

TABLE 1 - PRE AND POST CONSTRUCTION PEAK RUNOFF FOR DETENTION AREAS ON SITE

	Area	Stom Event	Existing Runoff	Proposed Peak Runoff (Undetained)	Proposed Peak Runoff (Detained)
			cfs	cfs	cfs
EDD-1	3.5	2-Yr	3.7	5.7	1.6
		10-Yr	5.6	8.6	4.2
		25-Yr	6.2	9.5	6.3
		100-Yr	8.1	12.5	9.9
EDD-2	8.2	2-Yr	7.6	10.9	3.7
		10-Yr	17.9	25.5	14.0
		25-Yr	19.8	28.4	17.1
		100-Yr	26.3	37.5	24.1
EDD-3	22.6	2-Yr	26.9	38.4	11.1
		10-Yr	63.5	90.7	35.9
		25-Yr	70.7	101.0	44.5
		100-Yr	93.7	133.8	63.0

LEE'S SUMMIT MIDDLE SCHOOL #4
TABLE 2 - PRE AND POST CONSTRUCTION HYDRAULIC AND ENERGY GRADE LINES IN STREAM

		2-Year				10-Year				25-Year				100-Year			
Sta	Cond	Q	HGL	V	EGL	Q	HGL	V	EGL	Q	HGL	V	EGL	Q	HGL	V	EGL
		cfs	ft	fps	ft	cfs	ft	fps	ft	cfs	ft	fps	ft	cfs	ft	fps	ft
26+75	Pre	129.06	1010.14	3.01	1010.28	183.68	1010.42	3.03	1010.56	215.58	1010.53	3.12	1010.68	332.59	1010.83	3.46	1011.02
	Post	129.06	1010.14	3.01	1010.28	183.68	1010.42	3.03	1010.56	215.58	1010.53	3.12	1010.68	332.59	1010.83	3.46	1011.02
	Delta (ft)		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
22+40	Pre	146.47	1002.50	3.99	1002.75	210.34	1002.86	4.36	1002.86	247.63	1003.04	4.54	1003.36	382.66	1003.58	5.05	1003.98
	Post	144.37	1002.49	3.95	1002.73	208.94	1002.85	4.35	1003.14	247.83	1003.05	4.52	1003.37	384.46	1003.59	5.06	1003.99
	Delta (ft)		-0.01		-0.02		-0.01		0.28		0.01		0.01		0.01		0.01
17+66	Pre	186.16	998.15	5.40	998.60	267.90	998.99	5.24	999.42	315.62	999.42	4.99	999.81	487.92	1000.20	5.04	1000.59
	Post	190.06	998.24	5.33	998.68	271.80	999.02	5.26	998.68	312.92	999.39	5.01	999.78	485.72	1000.19	5.04	1000.58
	Delta		0.09		0.08		0.03		-0.74		-0.03		-0.03		-0.01		-0.01
9+10	Pre	198.81	988.24	4.15	988.51	288.08	988.63	4.55	988.95	340.20	988.83	4.73	989.18	526.59	989.40	5.29	989.83
	Post	202.71	988.27	4.14	988.54	291.98	988.65	4.55	988.97	337.50	988.81	4.73	989.16	524.39	989.38	5.29	989.81
	Delta (ft)		0.03		0.03		0.02		0.02		-0.02		-0.02		-0.02		-0.02
3+35	Pre	216.20	982.43	4.82	982.78	314.53	982.92	5.31	983.36	371.95	983.17	5.52	983.65	576.15	983.91	6.16	984.50
	Post	200.40	982.32	4.74	982.67	298.73	982.85	5.23	983.27	345.75	982.87	5.23	983.27	545.45	983.81	6.08	984.38
	Delta (ft)		-0.11		-0.11		-0.07		-0.09		-0.30		-0.38		-0.10		-0.12
1+61	Pre	276.54	982.18	5.27	982.61	403.76	982.79	5.81	983.31	478.08	983.08	6.07	983.65	741.06	983.95	6.77	984.66
	Post	260.74	982.09	5.22	982.51	387.96	982.71	5.75	983.22	451.88	982.98	5.97	983.53	710.36	983.86	6.70	984.57
	Delta (ft)		-0.09		-0.10		-0.08		-0.09		-0.10		-0.12		-0.09		-0.09

DWG: F:\2020\0001-0500\020-0103\40-design\AutoCAD\preliminary plans\Sheets\GNCV\C_COR02_0200103.dwg USER: sgillard
DATE: May 08, 2020 11:26am XREFS: C_XBASE_0200103 C_PBASE_0200103 V_XBOU_00103 C_PTBLK_0200103 C_PSURF_0200103

LEGEND

- PROPERTY LINE
- LOT LINE
- UTILITY EASEMENT
- STREAM BUFFER ENCROACHMENT (32,509 SF)
- STREAM BUFFER ADDITION (33,236 SF)

N

0' 50' 100' 200'
SCALE IN FEET

EX-1

STREAM BUFFER ENCROACHMENT EXHIBIT

13-20102-90

WAIVER APPLICATION

Issue Date: 05.08.20
REVISIONS

LEE'S SUMMIT MIDDLE SCHOOL #4

Lee's Summit, MO

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DLR Group

LEE'S SUMMIT MIDDLE SCHOOL #4
PRE AND POST CONSTRUCTION SHEAR STRESS ANALYSIS IN STREAM
(SEDIMENT TRANSPORT)

TABLE 3 - AVERAGE APPLIED SHEAR STRESS													
Storm Event		10-Year				25-Year				100-Year			
Sta	Cond	Q	R	S	To	Q	R	S	To	Q	R	S	To
		cfs	ft2/ft	ft/ft	psf	cfs	ft2/ft	ft/ft	psf	cfs	ft2/ft	ft/ft	psf
26+75	Pre	183.68	0.82	0.007	0.36	215.58	0.84	0.007	0.37	332.59	0.99	0.007	0.43
	Post	183.68	0.82	0.007	0.36	215.58	0.84	0.007	0.37	332.59	0.99	0.007	0.43
22+40	Pre	210.34	1.39	0.007	0.61	247.63	1.48	0.007	0.65	382.66	1.74	0.007	0.76
	Post	208.94	1.38	0.007	0.60	247.83	1.48	0.007	0.65	384.46	1.75	0.007	0.76
17+66	Pre	267.90	1.84	0.005	0.57	315.62	1.71	0.005	0.53	487.92	1.73	0.005	0.54
	Post	271.80	1.84	0.005	0.57	312.92	1.71	0.005	0.53	485.72	1.73	0.005	0.54
9+10	Pre	288.08	1.57	0.006	0.59	340.20	1.57	0.006	0.59	526.59	1.86	0.006	0.70
	Post	291.98	1.49	0.006	0.56	337.50	1.57	0.006	0.59	524.39	1.85	0.006	0.69
3+35	Pre	314.53	1.86	0.005	0.58	371.95	1.99	0.005	0.62	576.15	2.34	0.005	0.73
	Post	298.73	1.83	0.005	0.57	345.75	1.94	0.005	0.60	545.45	2.29	0.005	0.72
1+61	Pre	403.76	2.14	0.004	0.53	478.08	2.28	0.004	0.57	741.06	2.68	0.004	0.67
	Post	387.96	2.10	0.004	0.53	451.88	2.23	0.004	0.56	710.36	2.64	0.004	0.66

TABLE 4 - PRE VS POST APPLIED STRESS			
Sta	10-Yr	25-Yr	100-Yr
26+75	0.0%	0.0%	0.0%
22+40	-0.4%	0.3%	0.3%
17+66	0.2%	0.1%	-0.1%
9+10	-5.3%	-0.3%	-0.3%
3+35	-1.8%	-2.7%	-2.1%
1+61	-1.6%	-2.1%	-1.6%

TABLE 5 - RATIO To vs Tc (POST CONSTRUCTUION)					
Sta	Channel Material	Tc	10-Yr	25-Yr	100-Yr
26+75	Course Gravel	0.670	0.53	0.55	0.65
22+40	Course Gravel	0.670	0.90	0.97	1.14
17+66	Course Gravel	0.670	0.86	0.80	0.81
9+10	Silts to Cobbles	0.800	0.70	0.73	0.87
3+35	Silts to Cobbles	0.800	0.71	0.75	0.89
1+61	Silts to Cobbles	0.800	0.66	0.70	0.82