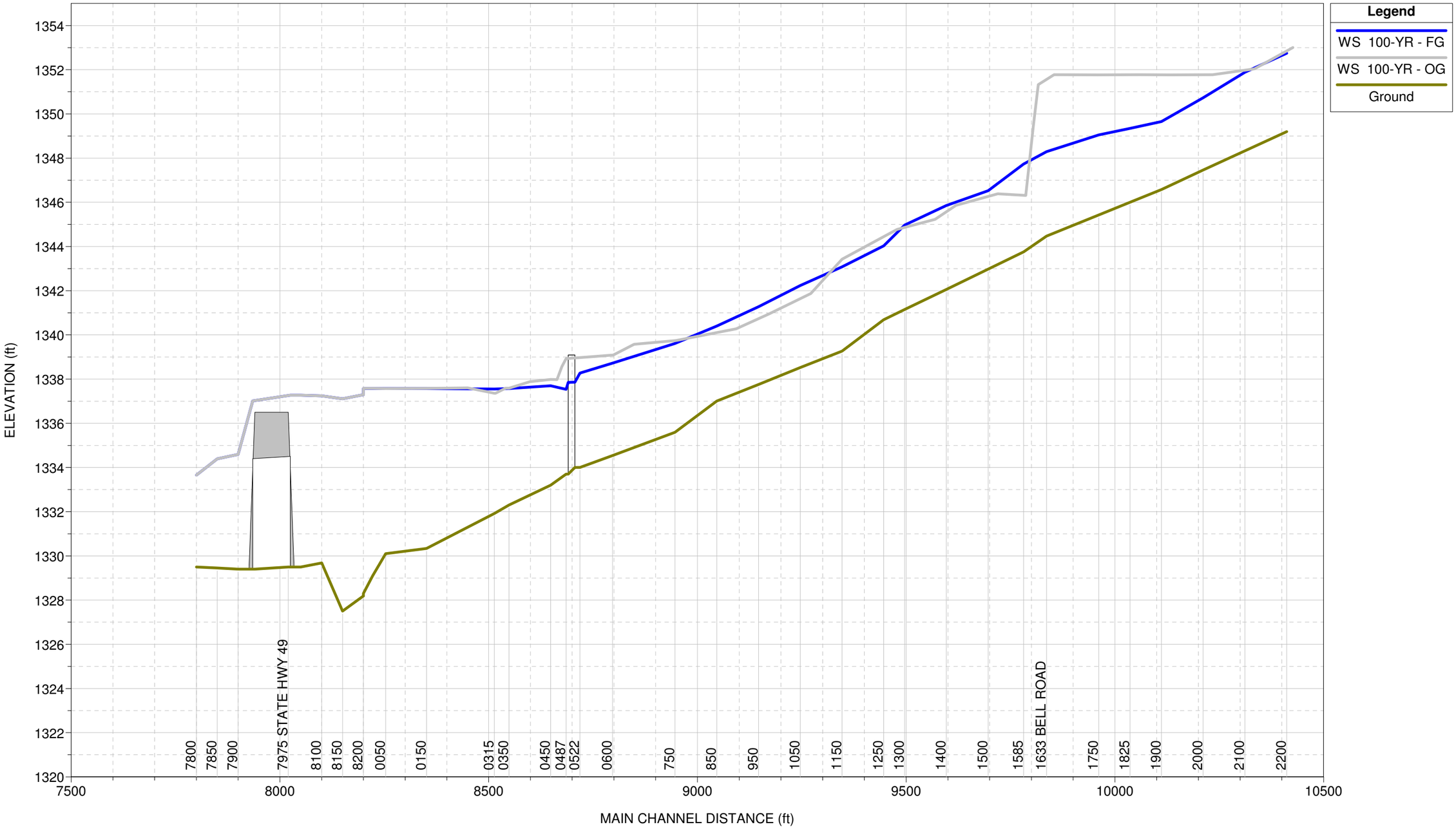
Rock Creek Tributary

FIGURE 7 - WS PROFILE COMPARISON OF PRE- AND POST- PROJECT CONDITION, 100-YR



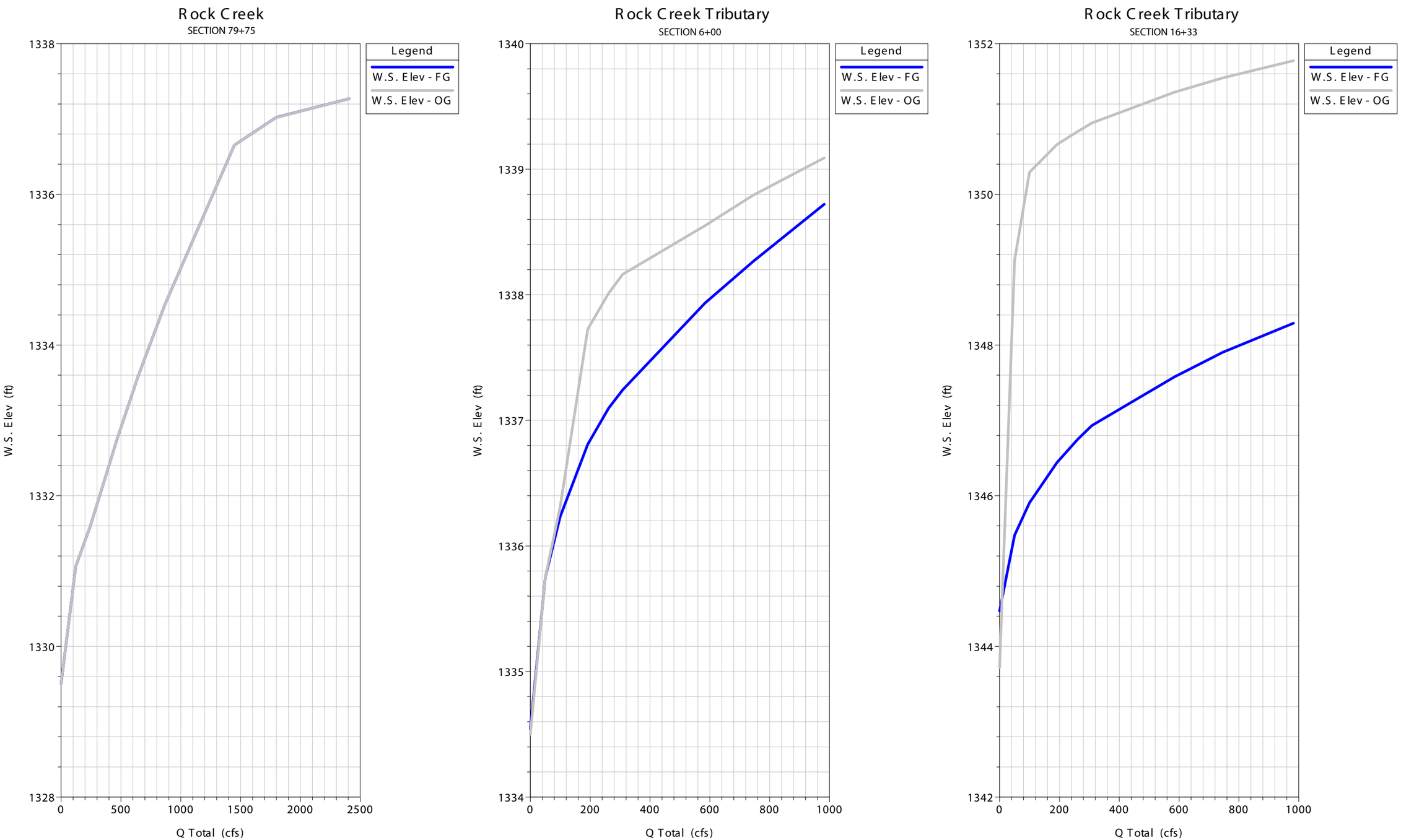
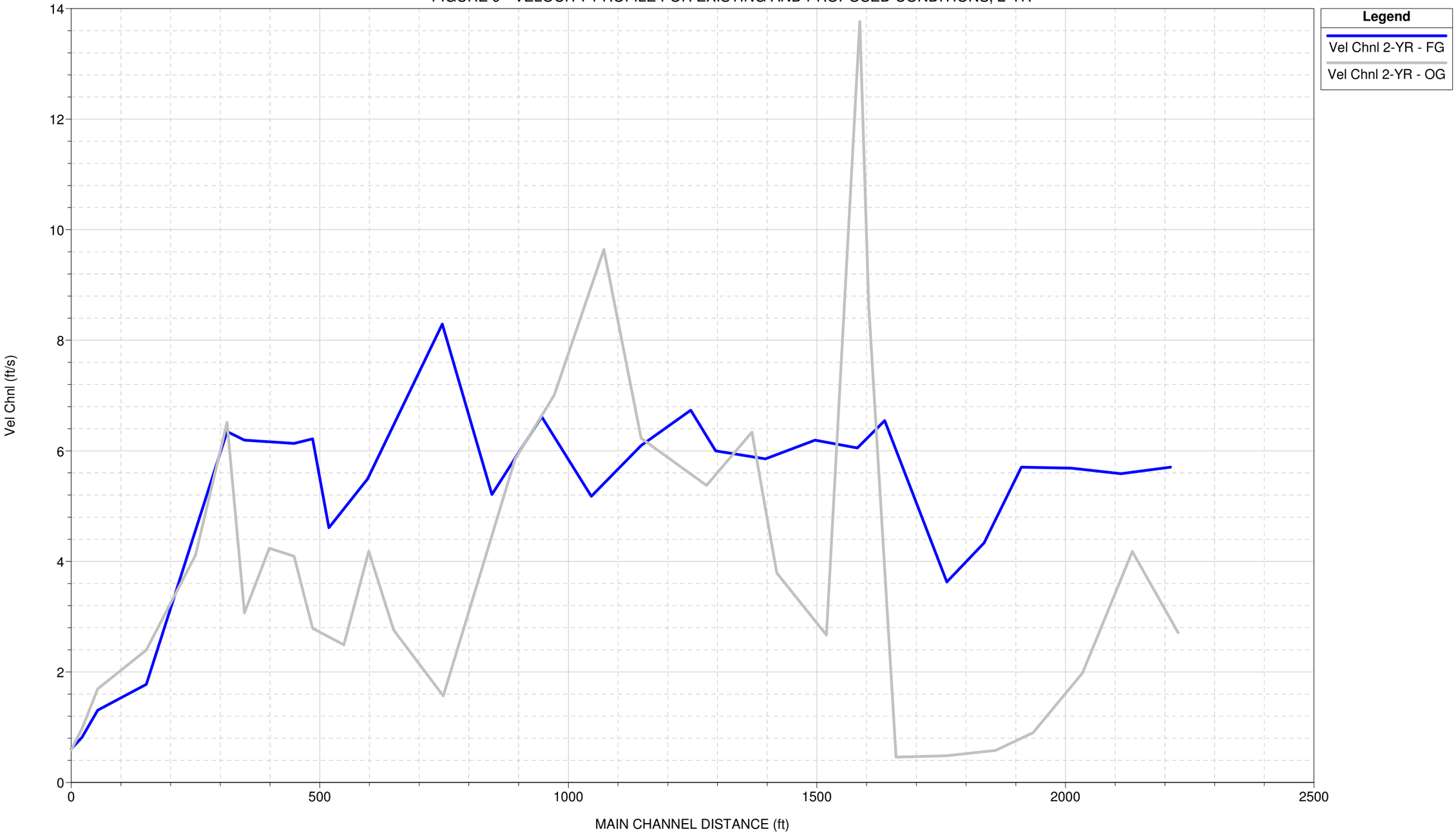


Figure 8: Rating curves summarizing water surface elevation vs. discharge

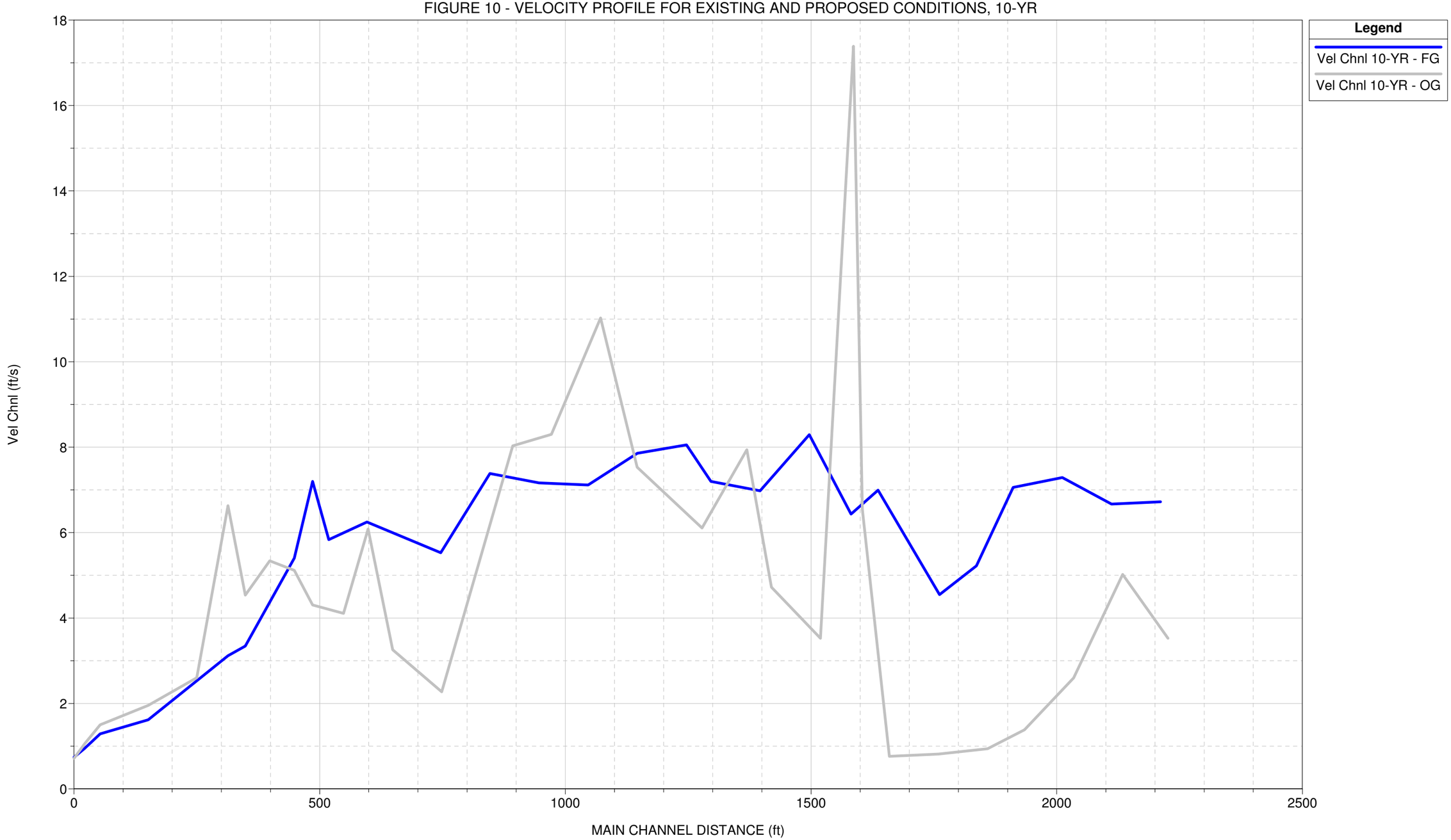
Rock Creek Tributary

FIGURE 9 - VELOCITY PROFILE FOR EXISTING AND PROPOSED CONDITIONS, 2-YR



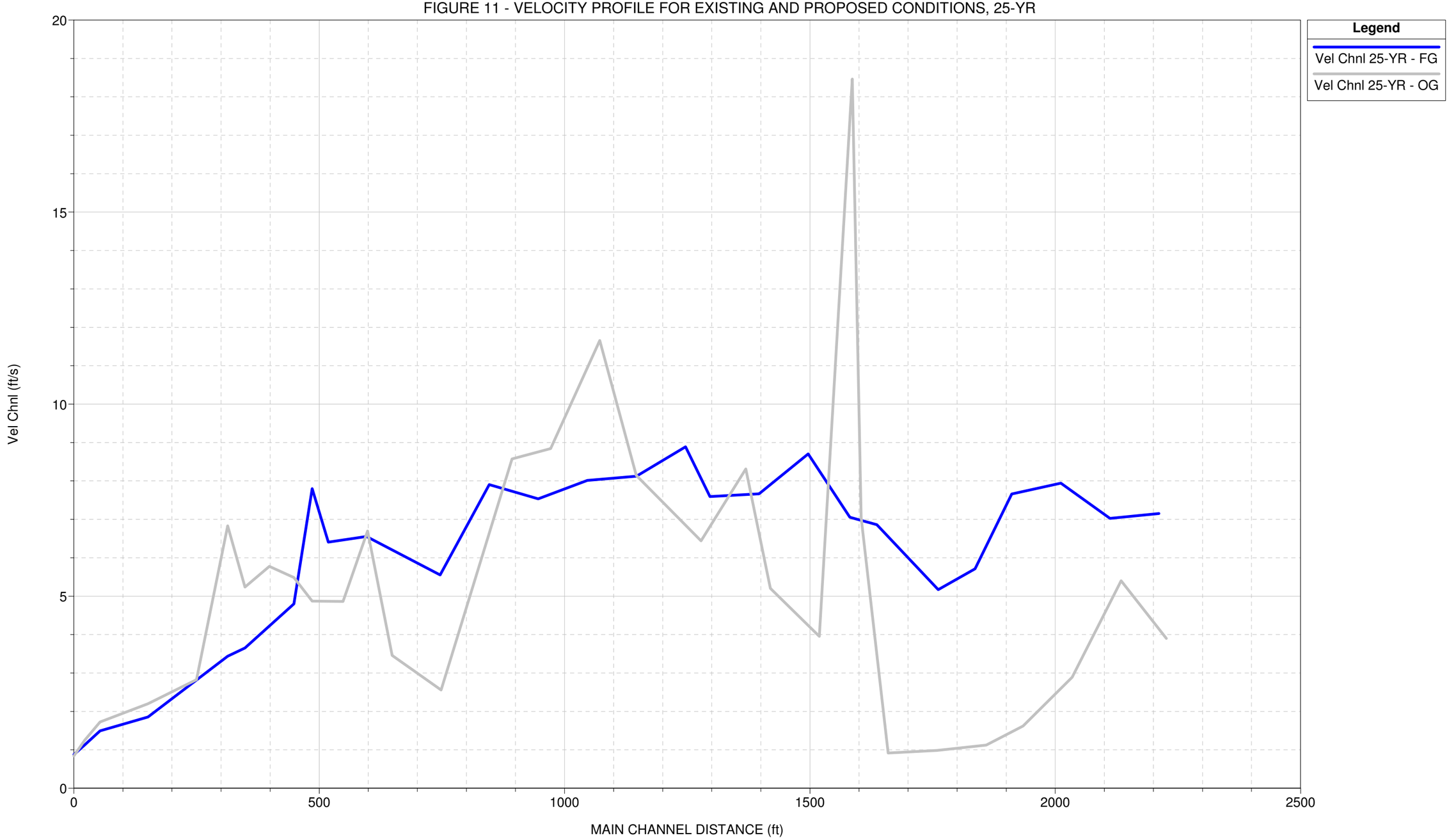
Rock Creek Tributary

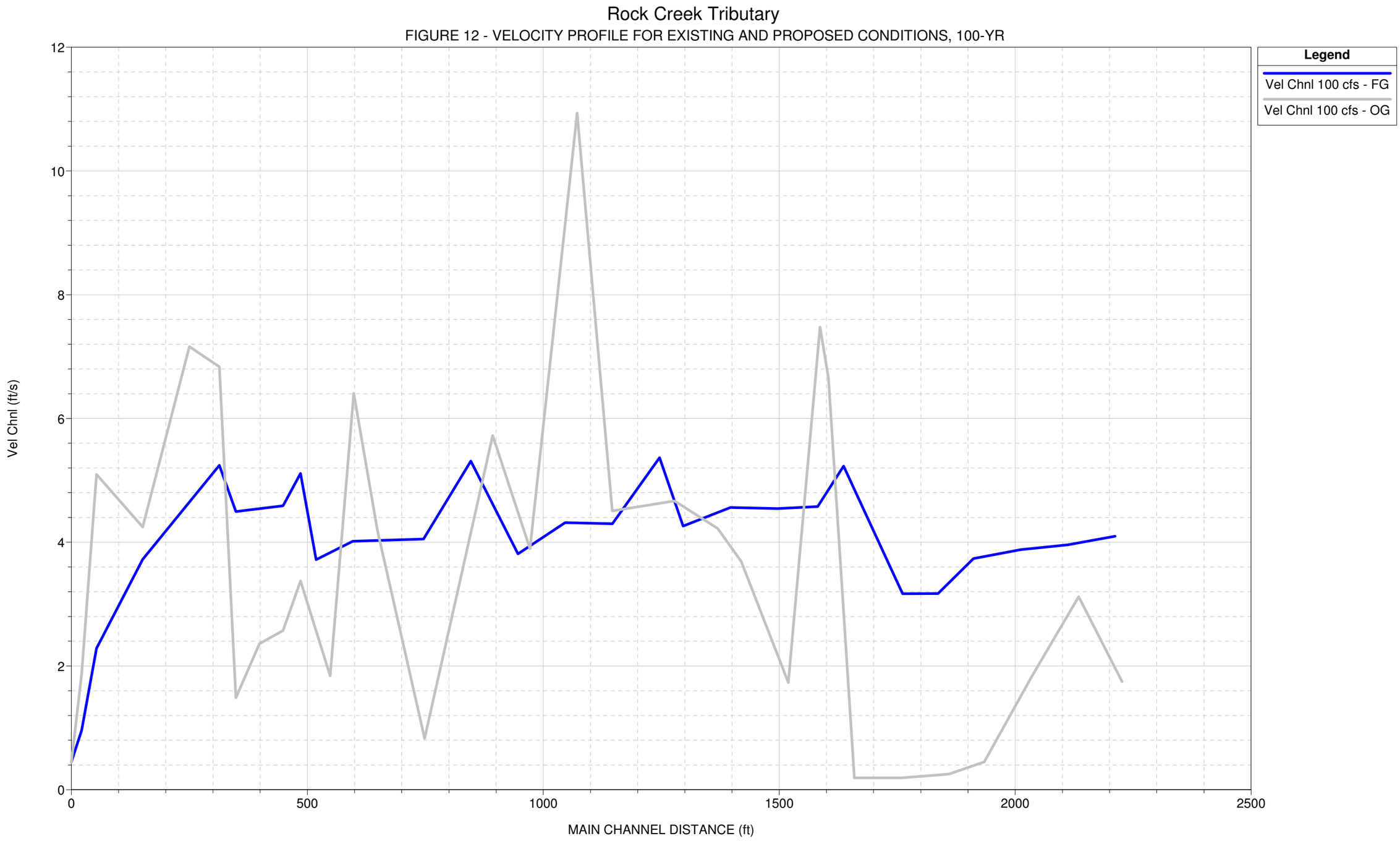
FIGURE 10 - VELOCITY PROFILE FOR EXISTING AND PROPOSED CONDITIONS, 10-YR



Rock Creek Tributary

FIGURE 11 - VELOCITY PROFILE FOR EXISTING AND PROPOSED CONDITIONS, 25-YR




Rock Creek Tributary
FIGURE 12 - VELOCITY PROFILE FOR EXISTING AND PROPOSED CONDITIONS, 100-YR
Legend
Vel Chnl 100 cfs - FG
Vel Chnl 100 cfs - OG
Vel Chnl (ft/s)
0
2
4
6
8
10
12
0
500
1000
1500
2000
2500
MAIN CHANNEL DISTANCE (ft)

A-1 Manning's *n* Calculations

Computation

HDR

Project	ROCK CREEK RESTORATION MANAGEMENT PLAN	Computed	MCG	Date	6/17/06
Subject	MANNING'S-N VALUE CALCULATION	Checked		Date	
Task	SUMMARY SHEET	Sheet	1	Of	2

Stream: ROCK CREEK TRIBUTARY
Location:
Aerial Picture Attached:
Photographs (#'s and locations)

Calculation of n-value:
n = (nb + n1 + n2 + n3 + n4)m

where:	Description of Range
nb = base n value for surface	*median size btwn 1" and 2.5"=0.028 to 0.035, btwn 2.5" and 10"=0.030 to 0.050*
n1 = surface irregularity factor	*smooth = 0 up to severe at 0.020*
n2 = cross section variation factor	*gradual = 0 up to alternating frequently at 0.015*
n3 = obstructions factor	*negligible = 0 up to severe (over 50% of cross section) at 0.015*
n4 = vegetation factor	*small = 0.002 to very lg (av depth of flow is less than 1/2 height of veg) at 0.100*
m = sinuosity/meandering factor	*minor = 1.0, appreciable = 1.15, Severe = 1.30*

Summary of n-values:

Existing Conditions:

LEFT OVERBANK			MAIN CHANNEL	RIGHT OVERBANK		
	LOB 6 TO 22	LOB 0 TO 6	Clayee-Silt/Gravel	ROB		
	0.047	0.077	0.031	0.047		

Proposed Conditions:

LEFT OVERBANK			MAIN CHANNEL	RIGHT OVERBANK		
		LOB		ROB		
		Moderate Veg	Native Material	Moderate Veg		
		0.055	0.031	0.055		

Computation

HDR

Project	ROCK CREEK RESTORATION MASTER PLAN	Computed	MCG	Date	6/17/06
Subject	N VALUE CALCULATIONS	Checked		Date	
Task	MAIN CHANNEL	Sheet	1	Of	2

Stream: ROCK CREEK TRIBUTARY
Location:
Aerial Picture Attached: no
Photographs:

Is roughness uniform throughout the reach? YES
Note: If not, n-value should be assigned for the AVERAGE condition of the reach

Is roughness uniformly distributed along the cross section? NO
Is a division between the channel and floodplain necessary? YES

Calculation of n-value:
n = (nb + n1 + n2 + n3 + n4)m
where:

	Description of Range
nb = base n value for surface	*median size btwn 1" and 2.5"=0.028 to 0.035, btwn 2.5" and 10"=0.030 to 0.050*
n1 = surface irregularity factor	*smooth = 0 up to severe at 0.020*
n2 = cross section variation factor	*gradual = 0 up to alternating frequently at 0.015*
n3 = obstructions factor	*negligible = 0 up to severe (over 50% of cross section) at 0.015*
n4 = vegetation factor	*small = 0.002 to very lg (av depth of flow is less than 1/2 height of veg) at 0.100*
m = sinuosity/meandering factor	*minor = 1.0, appreciable = 1.15, Severe = 1.30*

Base n value for surface

nb: Sand channel? NO if yes, median size of bed matl? NA

nb = **0.012**

median size (mm)	nb
0.2	0.012
0.3	0.017
0.4	0.020
0.5	0.022
0.6	0.023
0.8	0.025
1.0	0.026

All other channels:

nb = **0.028**

median size (in)	nb
.04 to .08	0.026 to 0.035
1 to 2.5	0.028 to 0.035
2.5 to 10	0.030 to 0.050
>10	0.040 to 0.070

Notes: MEDIAN PARTICLE SIZE BASED UPON VISUAL OBSERVATION

Surface Irregularity

n1:

Smooth	Is channel smooth? YES *The channel consists of a sand base and is very flat and smooth.*	if yes, n1 = 0
Minor	Is channel in good condition with slightly eroded or scoured side slopes?	if yes, n1 = 0.001 - 0.005
Moderate	Is channel a dredged channel having moderate to considerable bed roughness and moderately sloughed or eroded side slopes in rock? *no*	if yes, n1 = 0.006 - 0.010
Severe	Is channel badly sloughed, scalloped banks or badly eroded or sloughed sides or jagged and irregular surface?	if yes, n1 = 0.011 - 0.020

n1 = **0.002**

Notes: CHANNEL IS IN GOOD CONDITION. WITH MINOR EVIDENCE OF ERODED OR SCOURED SIDE SLOPES.

Cross Section Variation Factor

n2:

Gradual	Does the size and shape of the channel cross section change gradually?	if yes, n2 = 0.000
Alternately occasionally	Does the cross section alternate to large to small, *occasionally* or does the main flow *occasionally* shift from side to side?	if yes, n2 = 0.001 - 0.005

Alternately frequently	Does the cross section alternate to large to small, *frequently* or does the main flow *frequently* shift from side to side?	if yes, n2 = 0.010 - 0.015

n2 = **0.000**

Notes: THE EXISTING CHANNEL IS FAIRLY UNIFORM THROUGHOUT IT'S REACH.

Obstructions factor

n3:

Negligible	Does the stream have a few scattered obstructions that occupy < 5% of the cross-sectional area?	if yes, n3 = 0.000 - 0.004
Minor	Obstructions occupy < 15% of the cross-sectional area and the spacing btwn obstructions is such that the sphere of influence doesn't extend to other obstructions?	if yes, n3 = 0.005 - 0.015
Appreciable	Obstructions occupy 15% - 50% of the cross-sectional area and the spacing btwn obstructions is small enough to be additive?	if yes, n3 = 0.020 - 0.030
Severe	Obstructions occupy more than 50% of the cross-sectional area or the spacing btwn obstructions causes turbulence?	if yes, n3 = 0.040 - 0.050

n3 = **0.001**

Notes: OBSTRUCTIONS INCLUDE MEDIAL GRAVEL BARS AND DEBRIS. THESE ARE ASSUMED TO BE NEGLIGIBLE.

Vegetation factor

n4:

Small	Does the channel have dense growth of flexible turf grass or weed growth where the flow is at least 2 times the hght of the vegetation; tree seedlings of willows, cottonwoods, etc?	if yes, n4 = 0.002 - 0.010
Medium	Does the channel have turf grass where the ave depth of flow is 1 to 2 times the hght of the vegetation; moderately stemmy grass, weeds or tree seedlings growing where the flow is 2 to 3 times the height of the vegetation?	if yes, n4 = 0.010 - 0.025
Large	Does the channel where the ave. depth of flow is equal to the hght of the vegetation; 8 to 10 y.o. willows, cottonwoods intergrown with weeds and brush; where the R = 0.6 m (1.97 ft) or bushy willows of 1 y.o.are in the channel bottom, where R = 0.61 (2.0	if yes, n4 = 0.025 -0.050
Very large	Does the channel have turf grass growing where the ave depth of flow < 1/2 the hght of the vegetation; bushy willows about 1 y.o. with weeds intergrown on side slopes; dense cattails in channel btm; trees intergrown with weeds and brush?	if yes, n4 = 0.050 - 0.100

n4 = **0.000**

Notes: NO VEGETATION IN MAIN CHANNEL

Sinuosity/meandering factor

m

Minor	Ratio of the channel length to valley length in 1.0 to 1.2	if yes, m = 1.00
Appreciable	Ratio of the channel length to valley length in 1.2 to 1.5	if yes, m = 1.15
Severe	Ratio of the channel length to valley length > 1.5	if yes, m = 1.30

m = **1.00**

Notes: Ratio of channel length to valley length

Channel length	1254
Valley length	1200
Ratio =	1.05

n = **0.031**

Computation

HDR

Project	ROCK CREEK RESTORATION MASTER PLAN	Computed	MCG	Date	6/17/06
Subject	N VALUE CALCULATIONS	Checked		Date	
Task	LEFT OVERBANK 6+00 TO 22+00	Sheet	1	Of	2

Stream: ROCK CREEK TRIBUTARY
Location:
Aerial Picture Attached: no
Photographs:

Is roughness uniform throughout the reach? NO
Note: If not, n-value should be assigned for the AVERAGE condition of the reach

Is roughness uniformly distributed along the cross section? NO
Is a division between the channel and floodplain necessary? YES

Calculation of n-value:
n = (nb + n1 + n2 + n3 + n4)m

where:	Description of Range
nb = base n value for surface	*median size btwn 1" and 2.5"=0.028 to 0.035, btwn 2.5" and 10"=0.030 to 0.050*
n1 = surface irregularity factor	*smooth = 0 up to severe at 0.020*
n2 = cross section variation factor	*gradual = 0 up to alternating frequently at 0.015*
n3 = obstructions factor	*negligible = 0 up to severe (over 50% of cross section) at 0.015*
n4 = vegetation factor	*small = 0.002 to very lg (av depth of flow is less than 1/2 height of veg) at 0.100*
m = sinuosity/meandering factor	*minor = 1.0, appreciable = 1.15, Severe = 1.30*

Base n value for surface

nb: Sand channel? No if yes, median size of bed mat'l? _____

nb =

median size (mm)	nb
0.2	0.012
0.3	0.017
0.4	0.020
0.5	0.022
0.6	0.023
0.8	0.025
1.0	0.026

All other channels:

median size (in)	nb
.04 to .08	0.026 to 0.035
1 to 2.5	0.028 to 0.035
2.5 to 10	0.030 to 0.050
>10	0.040 to 0.070

nb = **0.03**

Notes: The ground surface consists of mostly soil with very few rocks present.

Surface Irregularity

n1:	Smooth	Is channel smooth? NO *Compares to the smoothest, flattest floodplain in a given bed material.*	if yes, n1 = 0
	Minor	Is channel in good condition with slightly eroded or scoured side slopes? *The ground surface is fairly flat - roaming hills.*	if yes, n1 = 0.001 - 0.005
	Moderate	Is channel a dredged channel having moderate to considerable bed roughness and moderately sloughed or eroded side slopes in rock?	if yes, n1 = 0.006 - 0.010
	Severe	Is channel badly sloughed, scalloped banks or badly eroded or sloughed sides or jagged and irregular surface?	if yes, n1 = 0.011 - 0.020

n1 = **0.001**

Notes: MINOR IRREGULARITY THROUGHOUT REACH

Cross Section Variation Factor

n2:	Gradual	Does the size and shape of the channel cross section change gradually?	if yes, n2 = 0.000
	Alternately occasionally	Does the cross section alternate to large to small, *occasionally* or does the main flow *occasionally* shift from side to side? *The cross-section of this area is generally fairly wide.*	if yes, n2 = 0.001 - 0.005
	Alternately frequently	Does the cross section alternate to large to small, *frequently* or does the main flow *frequently* shift from side to side?	if yes, n2 = 0.010 - 0.015

n2 = **0.001**

Notes: CROSS SECTION REMAINS FAIRLY CONSTANT THROUGHOUT REACH

Obstructions factor

n3:	Negligible	Does the stream have a few scattered obstructions that occupy < 5% of the cross-sectional area?	if yes, n3 = 0.000 - 0.004
	Minor	Obstructions occupy < 15% of the cross-sectional area and the spacing btwn obstructions is such that the sphere of influence doesn't extend to other obstructions?	if yes, n3 = 0.005 - 0.015
	Appreciable	Obstructions occupy 15% - 50% of the cross-sectional area and the spacing btwn obstructions is small enough to be additive?	if yes, n3 = 0.020 - 0.030
	Severe	Obstructions occupy more than 50% of the cross-sectional area or the spacing btwn obstructions causes turbulence?	if yes, n3 = 0.040 - 0.050

n3 = **0.005**

Notes: STRUCTURES AND DEBRIS EXISTING ALONG THE LEFT OVERBANK. THESE OBSTRUCTIONS ARE CLASSIFIED AS MINOR.

Vegetation factor

n4:	Small	Does the channel have dense growth of flexible turf grass or weed growth where the flow is at least 2 times the height of the vegetation; tree seedlings of willows, cottonwoods, etc?	if yes, n4 = 0.002 - 0.010
	Medium	Does the channel have turf grass where the ave depth of flow is 1 to 2 times the height of the vegetation; moderately stemmy grass, weeds or tree seedlings growing where the flow is 2 to 3 times the height of the vegetation?	if yes, n4 = 0.010 - 0.025
	Large	Does the channel where the ave. depth of flow is equal to the height of the vegetation; 8 to 10 y.o. willows, cottonwoods intergrown with weeds and brush; where the R = 0.6 m (1.97 ft) or bushy willows of 1 y.o.are in the channel bottom, where R = 0.61 (2	if yes, n4 = 0.025 -0.050
	Very large	Does the channel have turf grass growing where the ave depth of flow < 1/2 the hght of the vegetation; bushy willows about 1 y.o. with weeds intergrown on side slopes; dense cattails in channel btm; trees intergrown with weeds and brush?	if yes, n4 = 0.050 - 0.100

n4 = **0.010**

Notes: TREES AND SHRUBS EXIST MODERATELY ALONG THE LEFT OVERBANK. UNDER GROWTH IS COMPOSED PRIMARILY OF PERRENIAL GRASSES.

Sinuosity/meandering factor

m	Minor	Ratio of the channel length to valley length in 1.0 to 1.2	if yes, m = 1.00
	Appreciable	Ratio of the channel length to valley length in 1.2 to 1.5	if yes, m = 1.15
	Severe	Ratio of the channel length to valley length > 1.5	if yes, m = 1.30

m = **1.00**

Notes: Ratio of channel length to valley length

Channel length	4700
Valley length	4530
Ratio =	1.04

n = **0.047**

Computation

Project	ROCK CREEK RESTORATION MASTER PLAN	Computed	MCG	Date	6/17/06
Subject	N VALUE CALCULATIONS	Checked		Date	
Task	LEFT AND RIGHT OVERBANK 0+00 TO 6+00	Sheet	1	Of	2

Stream: ROCK CREEK TRIBUTARY
Location:
Aerial Picture Attached: no
Photographs:

Is roughness uniform throughout the reach? NO
Note: If not, n-value should be assigned for the AVERAGE condition of the reach

Is roughness uniformly distributed along the cross section? NO
Is a division between the channel and floodplain necessary? YES

Calculation of n-value:
n = (nb + n1 + n2 + n3 + n4)m

where:	Description of Range
nb = base n value for surface	*median size btwn 1" and 2.5"=0.028 to 0.035, btwn 2.5" and 10"=0.030 to 0.050*
n1 = surface irregularity factor	*smooth = 0 up to severe at 0.020*
n2 = cross section variation factor	*gradual = 0 up to alternating frequently at 0.015*
n3 = obstructions factor	*negligible = 0 up to severe (over 50% of cross section) at 0.015*
n4 = vegetation factor	*small = 0.002 to very lg (av depth of flow is less than 1/2 height of veg) at 0.100*
m = sinuosity/meandering factor	*minor = 1.0, appreciable = 1.15, Severe = 1.30*

Base n value for surface

nb: Sand channel? No if yes, median size of bed mat'l? _____

nb =

median size (mm)	nb
0.2	0.012
0.3	0.017
0.4	0.020
0.5	0.022
0.6	0.023
0.8	0.025
1.0	0.026

All other channels:

median size (in)	nb
.04 to .08	0.026 to 0.035
1 to 2.5	0.028 to 0.035
2.5 to 10	0.030 to 0.050
>10	0.040 to 0.070

nb = **0.03**

Notes: The ground surface consists of mostly soil with very few rocks present.

Surface Irregularity

n1:	Smooth	Is channel smooth? NO *Compares to the smoothest, flattest floodplain in a given bed material.*	if yes, n1 = 0
	Minor	Is channel in good condition with slightly eroded or scoured side slopes? *The ground surface is fairly flat - roaming hills.*	if yes, n1 = 0.001 - 0.005
	Moderate	Is channel a dredged channel having moderate to considerable bed roughness and moderately sloughed or eroded side slopes in rock?	if yes, n1 = 0.006 - 0.010
	Severe	Is channel badly sloughed, scalloped banks or badly eroded or sloughed sides or jagged and irregular surface?	if yes, n1 = 0.011 - 0.020

n1 = **0.001**

Notes: MINOR IRREGULARITY THROUGHOUT REACH

Cross Section Variation Factor

n2:	Gradual	Does the size and shape of the channel cross section change gradually?	if yes, n2 = 0.000
	Alternately occasionally	Does the cross section alternate to large to small, *occasionally* or does the main flow *occasionally* shift from side to side? *The cross-section of this area is generally fairly wide.*	if yes, n2 = 0.001 - 0.005
	Alternately frequently	Does the cross section alternate to large to small, *frequently* or does the main flow *frequently* shift from side to side?	if yes, n2 = 0.010 - 0.015

n2 = **0.001**

Notes: CROSS SECTION REMAINS FAIRLY CONSTANT THROUGHOUT REACH

Obstructions factor

n3:	Negligible	Does the stream have a few scattered obstructions that occupy < 5% of the cross-sectional area?	if yes, n3 = 0.000 - 0.004
	Minor	Obstructions occupy < 15% of the cross-sectional area and the spacing btwn obstructions is such that the sphere of influence doesn't extend to other obstructions?	if yes, n3 = 0.005 - 0.015
	Appreciable	Obstructions occupy 15% - 50% of the cross-sectional area and the spacing btwn obstructions is small enough to be additive?	if yes, n3 = 0.020 - 0.030
	Severe	Obstructions occupy more than 50% of the cross-sectional area or the spacing btwn obstructions causes turbulence?	if yes, n3 = 0.040 - 0.050

n3 = **0.005**

Notes: STRUCTURES AND DEBRIS EXISTING ALONG THE LEFT OVERBANK. THESE OBSTRUCTIONS ARE CLASSIFIED AS MINOR.

Vegetation factor

n4:	Small	Does the channel have dense growth of flexible turf grass or weed growth where the flow is at least 2 times the height of the vegetation; tree seedlings of willows, cottonwoods, etc?	if yes, n4 = 0.002 - 0.010
	Medium	Does the channel have turf grass where the ave depth of flow is 1 to 2 times the height of the vegetation; moderately stemmy grass, weeds or tree seedlings growing where the flow is 2 to 3 times the height of the vegetation?	if yes, n4 = 0.010 - 0.025
	Large	Does the channel where the ave. depth of flow is equal to the height of the vegetation; 8 to 10 y.o. willows, cottonwoods intergrown with weeds and brush; where the R = 0.6 m (1.97 ft) or bushy willows of 1 y.o.are in the channel bottom, where R = 0.61 (2	if yes, n4 = 0.025 -0.050
	Very large	Does the channel have turf grass growing where the ave depth of flow < 1/2 the hght of the vegetation; bushy willows about 1 y.o. with weeds intergrown on side slopes; dense cattails in channel btm; trees intergrown with weeds and brush?	if yes, n4 = 0.050 - 0.100

n4 = **0.040**

Notes: TREES AND SHRUBS EXIST HEAVILY THOUGHOUT THE LOWER REACH

Sinuosity/meandering factor

m	Minor	Ratio of the channel length to valley length in 1.0 to 1.2	if yes, m = 1.00
	Appreciable	Ratio of the channel length to valley length in 1.2 to 1.5	if yes, m = 1.15
	Severe	Ratio of the channel length to valley length > 1.5	if yes, m = 1.30

m = **1.00**

Notes: Ratio of channel length to valley length

Channel length	4700
Valley length	4530
Ratio =	1.04

n = **0.077**

Computation

Project	ROCK CREEK RESTORATION MASTER PLAN	Computed	MCG	Date	6/17/06
Subject	N VALUE CALCULATIONS	Checked		Date	
Task	LEFT OVERBANK 6+00 TO 22+00	Sheet	1	Of	2

Stream: ROCK CREEK TRIBUTARY
Location:
Aerial Picture Attached: no
Photographs:

Is roughness uniform throughout the reach? NO
Note: If not, n-value should be assigned for the AVERAGE condition of the reach

Is roughness uniformly distributed along the cross section? NO
Is a division between the channel and floodplain necessary? YES

Calculation of n-value:
n = (nb + n1 + n2 + n3 + n4)m

where:	Description of Range
nb = base n value for surface	*median size btwn 1" and 2.5"=0.028 to 0.035, btwn 2.5" and 10"=0.030 to 0.050*
n1 = surface irregularity factor	*smooth = 0 up to severe at 0.020*
n2 = cross section variation factor	*gradual = 0 up to alternating frequently at 0.015*
n3 = obstructions factor	*negligible = 0 up to severe (over 50% of cross section) at 0.015*
n4 = vegetation factor	*small = 0.002 to very lg (av depth of flow is less than 1/2 height of veg) at 0.100*
m = sinuosity/meandering factor	*minor = 1.0, appreciable = 1.15, Severe = 1.30*

Base n value for surface

nb: Sand channel? No if yes, median size of bed mat'l? _____

nb =

median size (mm)	nb
0.2	0.012
0.3	0.017
0.4	0.020
0.5	0.022
0.6	0.023
0.8	0.025
1.0	0.026

All other channels:

median size (in)	nb
.04 to .08	0.026 to 0.035
1 to 2.5	0.028 to 0.035
2.5 to 10	0.030 to 0.050
>10	0.040 to 0.070

nb = **0.03**

Notes: The ground surface consists of mostly soil with very few rocks present.

Surface Irregularity

n1:	Smooth	Is channel smooth? NO *Compares to the smoothest, flattest floodplain in a given bed material.*	if yes, n1 = 0
	Minor	Is channel in good condition with slightly eroded or scoured side slopes? *The ground surface is fairly flat - roaming hills.*	if yes, n1 = 0.001 - 0.005
	Moderate	Is channel a dredged channel having moderate to considerable bed roughness and moderately sloughed or eroded side slopes in rock?	if yes, n1 = 0.006 - 0.010
	Severe	Is channel badly sloughed, scalloped banks or badly eroded or sloughed sides or jagged and irregular surface?	if yes, n1 = 0.011 - 0.020

n1 = **0.001**

Notes: MINOR IRREGULARITY THROUGHOUT REACH

Cross Section Variation Factor

n2:	Gradual	Does the size and shape of the channel cross section change gradually?	if yes, n2 = 0.000
	Alternately occasionally	Does the cross section alternate to large to small, *occasionally* or does the main flow *occasionally* shift from side to side? *The cross-section of this area is generally fairly wide.*	if yes, n2 = 0.001 - 0.005
	Alternately frequently	Does the cross section alternate to large to small, *frequently* or does the main flow *frequently* shift from side to side?	if yes, n2 = 0.010 - 0.015

n2 = **0.001**

Notes: CROSS SECTION REMAINS FAIRLY CONSTANT THROUGHOUT REACH

Obstructions factor

n3:	Negligible	Does the stream have a few scattered obstructions that occupy < 5% of the cross-sectional area?	if yes, n3 = 0.000 - 0.004
	Minor	Obstructions occupy < 15% of the cross-sectional area and the spacing btwn obstructions is such that the sphere of influence doesn't extend to other obstructions?	if yes, n3 = 0.005 - 0.015
	Appreciable	Obstructions occupy 15% - 50% of the cross-sectional area and the spacing btwn obstructions is small enough to be additive?	if yes, n3 = 0.020 - 0.030
	Severe	Obstructions occupy more than 50% of the cross-sectional area or the spacing btwn obstructions causes turbulence?	if yes, n3 = 0.040 - 0.050

n3 = **0.005**

Notes: STRUCTURES AND DEBRIS EXISTING ALONG THE LEFT OVERBANK. THESE OBSTRUCTIONS ARE CLASSIFIED AS MINOR.

Vegetation factor

n4:	Small	Does the channel have dense growth of flexible turf grass or weed growth where the flow is at least 2 times the height of the vegetation; tree seedlings of willows, cottonwoods, etc?	if yes, n4 = 0.002 - 0.010
	Medium	Does the channel have turf grass where the ave depth of flow is 1 to 2 times the height of the vegetation; moderately stemmy grass, weeds or tree seedlings growing where the flow is 2 to 3 times the height of the vegetation?	if yes, n4 = 0.010 - 0.025
	Large	Does the channel where the ave. depth of flow is equal to the height of the vegetation; 8 to 10 y.o. willows, cottonwoods intergrown with weeds and brush; where the R = 0.6 m (1.97 ft) or bushy willows of 1 y.o.are in the channel bottom, where R = 0.61 (2	if yes, n4 = 0.025 -0.050
	Very large	Does the channel have turf grass growing where the ave depth of flow < 1/2 the hght of the vegetation; bushy willows about 1 y.o. with weeds intergrown on side slopes; dense cattails in channel btm; trees intergrown with weeds and brush?	if yes, n4 = 0.050 - 0.100

n4 = **0.010**

Notes: TREES AND SHRUBS EXIST MODERATELY ALONG THE LEFT OVERBANK. UNDER GROWTH IS COMPOSED PRIMARILY OF PERRENIAL GRASSES.

Sinuosity/meandering factor

m	Minor	Ratio of the channel length to valley length in 1.0 to 1.2	if yes, m = 1.00
	Appreciable	Ratio of the channel length to valley length in 1.2 to 1.5	if yes, m = 1.15
	Severe	Ratio of the channel length to valley length > 1.5	if yes, m = 1.30

m = **1.00**

Notes: Ratio of channel length to valley length

Channel length	4700
Valley length	4530
Ratio =	1.04

n = **0.047**

Computation

HDR

Project	ROCK CREEK RESTORATION MASTER PLAN	Computed	MCG	Date	6/17/06
Subject	N VALUE CALCULATIONS	Checked		Date	
Task	PROPOSED CONDITIONS RIGHT AND LEFT OVERBANK	Sheet	1	Of	2

Stream: ROCK CREEK TRIBUTARY
Location:
Aerial Picture Attached: no
Photographs:

Is roughness uniform throughout the reach? NO
Note: If not, n-value should be assigned for the AVERAGE condition of the reach

Is roughness uniformly distributed along the cross section? NO
Is a division between the channel and floodplain necessary? YES

Calculation of n-value:
n = (nb + n1 + n2 + n3 + n4)m

where:	Description of Range
nb = base n value for surface	*median size btwn 1" and 2.5"=0.028 to 0.035, btwn 2.5" and 10"=0.030 to 0.050*
n1 = surface irregularity factor	*smooth = 0 up to severe at 0.020*
n2 = cross section variation factor	*gradual = 0 up to alternating frequently at 0.015*
n3 = obstructions factor	*negligible = 0 up to severe (over 50% of cross section) at 0.015*
n4 = vegetation factor	*small = 0.002 to very lg (av depth of flow is less than 1/2 height of veg) at 0.100*
m = sinuosity/meandering factor	*minor = 1.0, appreciable = 1.15, Severe = 1.30*

Base n value for surface

nb: Sand channel? No if yes, median size of bed mat'l? _____

nb =

median size (mm)	nb
0.2	0.012
0.3	0.017
0.4	0.020
0.5	0.022
0.6	0.023
0.8	0.025
1.0	0.026

All other channels:

median size (in)	nb
.04 to .08	0.026 to 0.035
1 to 2.5	0.028 to 0.035
2.5 to 10	0.030 to 0.050
>10	0.040 to 0.070

nb = 0.03

Notes: The ground surface consists of mostly soil with very few rocks present.

Surface Irregularity

n1:	**Smooth**	Is channel smooth? NO *Compares to the smoothest, flattest floodplain in a given bed material.*	if yes, n1 = 0
	Minor	Is channel in good condition with slightly eroded or scoured side slopes? *The ground surface is fairly flat - roaming hills.*	if yes, n1 = 0.001 - 0.005
	Moderate	Is channel a dredged channel having moderate to considerable bed roughness and moderately sloughed or eroded side slopes in rock?	if yes, n1 = 0.006 - 0.010
	Severe	Is channel badly sloughed, scalloped banks or badly eroded or sloughed sides or jagged and irregular surface?	if yes, n1 = 0.011 - 0.020

n1 = 0.000

Notes: NO IRREGULARITIES PRESENT

Cross Section Variation Factor

n2:	**Gradual**	Does the size and shape of the channel cross section change gradually?	if yes, n2 = 0.000
	Alternately occasionally	Does the cross section alternate to large to small, *occasionally* or does the main flow *occasionally* shift from side to side? *The cross-section of this area is generally fairly wide.*	if yes, n2 = 0.001 - 0.005
	Alternately frequently	Does the cross section alternate to large to small, *frequently* or does the main flow *frequently* shift from side to side?	if yes, n2 = 0.010 - 0.015

n2 = 0.000

Notes: CROSS SECTIONS TRANSITION SMOOTHLY THROUGHOUT PROJECT REACH

Obstructions factor

n3:	**Negligible**	Does the stream have a few scattered obstructions that occupy < 5% of the cross-sectional area?	if yes, n3 = 0.000 - 0.004
	Minor	Obstructions occupy < 15% of the cross-sectional area and the spacing btwn obstructions is such that the sphere of influence doesn't extend to other obstructions?	if yes, n3 = 0.005 - 0.015
	Appreciable	Obstructions occupy 15% - 50% of the cross-sectional area and the spacing btwn obstructions is small enough to be additive?	if yes, n3 = 0.020 - 0.030
	Severe	Obstructions occupy more than 50% of the cross-sectional area or the spacing btwn obstructions causes turbulence?	if yes, n3 = 0.040 - 0.050

n3 = 0.000

Notes: DEBRIS AND OBSTRUCTIONS WILL BE REMOVED

Vegetation factor

n4:	Small	Does the channel have dense growth of flexible turf grass or weed growth where the flow is at least 2 times the height of the vegetation; tree seedlings of willows, cottonwoods, etc?	if yes, n4 = 0.002 - 0.010
	Medium	Does the channel have turf grass where the ave depth of flow is 1 to 2 times the height of the vegetation; moderately stemmy grass, weeds or tree seedlings growing where the flow is 2 to 3 times the height of the vegetation?	if yes, n4 = 0.010 - 0.025
	Large	Does the channel where the ave. depth of flow is equal to the height of the vegetation; 8 to 10 y.o. willows, cottonwoods intergrown with weeds and brush; where the R = 0.6 m (1.97 ft) or bushy willows of 1 y.o.are in the channel bottom, where R = 0.61 (2	if yes, n4 = 0.025 -0.050
	Very large	Does the channel have turf grass growing where the ave depth of flow < 1/2 the hght of the vegetation; bushy willows about 1 y.o. with weeds intergrown on side slopes; dense cattails in channel btm; trees intergrown with weeds and brush?	if yes, n4 = 0.050 - 0.100

n4 = 0.025

Notes: TREES AND SHRUBS WILL BE USED ON OVERBANK AREAS TO RE-ESTABLISH RIPARIAN COMMUNITY.
SOME GRASSES WILL BE PRESNT.

Sinuosity/meandering factor

m	Minor	Ratio of the channel length to valley length in 1.0 to 1.2	if yes, m = 1.00
	Appreciable	Ratio of the channel length to valley length in 1.2 to 1.5	if yes, m = 1.15
	Severe	Ratio of the channel length to valley length > 1.5	if yes, m = 1.30

m = 1.00

Notes: Ratio of channel length to valley length

Channel length	4700
Valley length	4530
Ratio =	1.04

n = 0.055

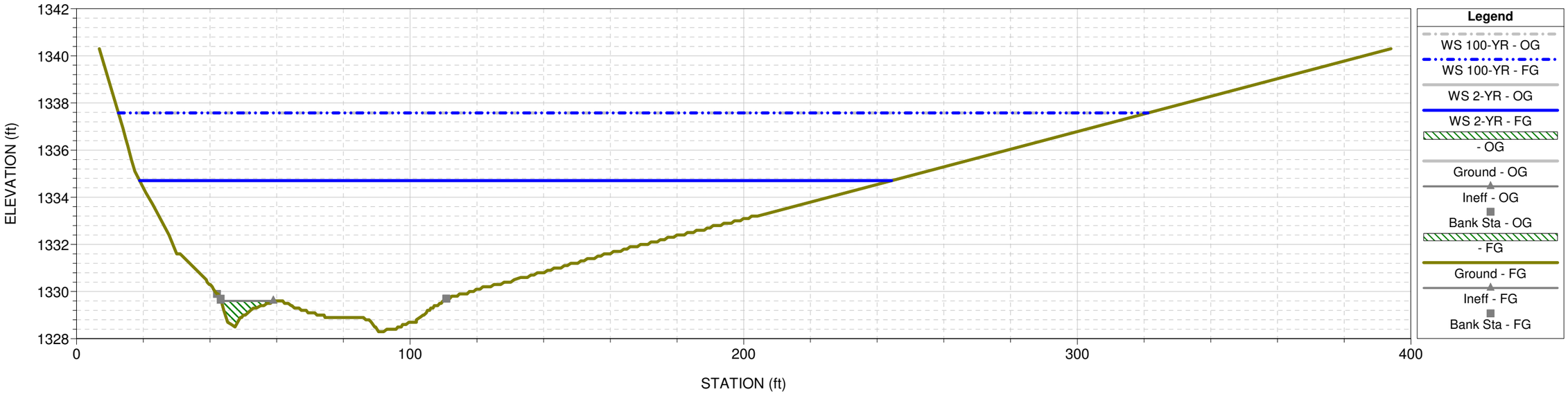
A-2 Cross-Sectional Geometry Reflecting Proposed Conditions

Appendix A

Rock Creek Restoration

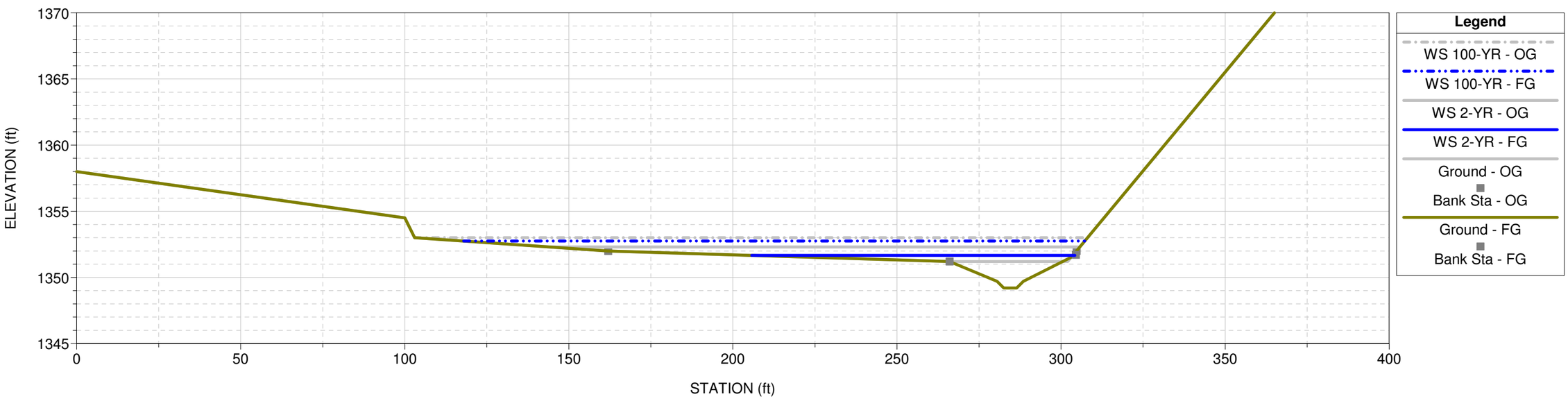
Rock Creek Tributary

River = Rock Creek Trib Reach = Main RS = 0000 EXISTING AND PROPOSED CROSS-SECTIONAL GEOMETRY



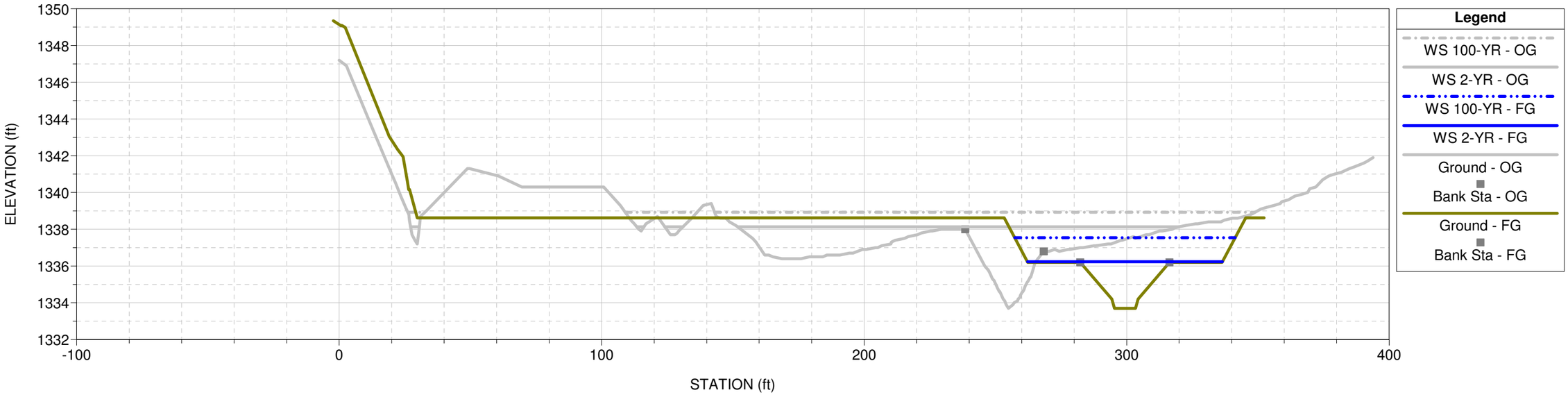
Rock Creek Tributary

River = Rock Creek Trib Reach = Main RS = 2200 EXISTING AND PROPOSED CROSS-SECTIONAL GEOMETRY



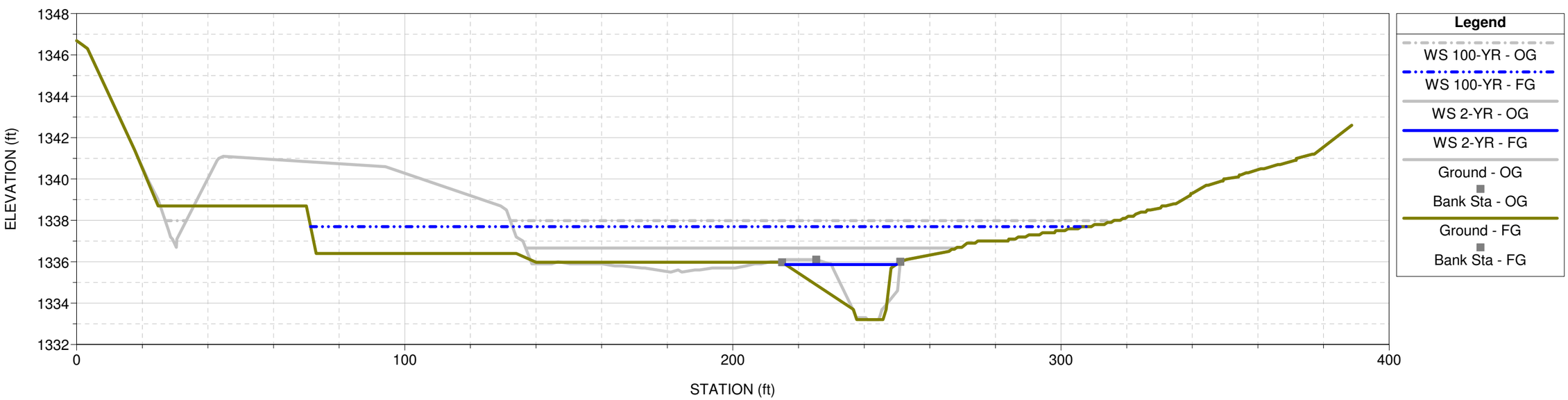
Rock Creek Tributary

River = Rock Creek Trib Reach = Main RS = 0487 EXISTING AND PROPOSED CROSS-SECTIONAL GEOMETRY



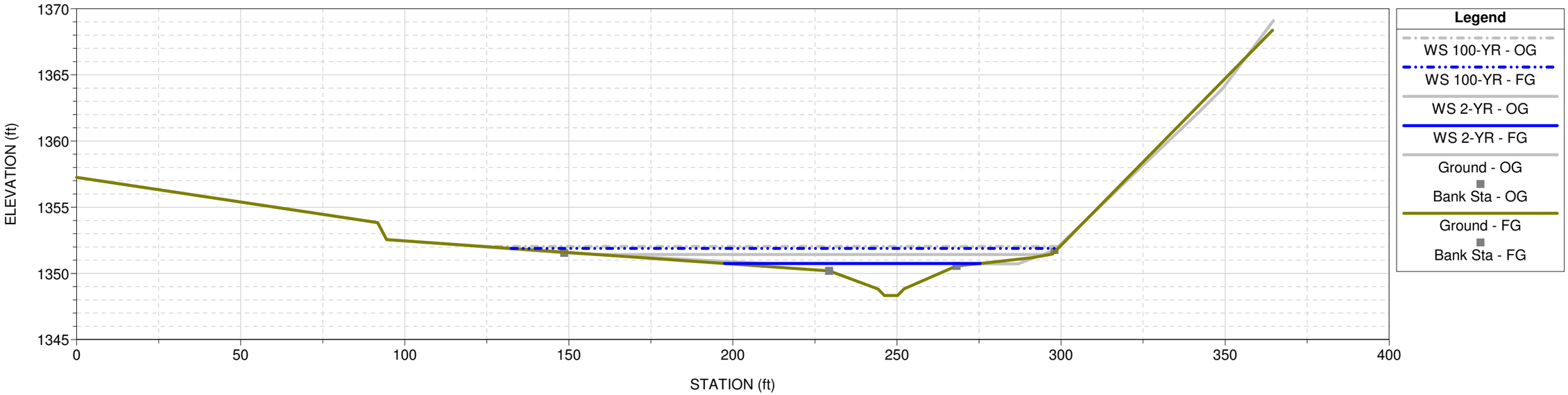
Rock Creek Tributary

River = Rock Creek Trib Reach = Main RS = 0450 EXISTING AND PROPOSED CROSS-SECTIONAL GEOMETRY



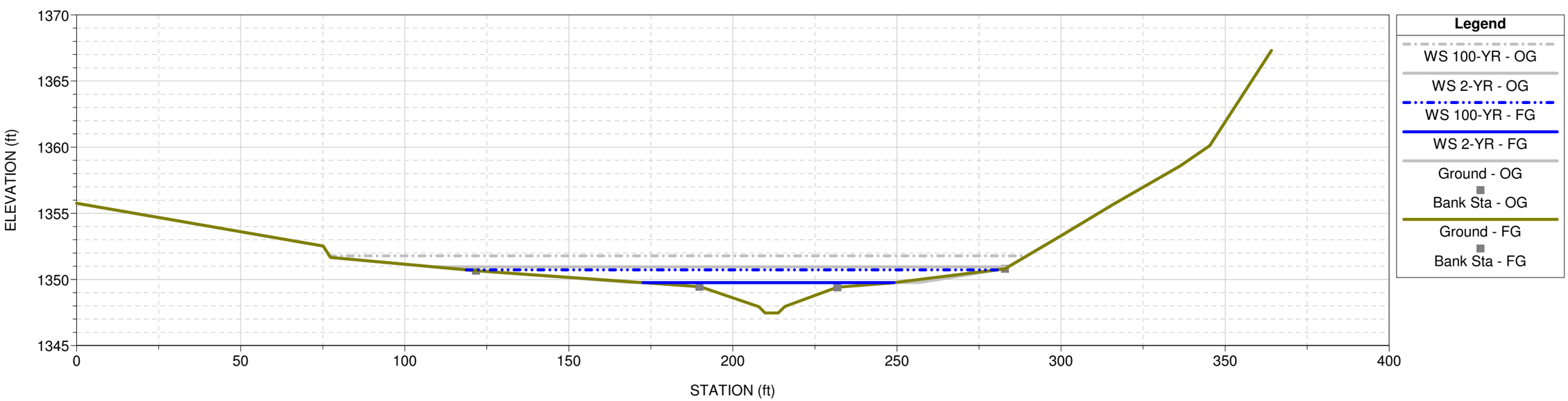
Rock Creek Tributary

River = Rock Creek Trib Reach = Main RS = 2100 EXISTING AND PROPOSED CROSS-SECTIONAL GEOMETRY



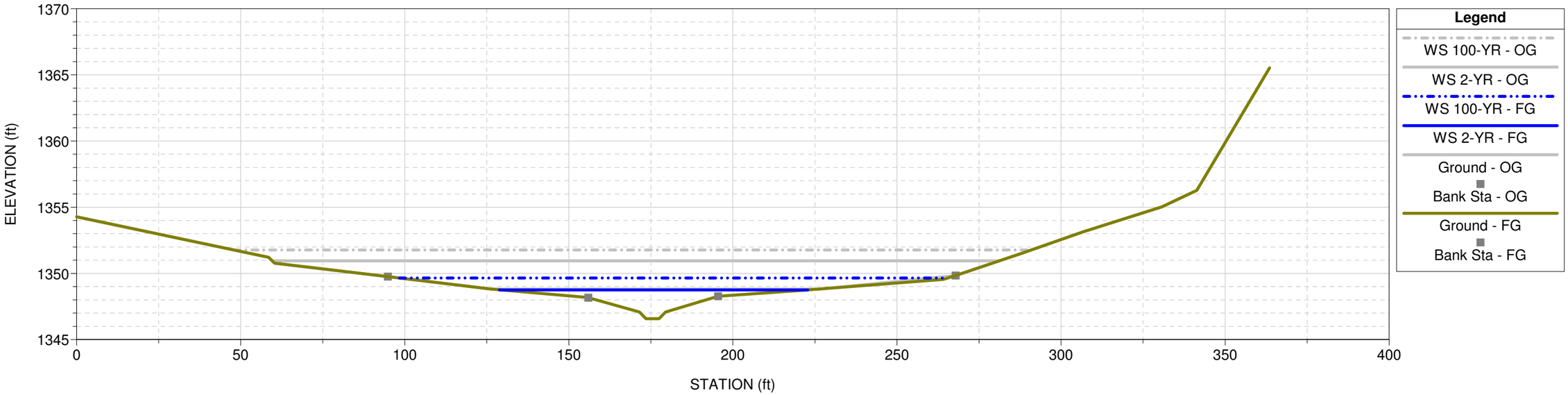
Rock Creek Tributary

River = Rock Creek Trib Reach = Main RS = 2000 EXISTING AND PROPOSED CROSS-SECTIONAL GEOMETRY



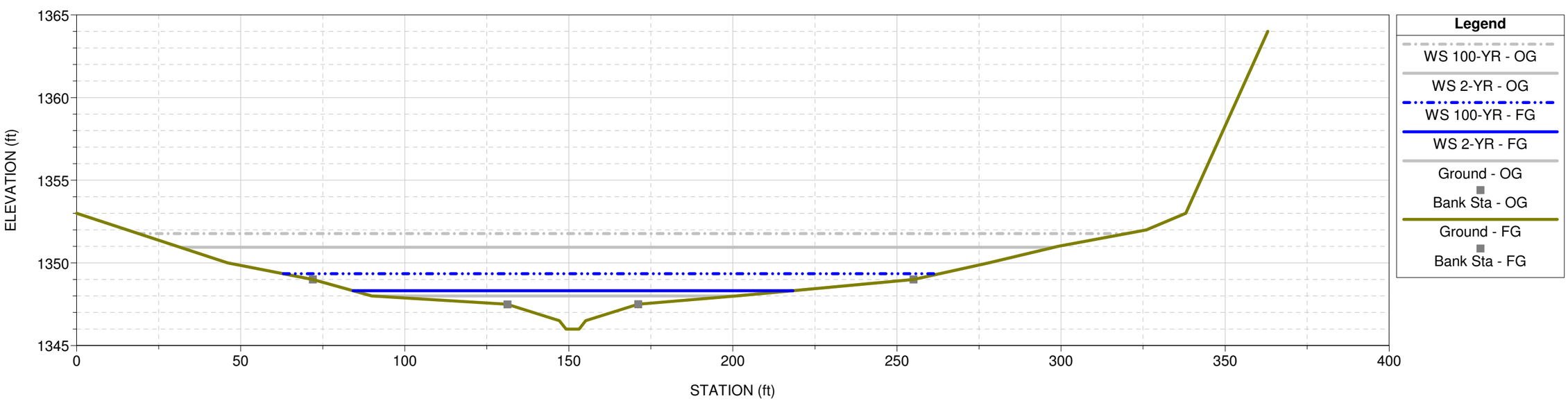
Rock Creek Tributary

River = Rock Creek Trib Reach = Main RS = 1900 EXISTING AND PROPOSED CROSS-SECTIONAL GEOMETRY



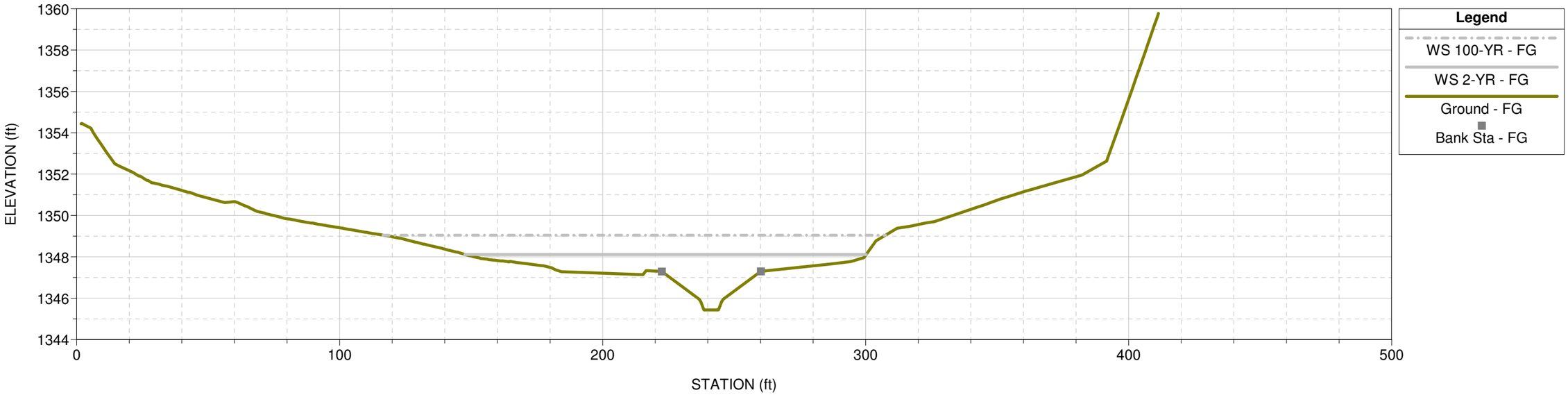
Rock Creek Tributary

River = Rock Creek Trib Reach = Main RS = 1825 EXISTING AND PROPOSED CROSS-SECTIONAL GEOMETRY



Rock Creek Tributary

River = Rock Creek Trib Reach = Main RS = 1750 EXISTING AND PROPOSED CROSS-SECTIONAL GEOMETRY



Rock Creek Tributary

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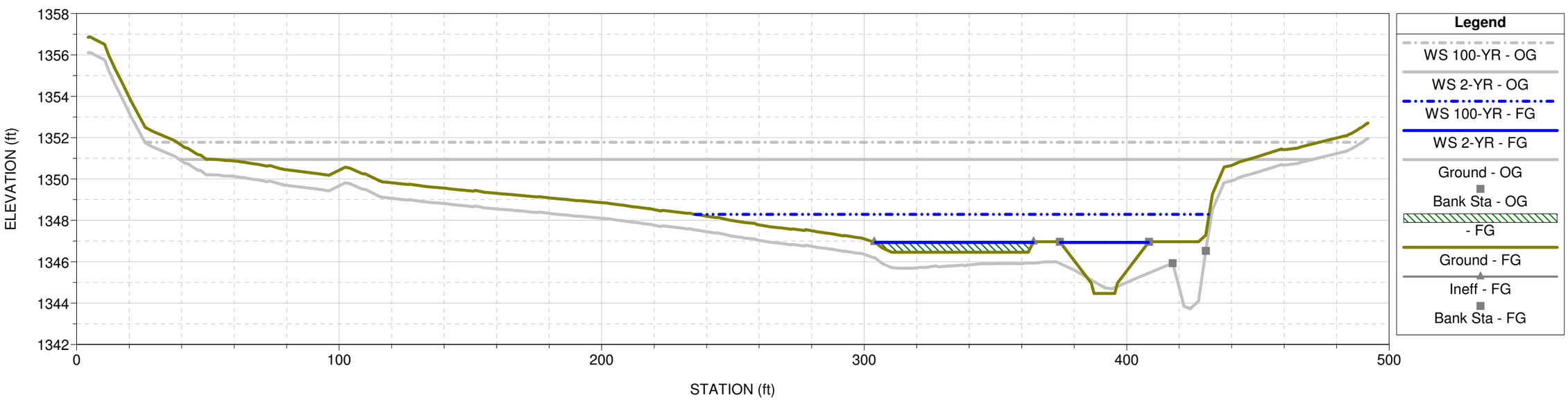
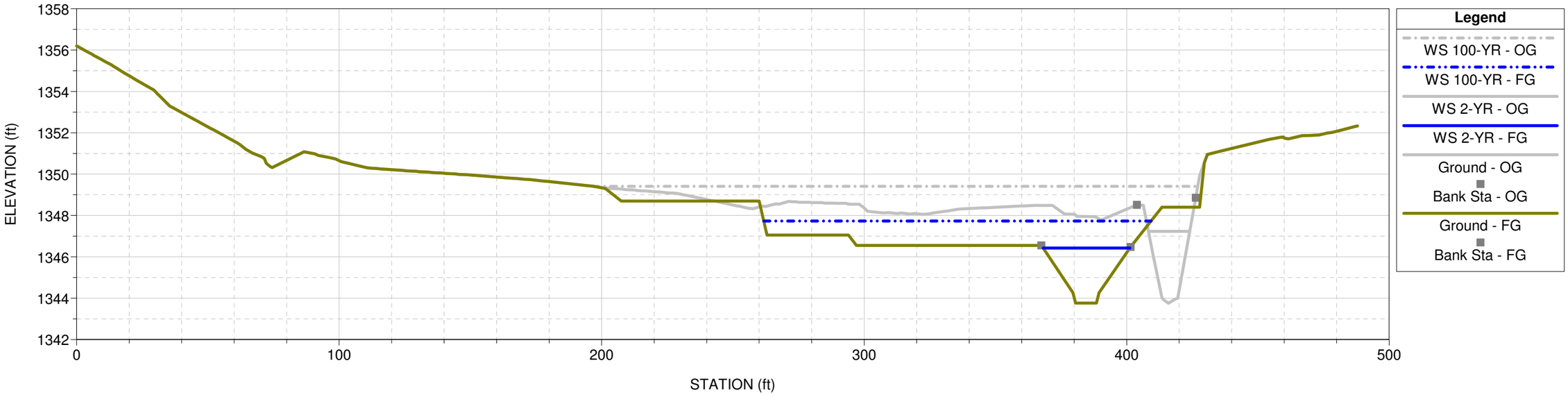


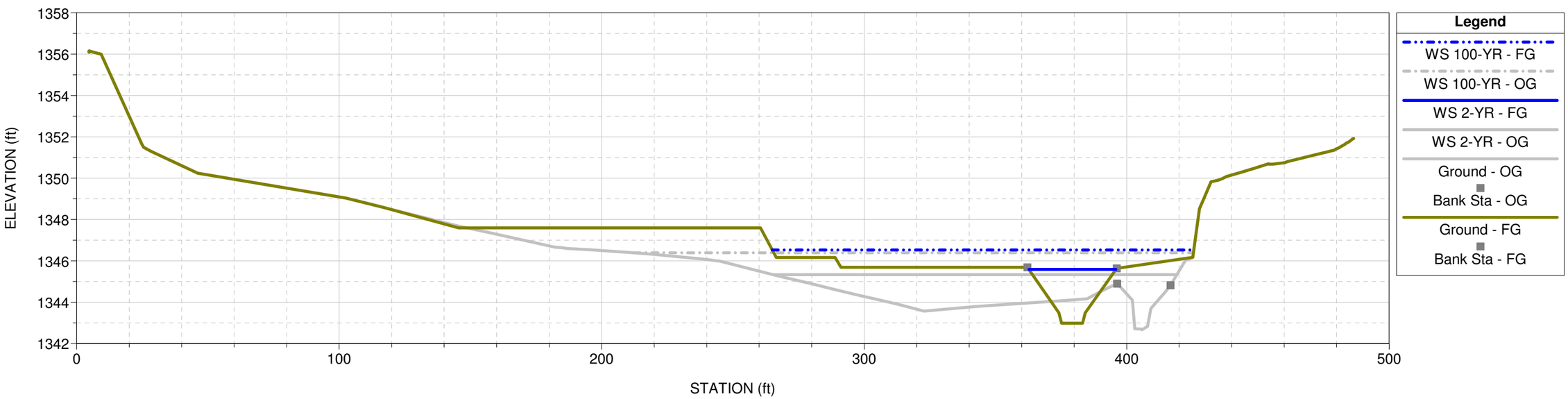
Rock Creek Tributary

River = Rock Creek Trib Reach = Main RS = 1585 EXISTING AND PROPOSED CROSS-SECTIONAL GEOMETRY



Rock Creek Tributary

River = Rock Creek Trib Reach = Main RS = 1500 EXISTING AND PROPOSED CROSS-SECTIONAL GEOMETRY



Rock Creek Tributary

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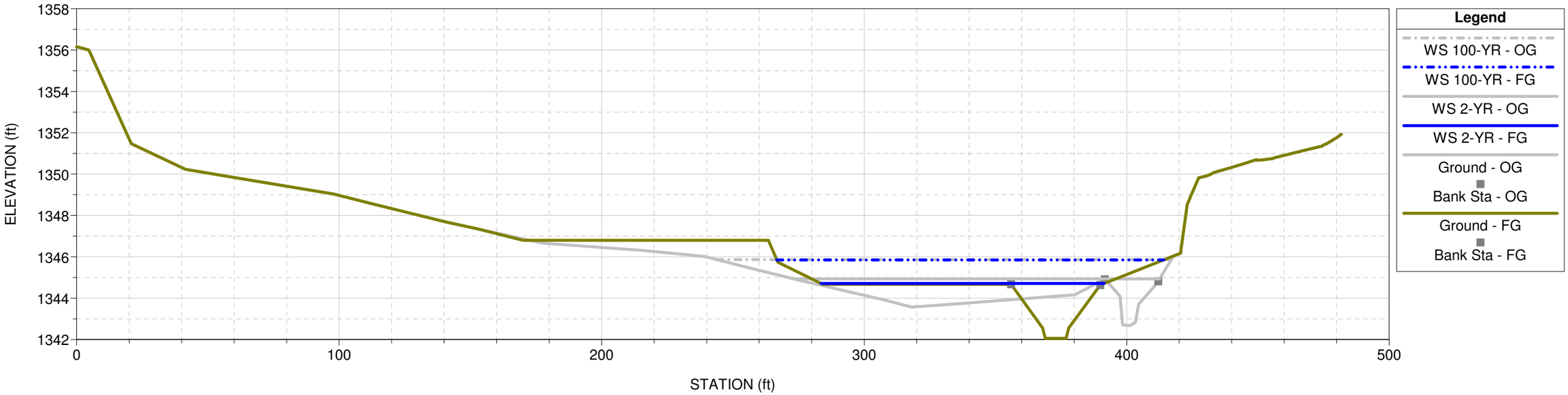
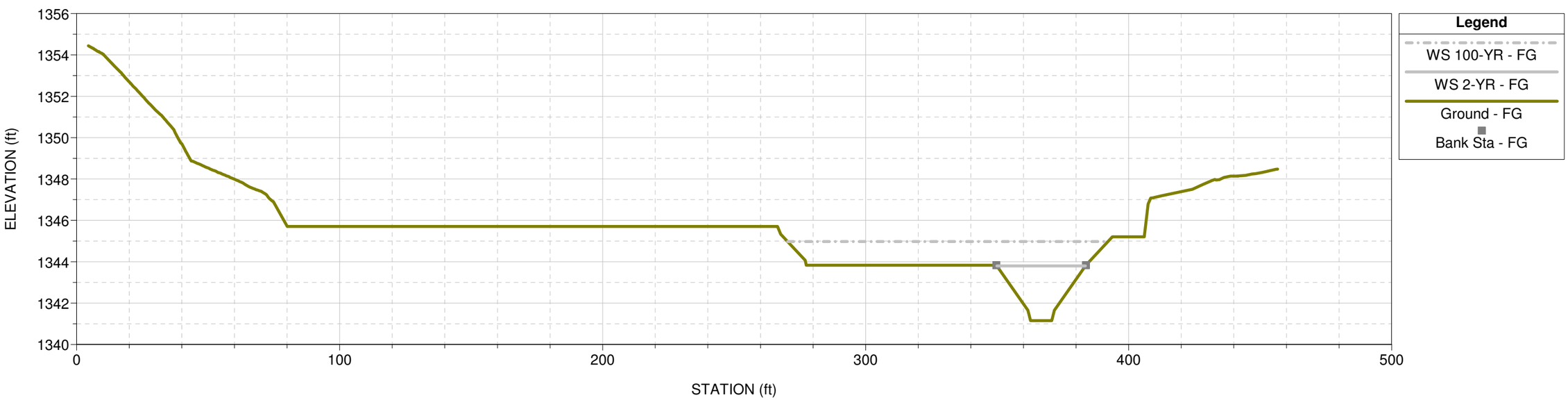


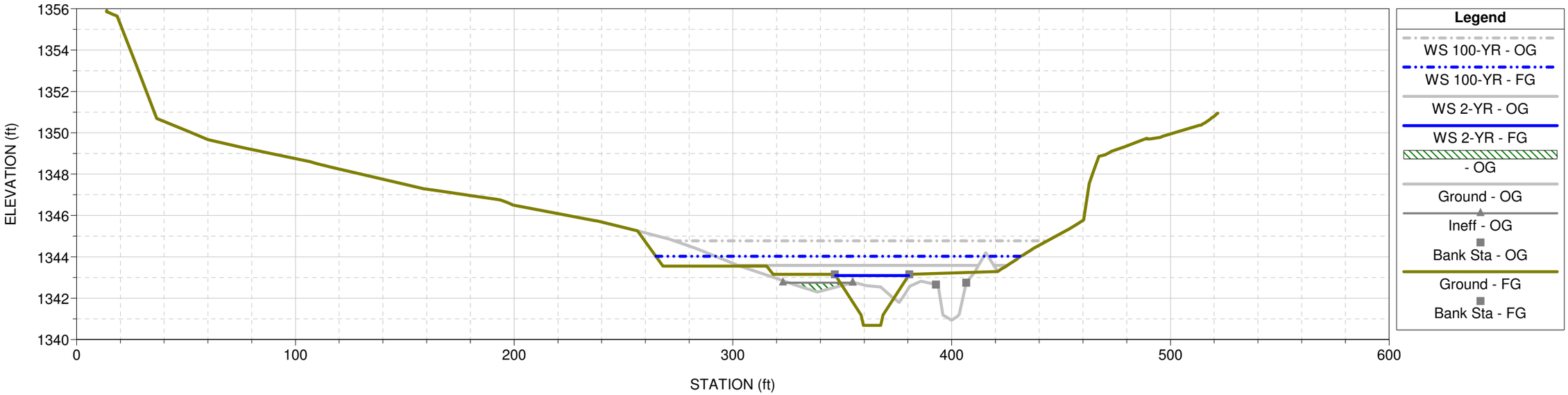
Rock Creek Tributary

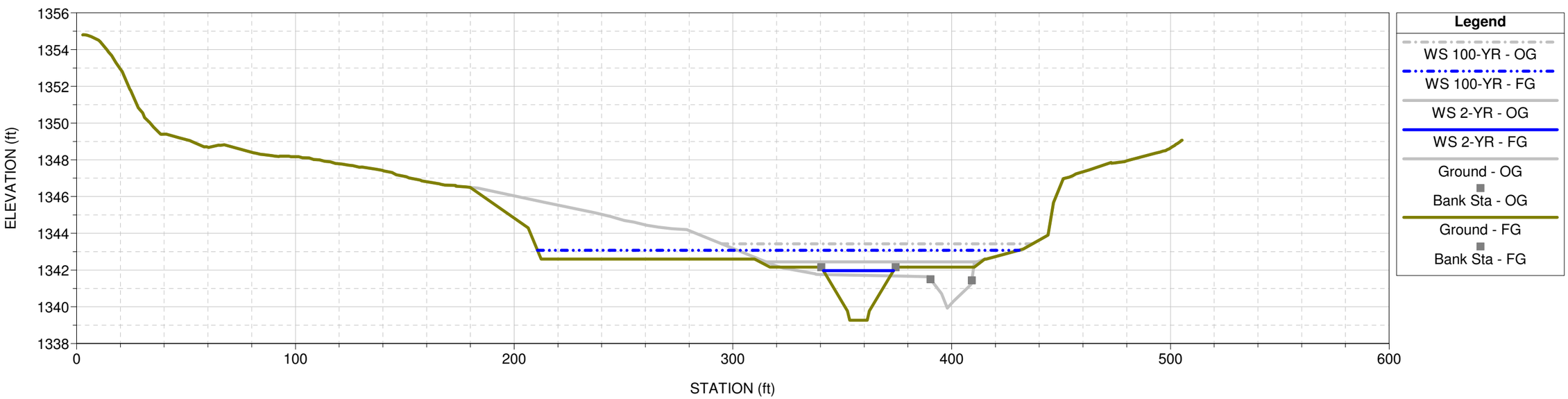
River = Rock Creek Trib Reach = Main RS = 1300 EXISTING AND PROPOSED CROSS-SECTIONAL GEOMETRY



Rock Creek Tributary

River = Rock Creek Trib Reach = Main RS = 1250 EXISTING AND PROPOSED CROSS-SECTIONAL GEOMETRY



Rock Creek Tributary

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