EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area B Perennial**
Assessment Objectives:	**5 Years**

NA	**Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)**
0.55	**Ecological Integrity Index (Habitat Integrity + Conductivity)**

Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*		
RBP Habitat Parameters			
1. Epifaunal Substrate	12	no units (0-20)	
2. Embeddedness	14	no units (0-20)	
3. Velocity/Depth Regime	7	no units (0-20)	
4. Sediment Deposition	9	no units (0-20)	
5. Channel Flow Status	8	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	16	no units (0-20)	
8. Bank stability (both combined)	14	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
Total Habitat Score	**96**	no units	**Subindex**
Habitat Integrity			**0.10**
Macroinvertebrate Data - *Genus/species Level*			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
Macroinvertebrate Bioassessment	**NA**	no units	**NA**
Conductivity	**70**	microMHOs	**1.00**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area C**
Assessment Objectives:	**5 Years**

NA	**Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)**
0.55	**Ecological Integrity Index (Habitat Integrity + Conductivity)**

	Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*			
	RBP Habitat Parameters			
	1. Epifaunal Substrate	5	no units (0-20)	
	2. Embeddedness	15	no units (0-20)	
	3. Velocity/Depth Regime	5	no units (0-20)	
	4. Sediment Deposition	6	no units (0-20)	
	5. Channel Flow Status	6	no units (0-20)	
	6. Channel Alteration	0	no units (0-20)	
	7. Freq. Of Riffles (bends)	13	no units (0-20)	
	8. Bank stability (both combined)	4	no units (0-20)	
	9. Veg. Protection (both combined)	8	no units (0-20)	
	10. Riparian Width (both combined)	8	no units (0-20)	
	Total Habitat Score	**70**	no units	**Subindex**
	Habitat Integrity			**0.10**
	Macroinvertebrate Data - *Genus/species Level*			
	11. Genus/species Taxa Richness		# of taxa sampled	
	12. Genus/species EPT Richness		# of EPT species sampled	
	13. % Ephemeroptera		% Mayflies (0-100)	
	14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
	15. % Clingers		% Clingers (0-100)	
	16. mHBI		no units	
	Macroinvertebrate Bioassessment	**NA**	no units	**NA**
	Conductivity	**70**	microMHOs	**1.00**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area D**
Assessment Objectives:	**5 Years**

NA	**Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)**
0.55	**Ecological Integrity Index (Habitat Integrity + Conductivity)**

	Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*			
	RBP Habitat Parameters			
	1. Epifaunal Substrate	8	no units (0-20)	
	2. Embeddedness	14	no units (0-20)	
	3. Velocity/Depth Regime	5	no units (0-20)	
	4. Sediment Deposition	12	no units (0-20)	
	5. Channel Flow Status	6	no units (0-20)	
	6. Channel Alteration	0	no units (0-20)	
	7. Freq. Of Riffles (bends)	15	no units (0-20)	
	8. Bank stability (both combined)	18	no units (0-20)	
	9. Veg. Protection (both combined)	8	no units (0-20)	
	10. Riparian Width (both combined)	8	no units (0-20)	
	Total Habitat Score	**94**	no units	**Subindex**
	Habitat Integrity			**0.10**
	Macroinvertebrate Data - *Genus/species Level*			
	11. Genus/species Taxa Richness		# of taxa sampled	
	12. Genus/species EPT Richness		# of EPT species sampled	
	13. % Ephemeroptera		% Mayflies (0-100)	
	14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
	15. % Clingers		% Clingers (0-100)	
	16. mHBI		no units	
	Macroinvertebrate Bioassessment	**NA**	no units	**NA**
	Conductivity	**70**	microMHOs	**1.00**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area E Intermittent**
Assessment Objectives:	**5 Years**

NA	**Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)**
0.56	**Ecological Integrity Index (Habitat Integrity + Conductivity)**

Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*		
RBP Habitat Parameters			
1. Epifaunal Substrate	13	no units (0-20)	
2. Embeddedness	14	no units (0-20)	
3. Velocity/Depth Regime	6	no units (0-20)	
4. Sediment Deposition	16	no units (0-20)	
5. Channel Flow Status	8	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	16	no units (0-20)	
8. Bank stability (both combined)	12	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
Total Habitat Score	**101**	no units	**Subindex**
Habitat Integrity			**0.11**
Macroinvertebrate Data - *Genus/species Level*			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
Macroinvertebrate Bioassessment	**NA**	no units	**NA**
Conductivity	**80**	microMHOs	**1.00**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area E Perennial**
Assessment Objectives:	**5 Years**

NA	**Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)**
0.60	**Ecological Integrity Index (Habitat Integrity + Conductivity)**

Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*		
RBP Habitat Parameters			
1. Epifaunal Substrate	10	no units (0-20)	
2. Embeddedness	15	no units (0-20)	
3. Velocity/Depth Regime	12	no units (0-20)	
4. Sediment Deposition	16	no units (0-20)	
5. Channel Flow Status	12	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	16	no units (0-20)	
8. Bank stability (both combined)	12	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
Total Habitat Score	**109**	no units	**Subindex**
Habitat Integrity			**0.19**
Macroinvertebrate Data - *Genus/species Level*			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
Macroinvertebrate Bioassessment	**NA**	no units	**NA**
Conductivity	**80**	microMHOs	**1.00**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area F Perennial**
Assessment Objectives:	**5 Years**

NA	**Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)**
0.55	**Ecological Integrity Index (Habitat Integrity + Conductivity)**

Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*		
RBP Habitat Parameters			
1. Epifaunal Substrate	10	no units (0-20)	
2. Embeddedness	15	no units (0-20)	
3. Velocity/Depth Regime	9	no units (0-20)	
4. Sediment Deposition	7	no units (0-20)	
5. Channel Flow Status	11	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	16	no units (0-20)	
8. Bank stability (both combined)	12	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
Total Habitat Score	**96**	no units	**Subindex**
Habitat Integrity			**0.10**
Macroinvertebrate Data - *Genus/species Level*			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
Macroinvertebrate Bioassessment	**NA**	no units	**NA**
Conductivity	**100**	microMHOs	**1.00**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area G Perennial**
Assessment Objectives:	**5 Years**

NA	**Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)**
0.10	**Ecological Integrity Index (Habitat Integrity + Conductivity)**

	Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*			
	RBP Habitat Parameters			
	1. Epifaunal Substrate	10	no units (0-20)	
	2. Embeddedness	11	no units (0-20)	
	3. Velocity/Depth Regime	8	no units (0-20)	
	4. Sediment Deposition	6	no units (0-20)	
	5. Channel Flow Status	16	no units (0-20)	
	6. Channel Alteration	0	no units (0-20)	
	7. Freq. Of Riffles (bends)	16	no units (0-20)	
	8. Bank stability (both combined)	16	no units (0-20)	
	9. Veg. Protection (both combined)	8	no units (0-20)	
	10. Riparian Width (both combined)	8	no units (0-20)	
	Total Habitat Score	**99**	no units	**Subindex**
	Habitat Integrity			**0.10**
	Macroinvertebrate Data - *Genus/species Level*			
	11. Genus/species Taxa Richness		# of taxa sampled	
	12. Genus/species EPT Richness		# of EPT species sampled	
	13. % Ephemeroptera		% Mayflies (0-100)	
	14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
	15. % Clingers		% Clingers (0-100)	
	16. mHBI		no units	
	Macroinvertebrate Bioassessment	**NA**	no units	**NA**
	Conductivity	**730**	microMHOs	**0.10**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area H Intermittent**
Assessment Objectives:	**5 Years**

NA	**Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)**
0.55	**Ecological Integrity Index (Habitat Integrity + Conductivity)**

	Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*			
	RBP Habitat Parameters			
	1. Epifaunal Substrate	8	no units (0-20)	
	2. Embeddedness	11	no units (0-20)	
	3. Velocity/Depth Regime	8	no units (0-20)	
	4. Sediment Deposition	10	no units (0-20)	
	5. Channel Flow Status	10	no units (0-20)	
	6. Channel Alteration	0	no units (0-20)	
	7. Freq. Of Riffles (bends)	16	no units (0-20)	
	8. Bank stability (both combined)	16	no units (0-20)	
	9. Veg. Protection (both combined)	8	no units (0-20)	
	10. Riparian Width (both combined)	8	no units (0-20)	
	Total Habitat Score	**95**	no units	**Subindex**
	Habitat Integrity			**0.10**
	Macroinvertebrate Data - *Genus/species Level*			
	11. Genus/species Taxa Richness		# of taxa sampled	
	12. Genus/species EPT Richness		# of EPT species sampled	
	13. % Ephemeroptera		% Mayflies (0-100)	
	14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
	15. % Clingers		% Clingers (0-100)	
	16. mHBI		no units	
	Macroinvertebrate Bioassessment	**NA**	no units	**NA**
	Conductivity	**90**	microMHOs	**1.00**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area H Perennial**
Assessment Objectives:	**5 Years**

NA	**Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)**
0.55	**Ecological Integrity Index (Habitat Integrity + Conductivity)**

Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*		
RBP Habitat Parameters			
1. Epifaunal Substrate	8	no units (0-20)	
2. Embeddedness	11	no units (0-20)	
3. Velocity/Depth Regime	8	no units (0-20)	
4. Sediment Deposition	6	no units (0-20)	
5. Channel Flow Status	16	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	16	no units (0-20)	
8. Bank stability (both combined)	16	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
Total Habitat Score	**97**	no units	**Subindex**
Habitat Integrity			**0.10**
Macroinvertebrate Data - *Genus/species Level*			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
Macroinvertebrate Bioassessment	**NA**	no units	**NA**
Conductivity	**90**	microMHOs	**1.00**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area I Intermittent**
Assessment Objectives:	**5 Years**

NA	Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)
0.49	Ecological Integrity Index (Habitat Integrity + Conductivity)

Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*		
RBP Habitat Parameters			
1. Epifaunal Substrate	9	no units (0-20)	
2. Embeddedness	15	no units (0-20)	
3. Velocity/Depth Regime	10	no units (0-20)	
4. Sediment Deposition	9	no units (0-20)	
5. Channel Flow Status	14	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	13	no units (0-20)	
8. Bank stability (both combined)	12	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
Total Habitat Score	**98**	no units	**Subindex**
Habitat Integrity			**0.10**
Macroinvertebrate Data - *Genus/species Level*			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
Macroinvertebrate Bioassessment	**NA**	no units	**NA**
Conductivity	**195**	microMHOs	**0.87**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area J Lower**
Assessment Objectives:	**5 Years**

NA	Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)
0.52	Ecological Integrity Index (Habitat Integrity + Conductivity)

Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*		
RBP Habitat Parameters			
1. Epifaunal Substrate	12	no units (0-20)	
2. Embeddedness	16	no units (0-20)	
3. Velocity/Depth Regime	12	no units (0-20)	
4. Sediment Deposition	13	no units (0-20)	
5. Channel Flow Status	13	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	16	no units (0-20)	
8. Bank stability (both combined)	13	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
Total Habitat Score	**111**	no units	**Subindex**
Habitat Integrity			**0.21**
Macroinvertebrate Data - *Genus/species Level*			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
Macroinvertebrate Bioassessment	**NA**	no units	**NA**
Conductivity	**210**	microMHOs	**0.83**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area J Upper**
Assessment Objectives:	**5 Years**

NA	Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)
0.49	Ecological Integrity Index (Habitat Integrity + Conductivity)

Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*		
RBP Habitat Parameters			
1. Epifaunal Substrate	12	no units (0-20)	
2. Embeddedness	16	no units (0-20)	
3. Velocity/Depth Regime	10	no units (0-20)	
4. Sediment Deposition	12	no units (0-20)	
5. Channel Flow Status	10	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	16	no units (0-20)	
8. Bank stability (both combined)	13	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
Total Habitat Score	**105**	no units	**Subindex**
Habitat Integrity			**0.15**
Macroinvertebrate Data - *Genus/species Level*			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
Macroinvertebrate Bioassessment	**NA**	no units	**NA**
Conductivity	**210**	microMHOs	**0.83**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area K Ephemeral**
Assessment Objectives:	**5 Years**

NA	**Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)**
0.10	**Ecological Integrity Index (Habitat Integrity + Conductivity)**

	Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*			
	RBP Habitat Parameters			
	1. Epifaunal Substrate	4	no units (0-20)	
	2. Embeddedness	15	no units (0-20)	
	3. Velocity/Depth Regime	5	no units (0-20)	
	4. Sediment Deposition	14	no units (0-20)	
	5. Channel Flow Status	10	no units (0-20)	
	6. Channel Alteration	0	no units (0-20)	
	7. Freq. Of Riffles (bends)	9	no units (0-20)	
	8. Bank stability (both combined)	12	no units (0-20)	
	9. Veg. Protection (both combined)	8	no units (0-20)	
	10. Riparian Width (both combined)	8	no units (0-20)	
	Total Habitat Score	**85**	no units	**Subindex**
	Habitat Integrity			**0.10**
	Macroinvertebrate Data - *Genus/species Level*			
	11. Genus/species Taxa Richness		# of taxa sampled	
	12. Genus/species EPT Richness		# of EPT species sampled	
	13. % Ephemeroptera		% Mayflies (0-100)	
	14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
	15. % Clingers		% Clingers (0-100)	
	16. mHBI		no units	
	Macroinvertebrate Bioassessment	**NA**	no units	**NA**
	Conductivity	**730**	microMHOs	**0.10**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area L Intermittent**
Assessment Objectives:	**5 Years**

NA	**Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)**
0.55	**Ecological Integrity Index (Habitat Integrity + Conductivity)**

Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*		
RBP Habitat Parameters			
1. Epifaunal Substrate	8	no units (0-20)	
2. Embeddedness	13	no units (0-20)	
3. Velocity/Depth Regime	10	no units (0-20)	
4. Sediment Deposition	12	no units (0-20)	
5. Channel Flow Status	6	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	15	no units (0-20)	
8. Bank stability (both combined)	18	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
Total Habitat Score	**98**	no units	**Subindex**
Habitat Integrity			**0.10**
Macroinvertebrate Data - *Genus/species Level*			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
Macroinvertebrate Bioassessment	**NA**	no units	**NA**
Conductivity	**100**	microMHOs	**1.00**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area L Perennial**
Assessment Objectives:	**5 Years**

NA	**Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)**
0.55	**Ecological Integrity Index (Habitat Integrity + Conductivity)**

Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*		
RBP Habitat Parameters			
1. Epifaunal Substrate	8	no units (0-20)	
2. Embeddedness	13	no units (0-20)	
3. Velocity/Depth Regime	10	no units (0-20)	
4. Sediment Deposition	12	no units (0-20)	
5. Channel Flow Status	6	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	15	no units (0-20)	
8. Bank stability (both combined)	18	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
Total Habitat Score	**98**	no units	**Subindex**
Habitat Integrity			**0.10**
Macroinvertebrate Data - *Genus/species Level*			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
Macroinvertebrate Bioassessment	**NA**	no units	**NA**
Conductivity	**100**	microMHOs	**1.00**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area M Perennial**
Assessment Objectives:	**5 Years**

NA	**Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)**
0.60	**Ecological Integrity Index (Habitat Integrity + Conductivity)**

Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*		
RBP Habitat Parameters			
1. Epifaunal Substrate	13	no units (0-20)	
2. Embeddedness	15	no units (0-20)	
3. Velocity/Depth Regime	11	no units (0-20)	
4. Sediment Deposition	11	no units (0-20)	
5. Channel Flow Status	13	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	15	no units (0-20)	
8. Bank stability (both combined)	16	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
Total Habitat Score	**110**	no units	**Subindex**
Habitat Integrity			**0.20**
Macroinvertebrate Data - *Genus/species Level*			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
Macroinvertebrate Bioassessment	**NA**	no units	**NA**
Conductivity	**100**	microMHOs	**1.00**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area N Ephemeral**
Assessment Objectives:	**5 Years**

NA	**Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)**
0.55	**Ecological Integrity Index (Habitat Integrity + Conductivity)**

Variables	Measure	Units	Subindex
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*		
RBP Habitat Parameters			
1. Epifaunal Substrate	10	no units (0-20)	
2. Embeddedness	15	no units (0-20)	
3. Velocity/Depth Regime	5	no units (0-20)	
4. Sediment Deposition	12	no units (0-20)	
5. Channel Flow Status	6	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	12	no units (0-20)	
8. Bank stability (both combined)	16	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
Total Habitat Score	**92**	no units	
Habitat Integrity			**0.10**
Macroinvertebrate Data - *Genus/species Level*			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
Macroinvertebrate Bioassessment	**NA**	no units	**NA**
Conductivity	**100**	microMHOs	**1.00**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area O Ephemeral**
Assessment Objectives:	**5 Years**

NA	Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)
0.46	Ecological Integrity Index (Habitat Integrity + Conductivity)

Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*		
RBP Habitat Parameters			
1. Epifaunal Substrate	8	no units (0-20)	
2. Embeddedness	14	no units (0-20)	
3. Velocity/Depth Regime	5	no units (0-20)	
4. Sediment Deposition	14	no units (0-20)	
5. Channel Flow Status	6	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	10	no units (0-20)	
8. Bank stability (both combined)	12	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
Total Habitat Score	**85**	no units	**Subindex**
Habitat Integrity			**0.10**
Macroinvertebrate Data - *Genus/species Level*			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
Macroinvertebrate Bioassessment	**NA**	no units	**NA**
Conductivity	**210**	microMHOs	**0.83**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area P Ephemeral**
Assessment Objectives:	**5 Years**

NA	**Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)**
0.46	**Ecological Integrity Index (Habitat Integrity + Conductivity)**

Variables	Measure	Units	
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*		
RBP Habitat Parameters			
1. Epifaunal Substrate	9	no units (0-20)	
2. Embeddedness	15	no units (0-20)	
3. Velocity/Depth Regime	4	no units (0-20)	
4. Sediment Deposition	6	no units (0-20)	
5. Channel Flow Status	2	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	16	no units (0-20)	
8. Bank stability (both combined)	14	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
Total Habitat Score	**82**	no units	**Subindex**
Habitat Integrity			**0.10**
Macroinvertebrate Data - *Genus/species Level*			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
Macroinvertebrate Bioassessment	**NA**	no units	**NA**
Conductivity	**210**	microMHOs	**0.83**

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EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)
****(Genus/species Level Taxonomy - Riffle Only Sample)****

Project ID:	**LRN-2012-00914**
Stream Reach	**Mitigation Area P Intermittent**
Assessment Objectives:	**5 Years**

NA	Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)
0.46	Ecological Integrity Index (Habitat Integrity + Conductivity)

Variables	Measure	Units	Subindex
>>>>>>>	*Enter quantitative or categorical measure from Field Data Sheet in shaded cells*		
RBP Habitat Parameters			
1. Epifaunal Substrate	9	no units (0-20)	
2. Embeddedness	15	no units (0-20)	
3. Velocity/Depth Regime	8	no units (0-20)	
4. Sediment Deposition	6	no units (0-20)	
5. Channel Flow Status	5	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	16	no units (0-20)	
8. Bank stability (both combined)	14	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
Total Habitat Score	**89**	no units	**Subindex**
Habitat Integrity			**0.10**
Macroinvertebrate Data - *Genus/species Level*			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
Macroinvertebrate Bioassessment	**NA**	no units	**NA**
Conductivity	**210**	microMHOs	**0.83**

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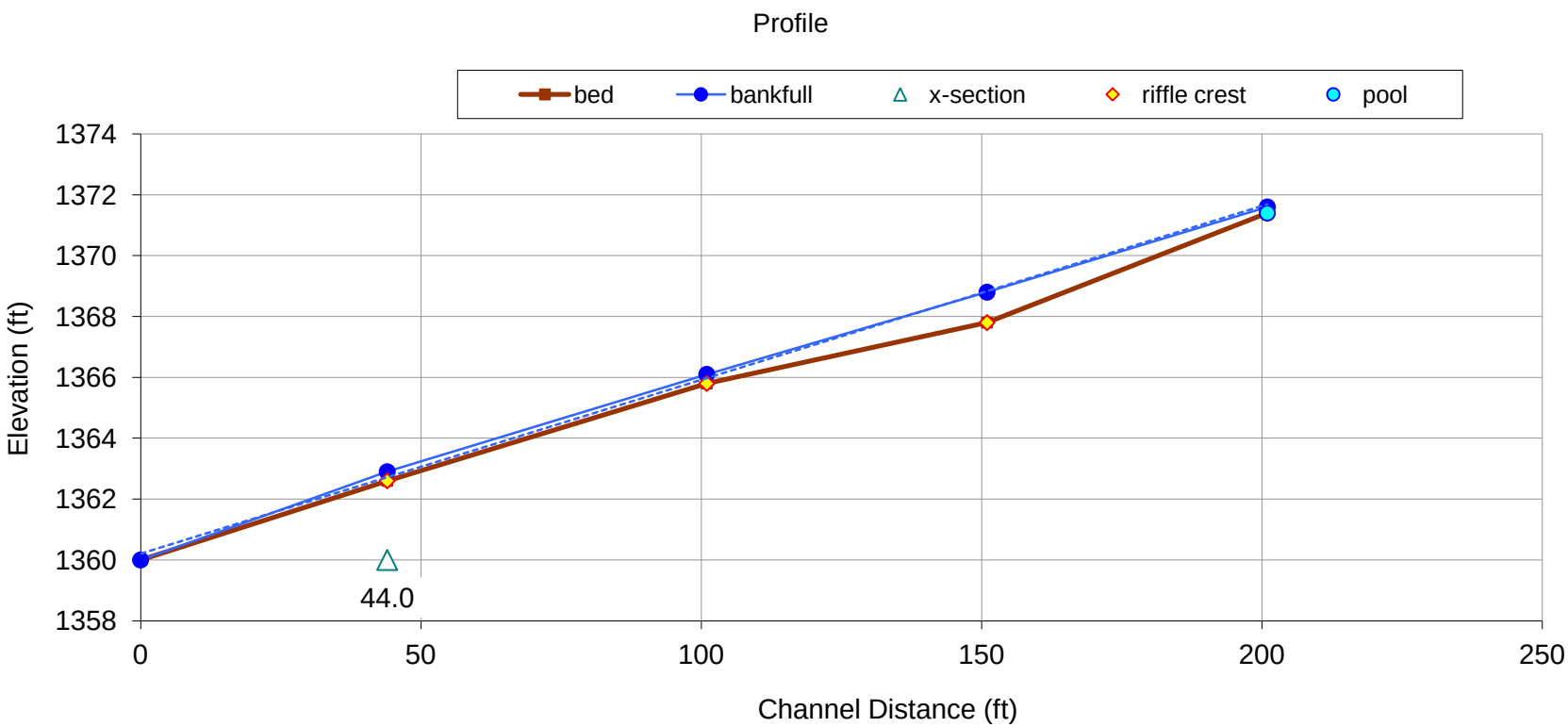
TYPICAL EXISTING AND PROPOSED PATTERN AND PROFILE INFORMATION FOR MITIGATION AREAS A, C, I, K, L, M, N, O, AND P



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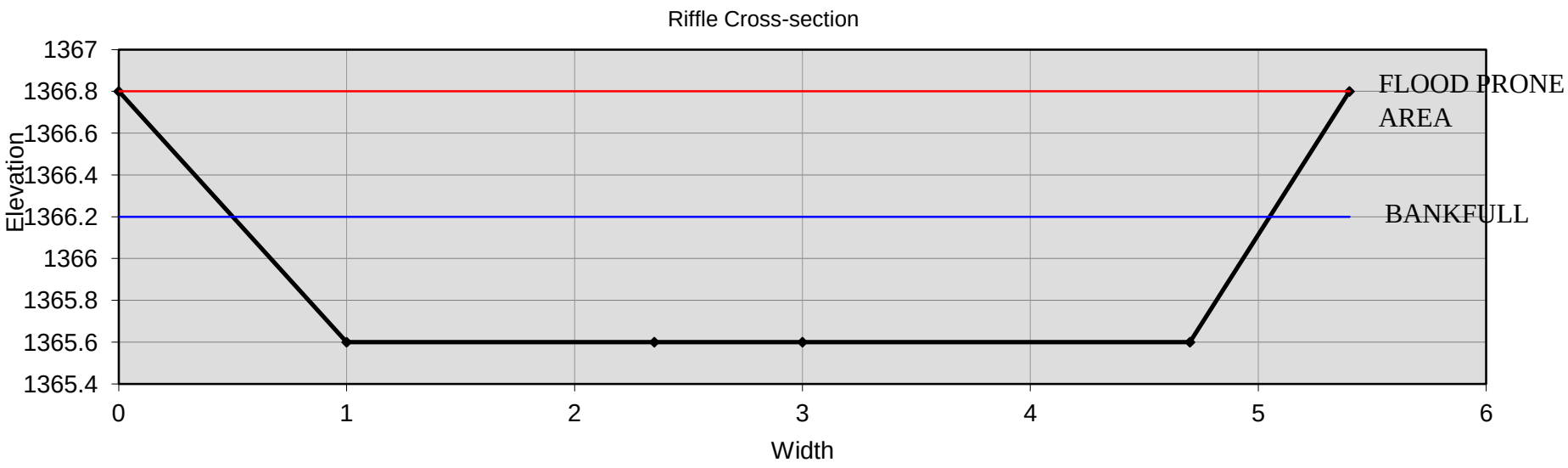


Bankfull Dimensions	
2.5	x-section area (ft.sq.)
4.6	width (ft)
0.5	mean depth (ft)
0.6	max depth (ft)
5.2	wetted parimeter (ft)
0.5	hyd radi (ft)
8.4	width-depth ratio

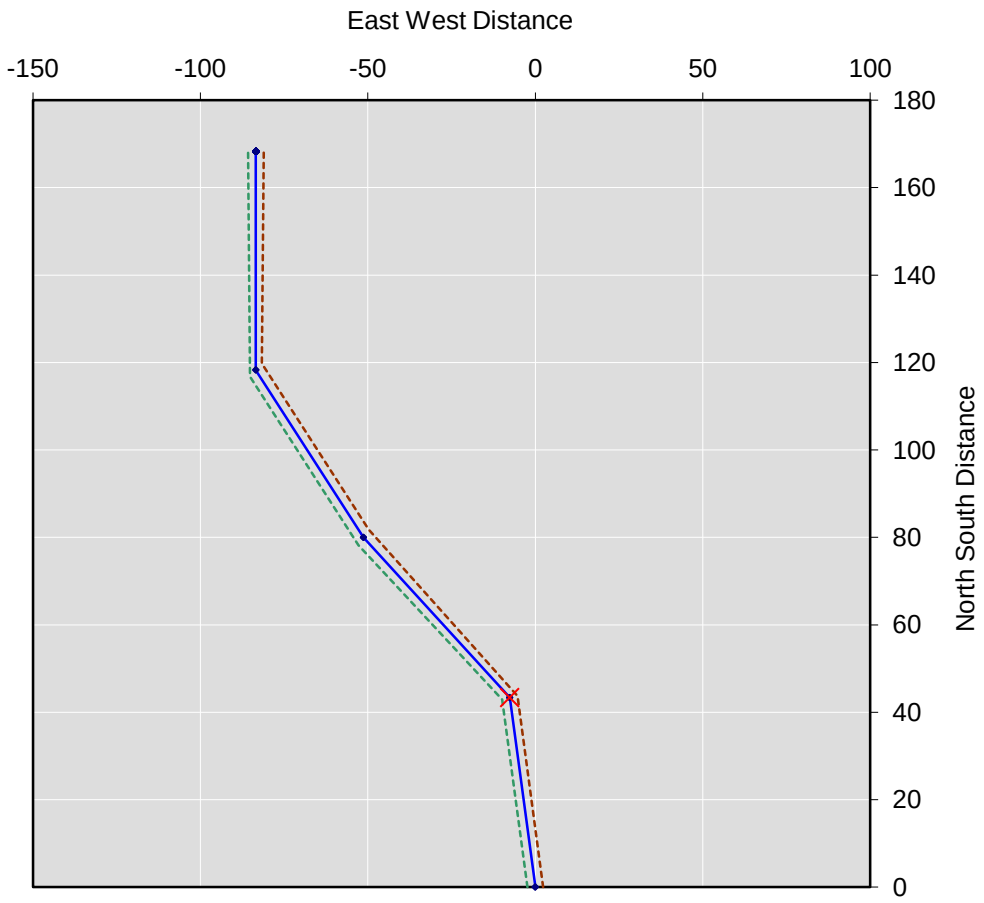
Flood Dimensions	
5.4	W flood prone area (ft)
1.2	entrenchment ratio
0.8	low bank height (ft)
1.3	low bank height ratio

Materials	
---	D50 (mm)
---	D84 (mm)
87	threshold grain size (mm):

Bankfull Flow	
1.5	velocity (ft/s)
3.7	discharge rate (cfs)
0.38	Froude number

Flow Resistance	
0.150	Manning's roughness
3.34	D'Arcy-Weisbach fric.
---	resistance factor u/u*
---	relative roughness

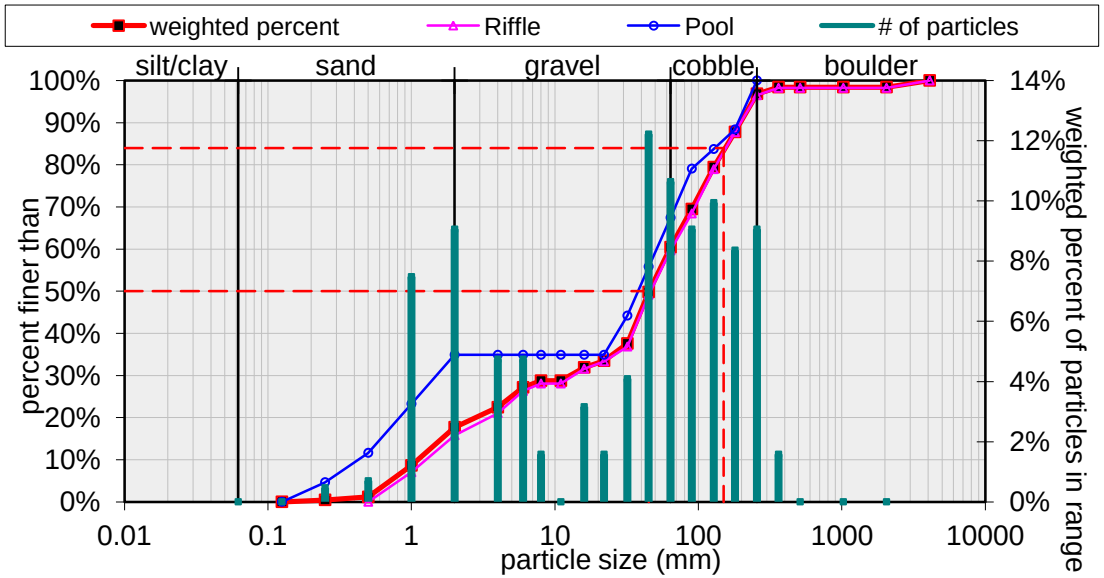
Forces & Power	
5.9	channel slope (%)
1.76	shear stress (lb/sq.ft.)
0.95	shear velocity (ft/s)
3	unit strm power (lb/ft/s)



Sinuosity = 1.1

Typical Weighted pebble count by bed features ---

90% riffle 10% pool

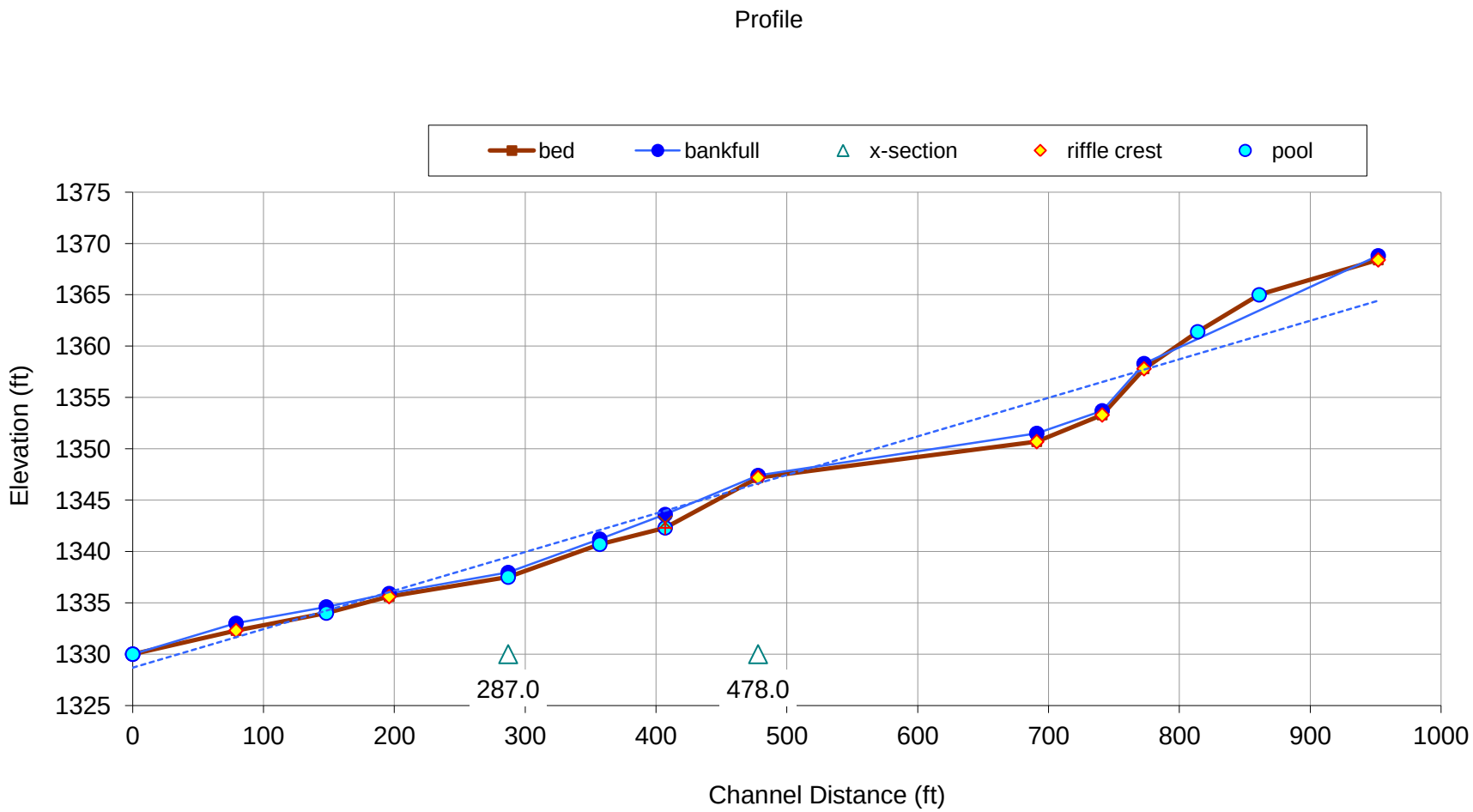


Size (mm)	
D16	1.8
D35	25
D50	45
D65	76
D84	150
D95	240

Size Distribution	
mean	16.4
dispersion	14.2
skewness	-0.32

Type	
silt/clay	0%
sand	18%
gravel	43%
cobble	36%
boulder	3%

TYPICAL EXISTING AND PROPOSED PATTERN AND PROFILE INFORMATION FOR MITIGATION AREAS B AND F



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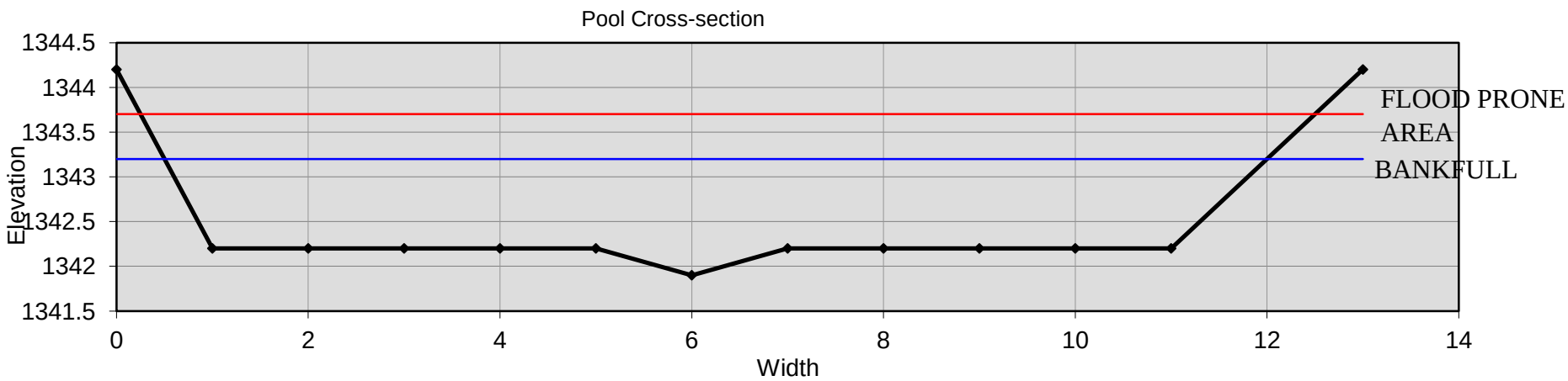

Bankfull Dimensions		Flood Dimensions		Materials	
11.0	x-section area (ft.sq.)	12.0	W flood prone area (ft)	---	D50 (mm)
11.5	width (ft)	1.0	entrenchment ratio	---	D84 (mm)
1.0	mean depth (ft)	---	low bank height (ft)	107	threshold grain size (mm):
1.3	max depth (ft)	---	low bank height ratio		
12.6	wetted parimeter (ft)				
0.9	hyd radi (ft)				
12.0	width-depth ratio				

Bankfull Flow		Flow Resistance		Forces & Power	
1.8	velocity (ft/s)	0.150	Manning's roughness	4	channel slope (%)
20.1	discharge rate (cfs)	2.73	D'Arcy-Weisbach fric.	2.19	shear stress (lb/sq.ft.)
0.34	Froude number	---	resistance factor u/u*	1.06	shear velocity (ft/s)
		---	relative roughness	4.4	unit strm power (lb/ft/s)

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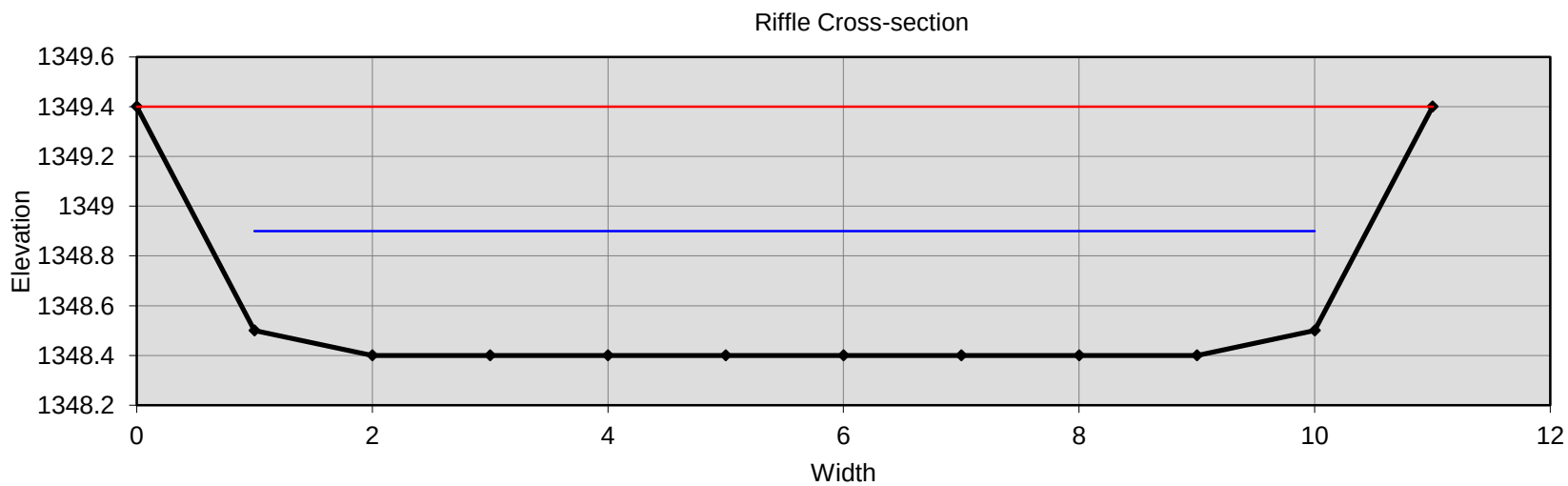
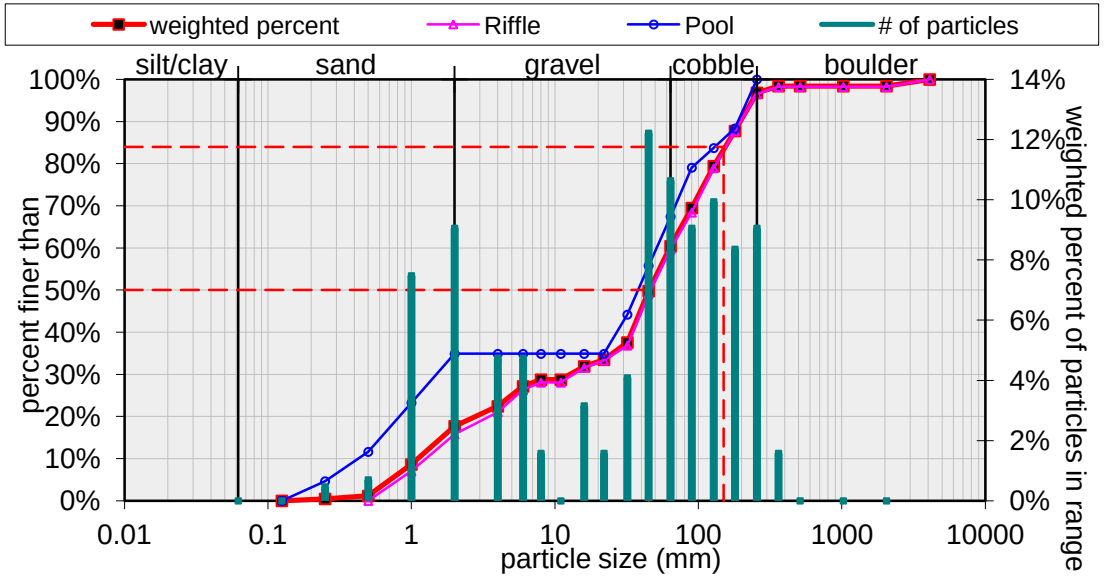


Bankfull Dimensions		Flood Dimensions		Materials	
4.4	x-section area (ft.sq.)	11.0	W flood prone area (ft)	---	D50 (mm)
9.0	width (ft)	1.2	entrenchment ratio	---	D84 (mm)
0.5	mean depth (ft)	---	low bank height (ft)	60	threshold grain size (mm):
0.5	max depth (ft)	---	low bank height ratio		
9.0	wetted parimeter (ft)				
0.5	hyd radi (ft)				
18.4	width-depth ratio				

Bankfull Flow		Flow Resistance		Forces & Power	
1.2	velocity (ft/s)	0.150	Manning's roughness	4	channel slope (%)
5.4	discharge rate (cfs)	3.31	D'Arcy-Weisbach fric.	1.22	shear stress (lb/sq.ft.)
0.31	Froude number	---	resistance factor u/u*	0.79	shear velocity (ft/s)
		---	relative roughness	1.5	unit strm power (lb/ft/s)

Typical Weighted pebble count by bed features ---

90% riffle 10% pool

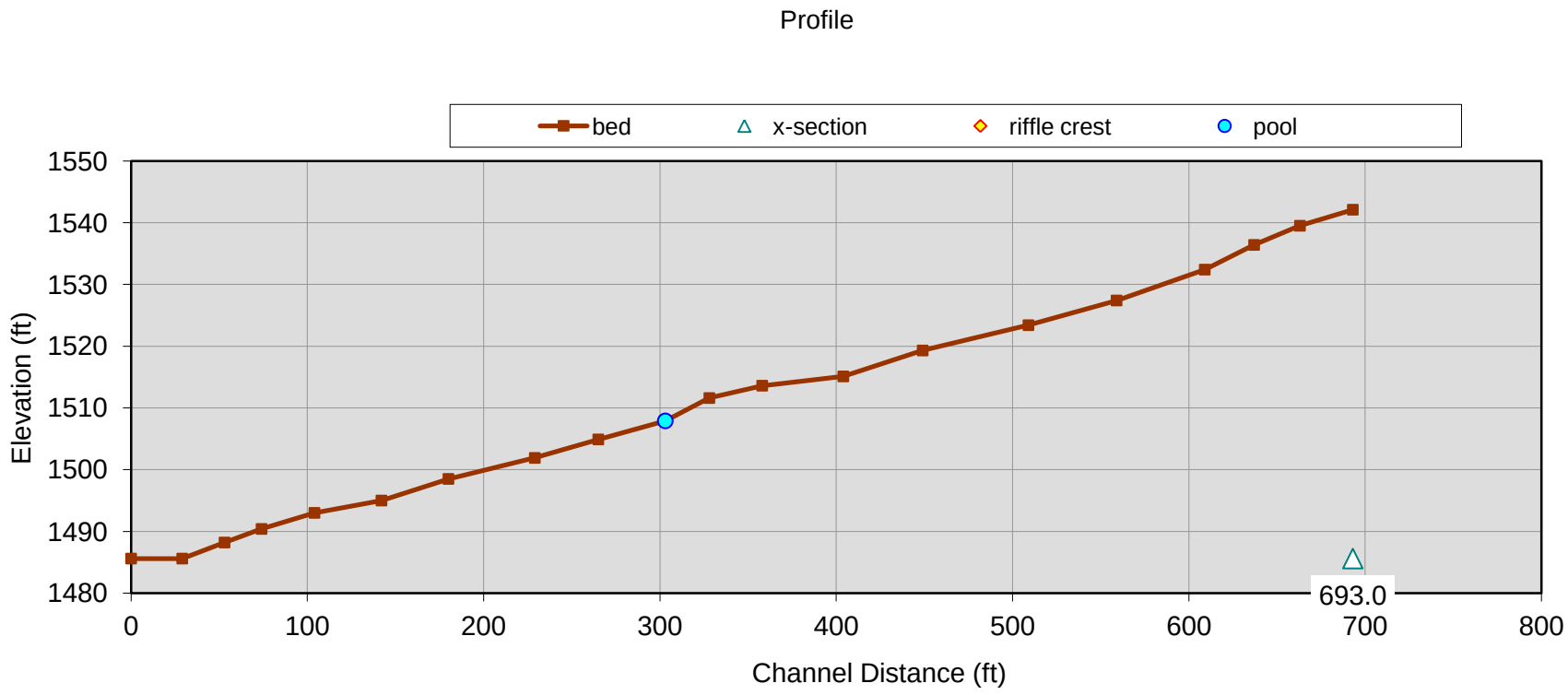


Size (mm)	
D16	1.8
D35	25
D50	45
D65	76
D84	150
D95	240

Size Distribution	
mean	16.4
dispersion	14.2
skewness	-0.32

Type	
silt/clay	0%
sand	18%
gravel	43%
cobble	36%
boulder	3%

EXISTING AND PROPOSED PATTERN AND PROFILE INFORMATION FOR MITIGATION AREA D



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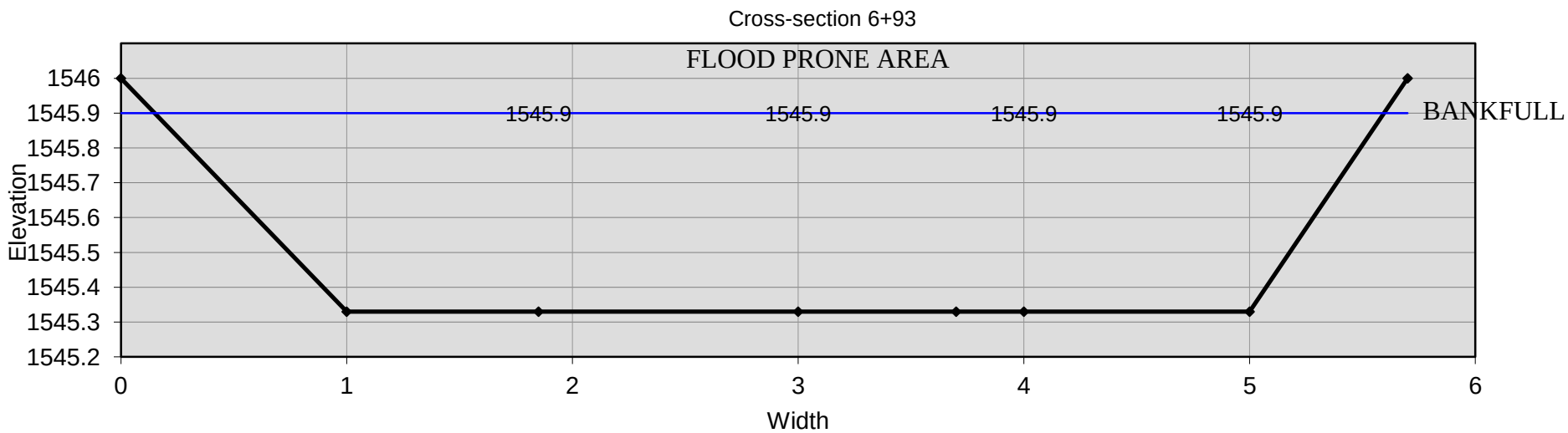

Bankfull Dimensions	
2.7	x-section area (ft.sq.)
5.4	width (ft)
0.5	mean depth (ft)
0.6	max depth (ft)
5.8	wetted parimeter (ft)
0.5	hyd radi (ft)
11.0	width-depth ratio

Flood Dimensions	
5.7	W flood prone area (ft)
1.0	entrenchment ratio
---	low bank height (ft)
---	low bank height ratio

Materials	
46	D50 Riffle (mm)
160	D84 Riffle (mm)
116	threshold grain size (mm):

Bankfull Flow	
1.7	velocity (ft/s)
4.6	discharge rate (cfs)
0.44	Froude number

Flow Resistance	
0.150	Manning's roughness
3.38	D'Arcy-Weisbach fric.
2.7	resistance factor u/u*
0.9	relative roughness

Forces & Power	
8.2	channel slope (%)
2.36	shear stress (lb/sq.ft.)
1.10	shear velocity (ft/s)
4.3	unit strm power (lb/ft/s)

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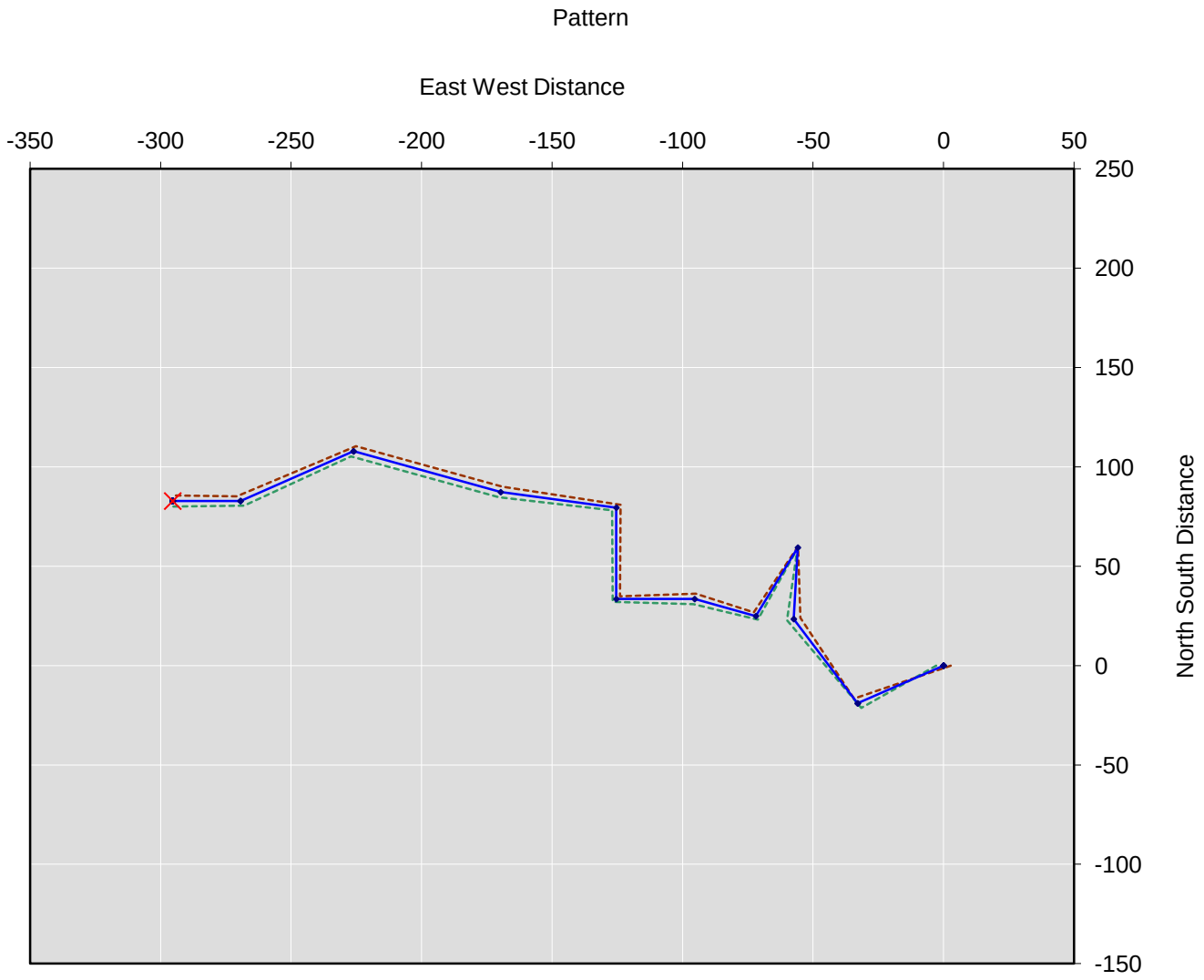

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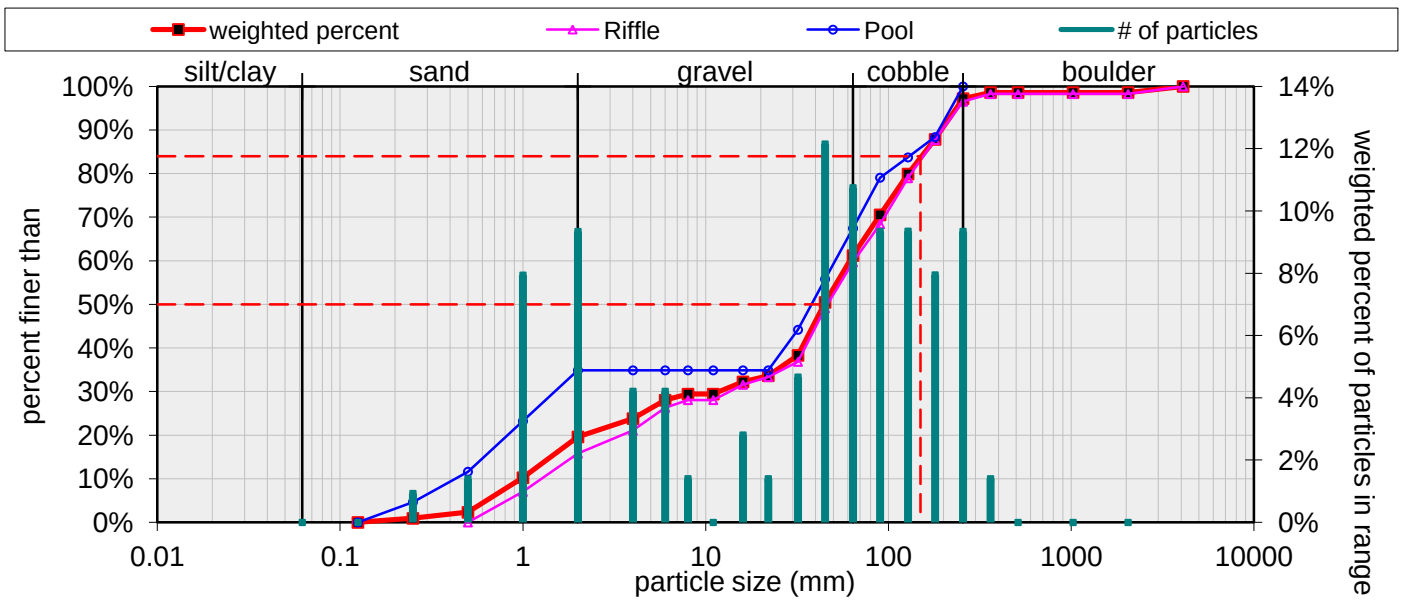
Weighted pebble count by bed features ---

80% riffle 20% pool

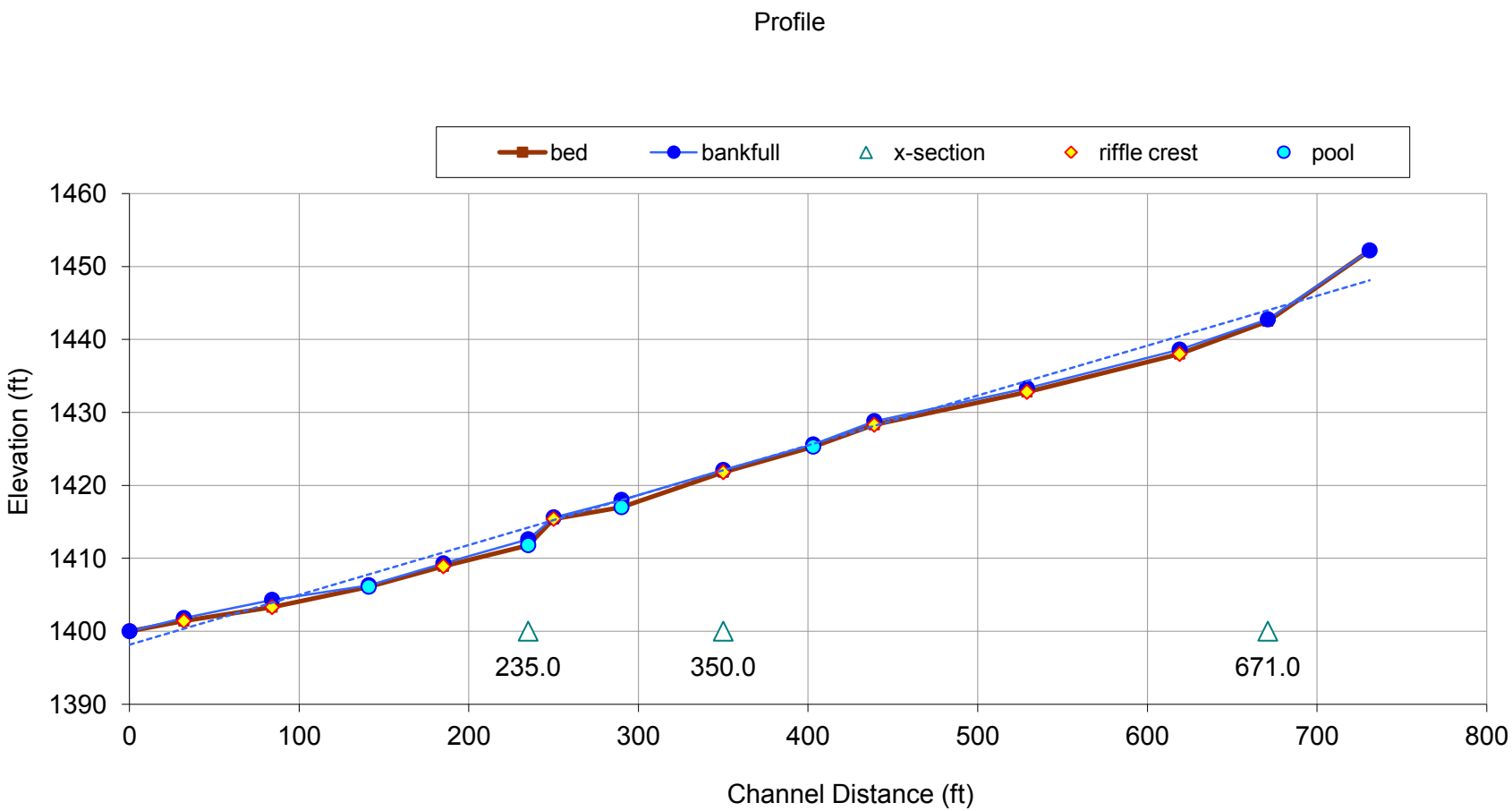


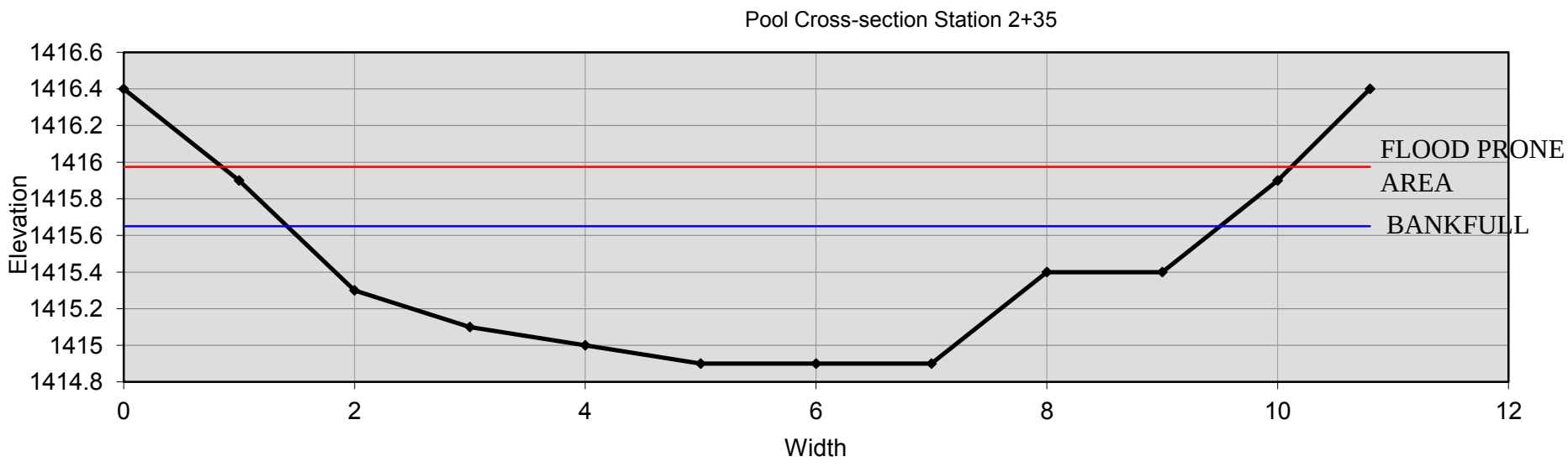
Size (mm)	
D16	1.5
D35	25
D50	44
D65	73
D84	150
D95	240

Size Distribution	
mean	15.0
dispersion	16.4
skewness	-0.33

Type	
silt/clay	0%
sand	20%
gravel	42%
cobble	36%
boulder	3%

TYPICAL EXISTING AND PROPOSED PATTERN AND PROFILE INFORMATION FOR MITIGATION AREAS E and H





Bankfull Dimensions	
4.2	x-section area (ft.sq.)
8.1	width (ft)
0.5	mean depth (ft)
0.8	max depth (ft)
8.4	wetted parimeter (ft)
0.5	hyd radi (ft)
15.7	width-depth ratio

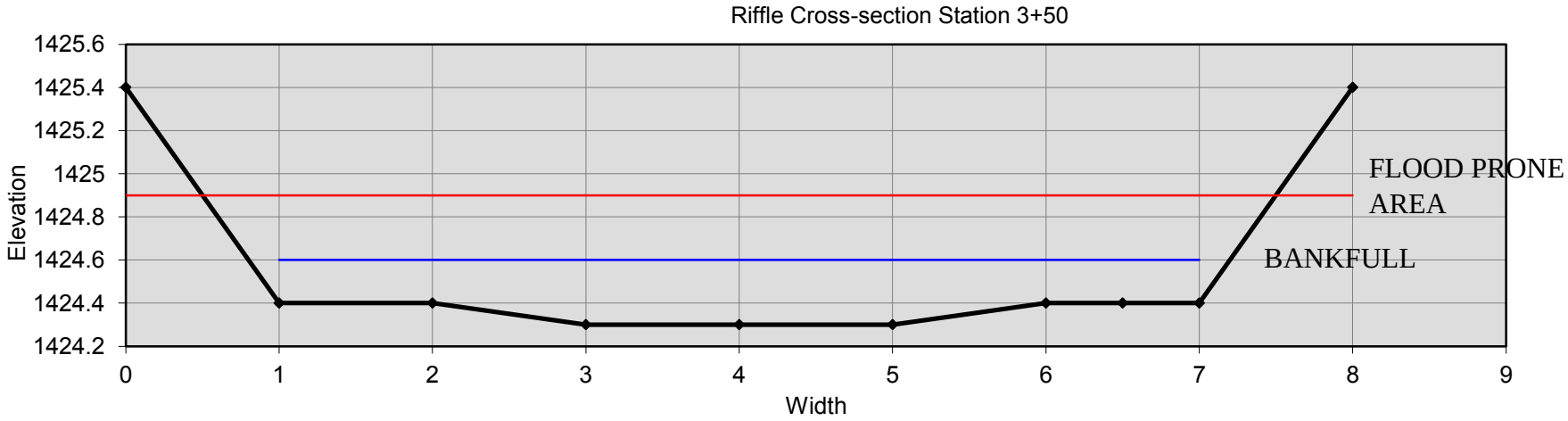
Flood Dimensions	
10.8	W flood prone area (ft)
1.3	entrenchment ratio
---	low bank height (ft)
---	low bank height ratio

Materials	
46	D50 Riffle (mm)
160	D84 Riffle (mm)
---	threshold grain size (mm):

Bankfull Flow	
---	velocity (ft/s)
---	discharge rate (cfs)
---	Froude number

Flow Resistance	
0.076	Manning's roughness
0.40	D'Arcy-Weisbach fric.
3.1	resistance factor u/u*
1.0	relative roughness

Forces & Power	
---	channel slope (%)
---	shear stress (lb/sq.ft.)
---	shear velocity (ft/s)
---	unit strm power (lb/ft/s)



Bankfull Dimensions	
1.5	x-section area (ft.sq.)
6.0	width (ft)
0.2	mean depth (ft)
0.3	max depth (ft)
6.0	wetted parimeter (ft)
0.2	hyd radi (ft)
24.0	width-depth ratio

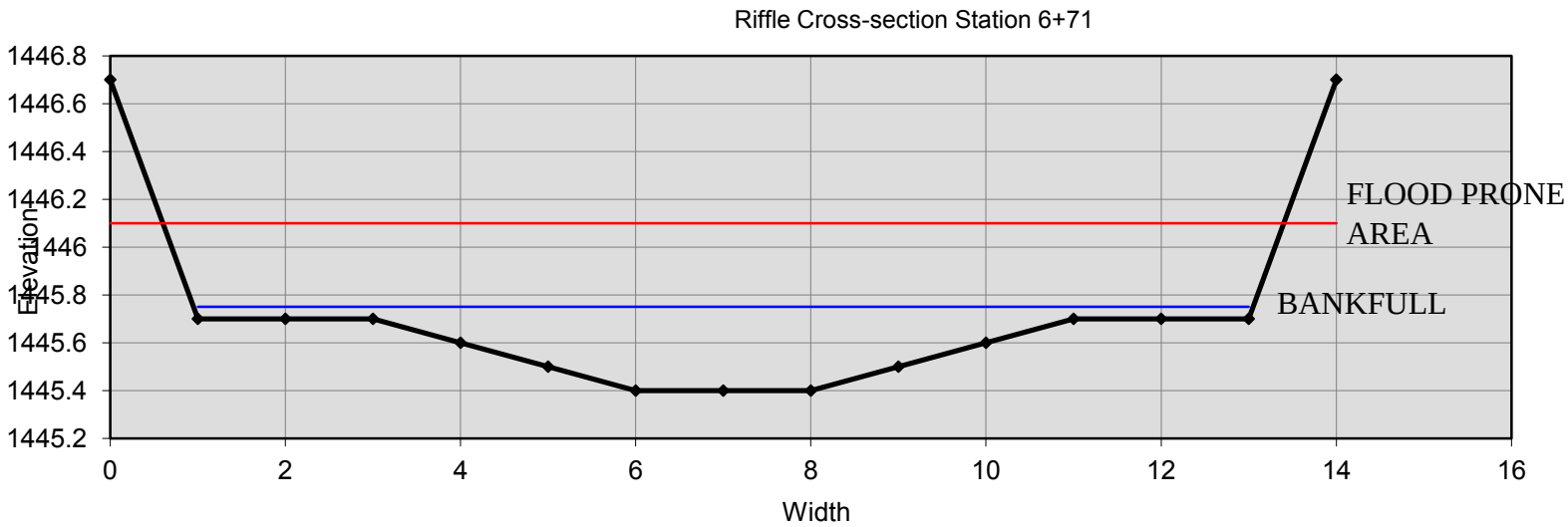
Flood Dimensions	
8.0	W flood prone area (ft)
1.3	entrenchment ratio
---	low bank height (ft)
---	low bank height ratio

Materials	
46	D50 Riffle (mm)
160	D84 Riffle (mm)
54	threshold grain size (mm):

Bankfull Flow	
0.9	velocity (ft/s)
1.3	discharge rate (cfs)
0.31	Froude number

Flow Resistance	
0.178	Manning's roughness
1.95	D'Arcy-Weisbach fric.
1.2	resistance factor u/u*
0.5	relative roughness

Forces & Power	
7	channel slope (%)
1.09	shear stress (lb/sq.ft.)
0.75	shear velocity (ft/s)
0.96	unit strm power (lb/ft/s)



Bankfull Dimensions	
2.1	x-section area (ft.sq.)
12.0	width (ft)
0.2	mean depth (ft)
0.3	max depth (ft)
12.0	wetted parimeter (ft)
0.2	hyd radi (ft)
68.6	width-depth ratio

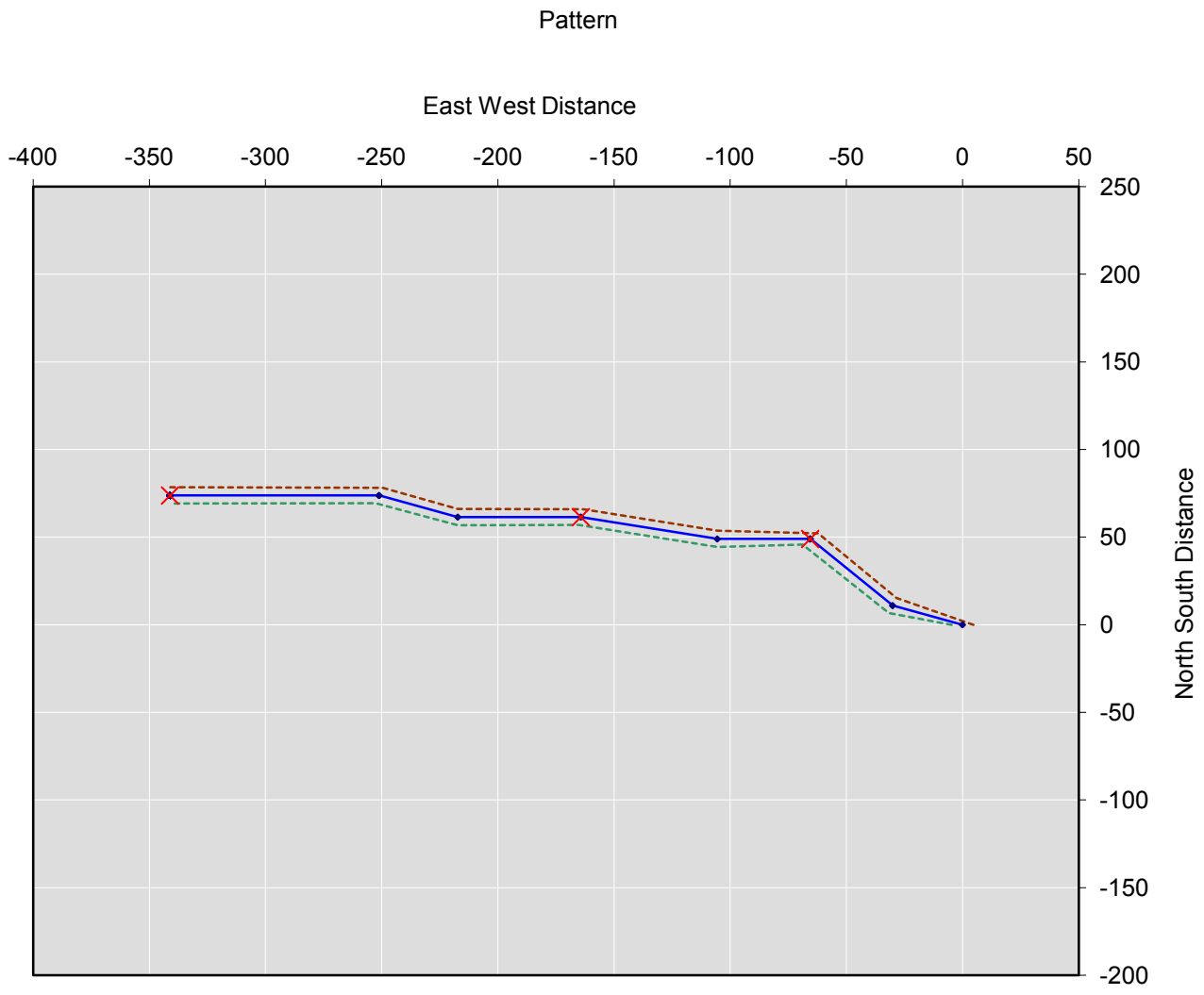
Flood Dimensions	
14.0	W flood prone area (ft)
1.2	entrenchment ratio
---	low bank height (ft)
---	low bank height ratio

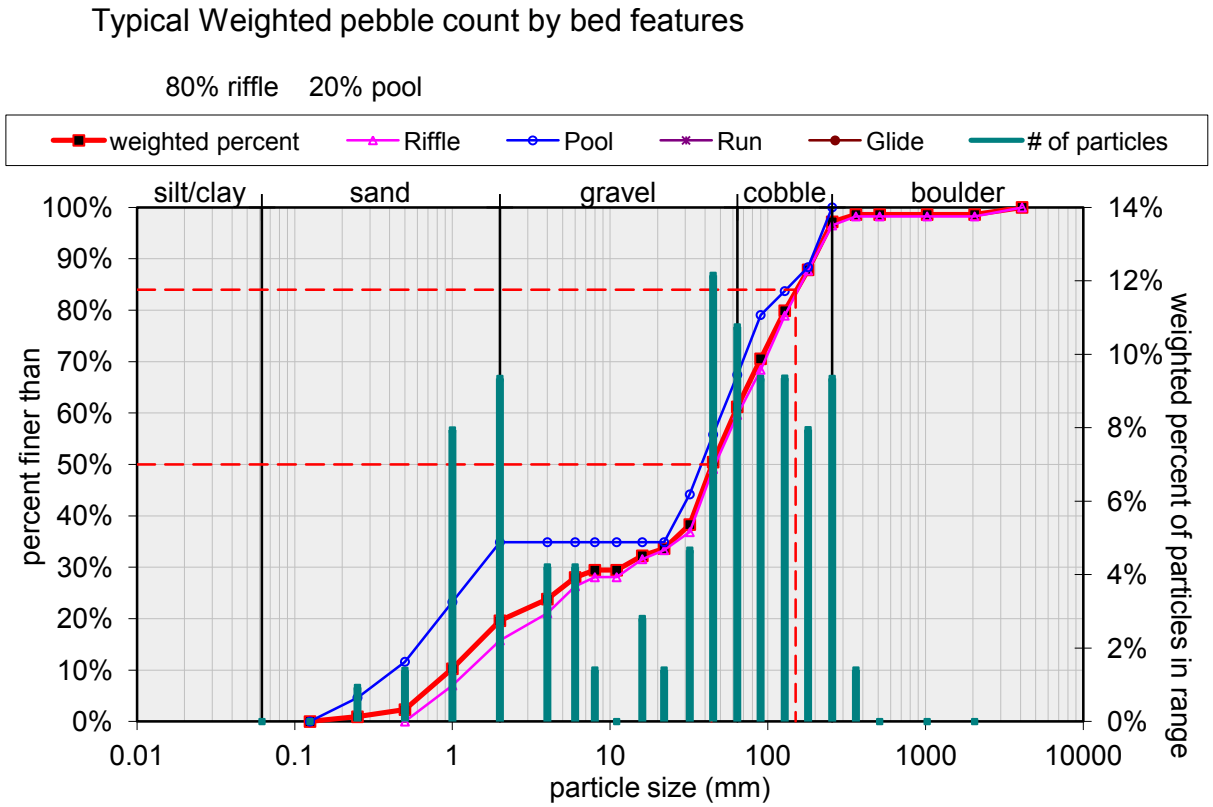
Materials	
46	D50 Riffle (mm)
160	D84 Riffle (mm)
37	threshold grain size (mm):

Bankfull Flow	
0.4	velocity (ft/s)
0.9	discharge rate (cfs)
0.18	Froude number

Flow Resistance	
0.289	Manning's roughness
2.73	D'Arcy-Weisbach fric.
0.7	resistance factor u/u*
0.3	relative roughness

Forces & Power	
7	channel slope (%)
0.76	shear stress (lb/sq.ft.)
0.63	shear velocity (ft/s)
0.33	unit strm power (lb/ft/s)


Pattern
East West Distance
-400
-350
-300
-250
-200
-150
-100
-50
0
50
250
200
150
100
50
0
-50
-100
-150
-200
North South Distance


Typical Weighted pebble count by bed features
80% riffle
20% pool
weighted percent
Riffle
Pool
Run
Glide
# of particles
silt/clay
sand
gravel
cobble
boulder
percent finer than
weighted percent of particles in range
particle size (mm)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
14%
12%
10%
8%
6%
4%
2%
0%
0.01
0.1
1
10
100
1000
10000

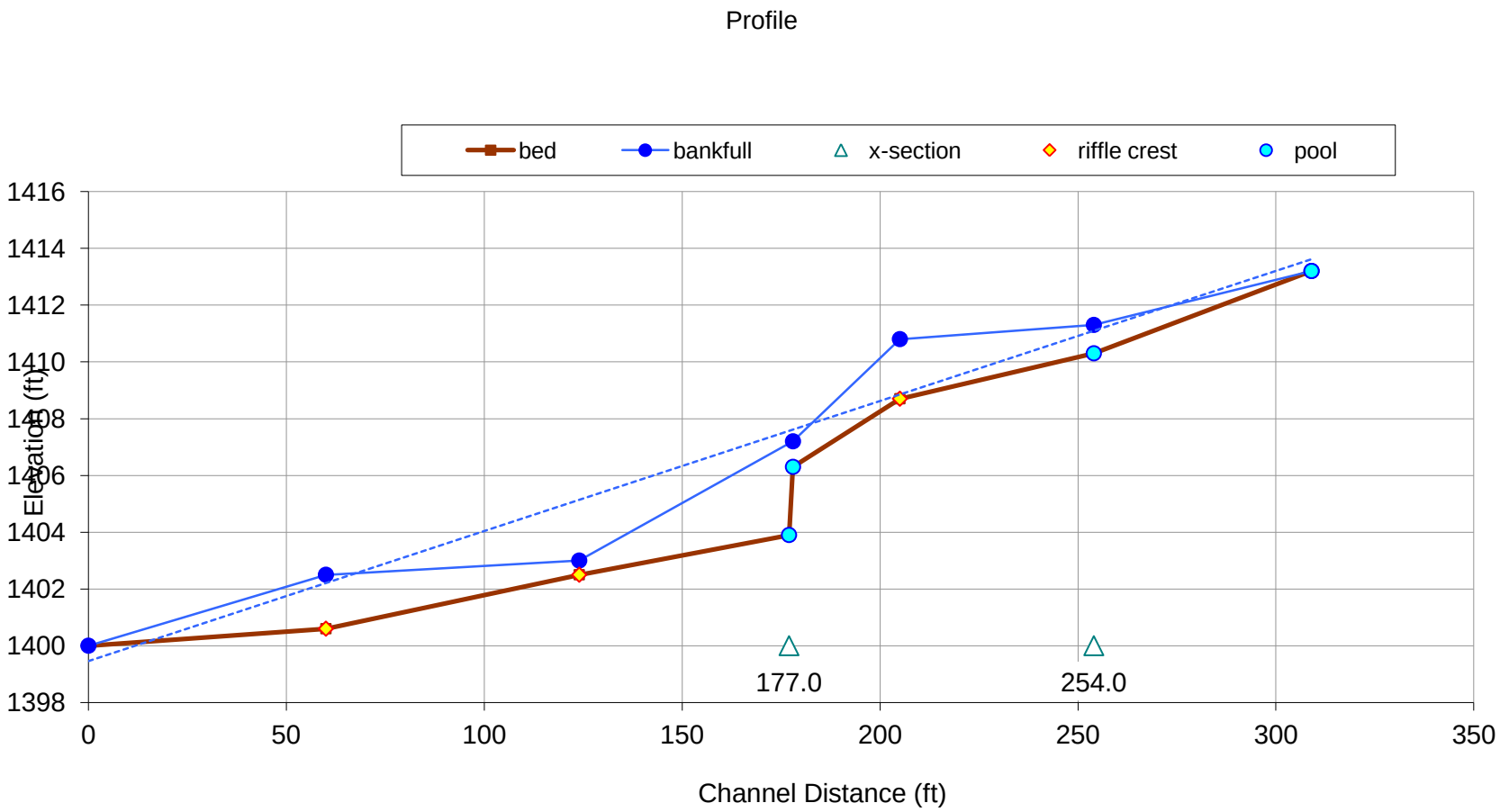
Nally & Hamilton Enterprises, Inc.
LRN-2009-00741
Individual Permit Application and Stream Restoration Plan
January 31, 2013

Size (mm)	
D16	1.5
D35	25
D50	44
D65	73
D84	150
D95	240

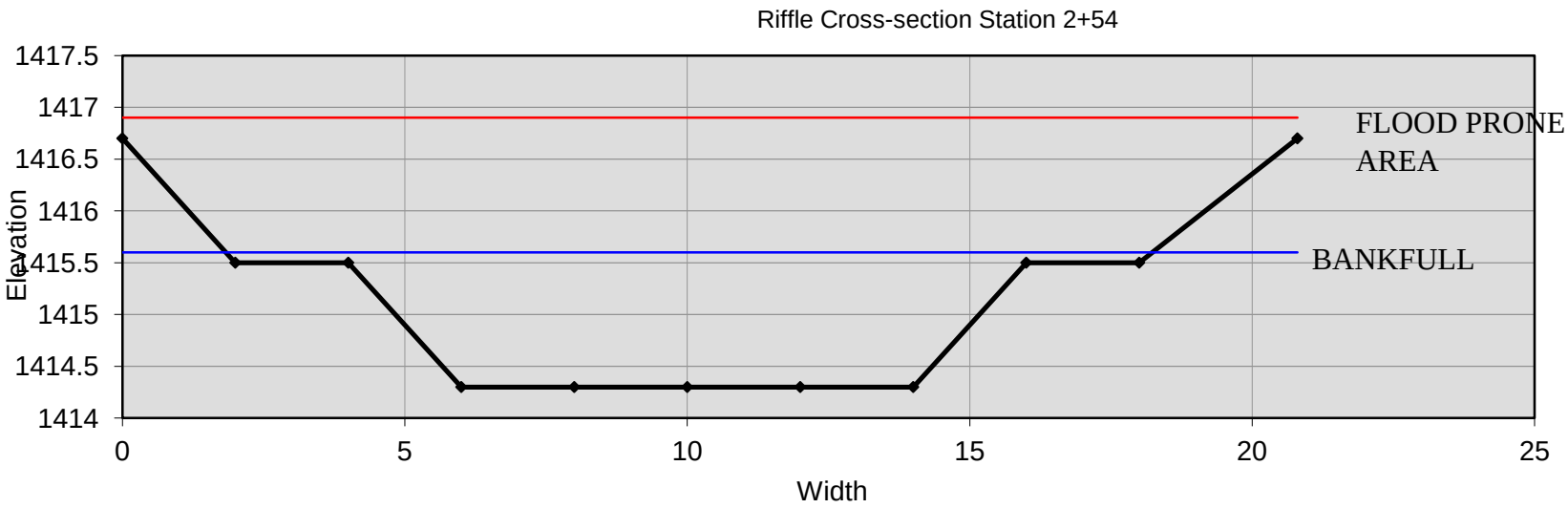
Size Distribution	
mean	15.0
dispersion	16.4
skewness	-0.33

Type	
silt/clay	0%
sand	20%
gravel	42%
cobble	36%
boulder	3%

EXISTING AND PROPOSED PATTERN AND PROFILE INFORMATION FOR MITIGATION AREA G



Nally & Hamilton Enterprises, Inc.
LRN-2009-00741
Individual Permit Application and Stream Restoration Plan
Revised January 31, 2013



Bankfull Dimensions	
13.6	x-section area (ft.sq.)
16.4	width (ft)
0.8	mean depth (ft)
1.3	max depth (ft)
17.1	wetted parimeter (ft)
0.8	hyd radi (ft)
19.7	width-depth ratio

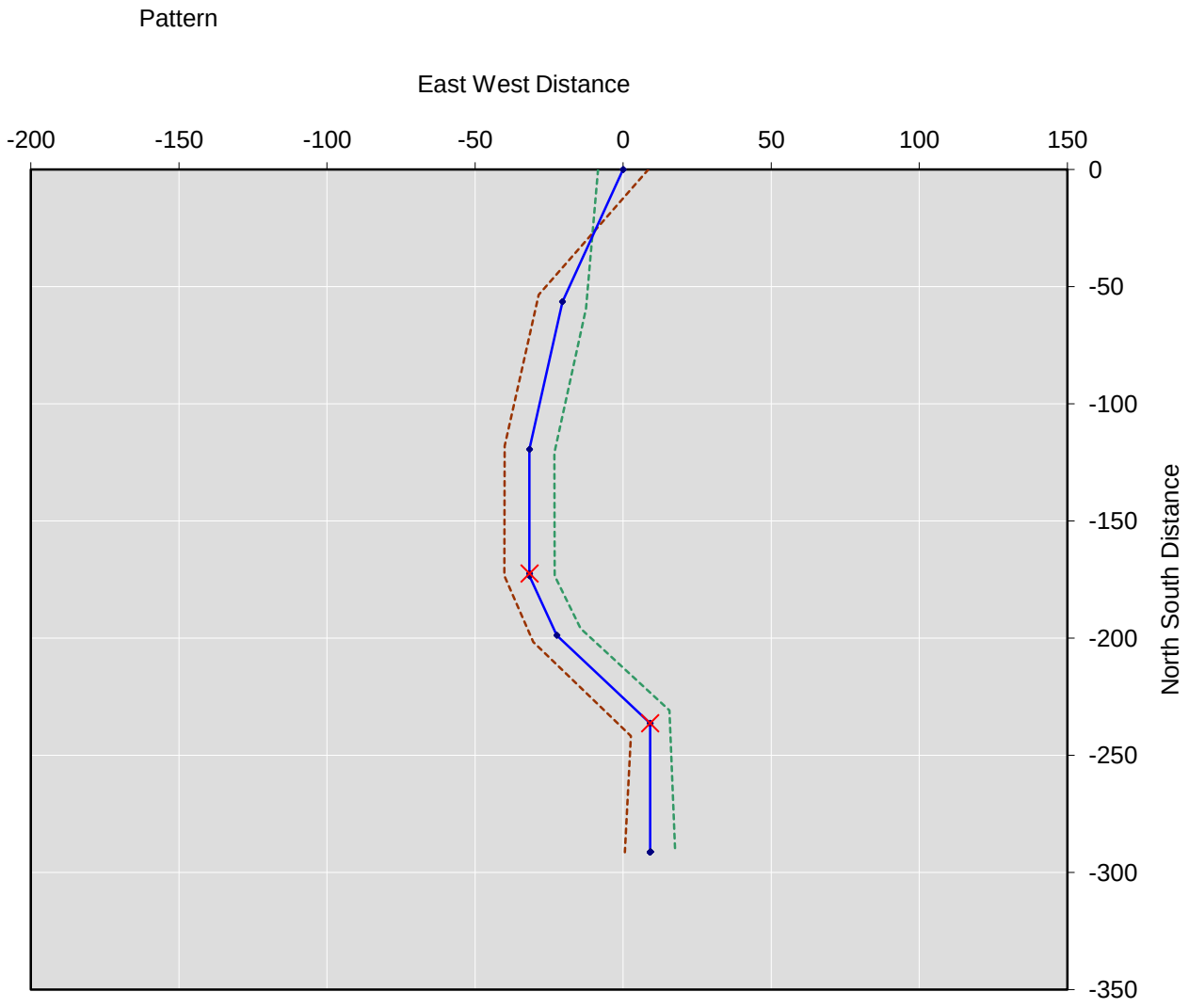
Flood Dimensions	
20.8	W flood prone area (ft)
1.3	entrenchment ratio
---	low bank height (ft)
---	low bank height ratio

Materials	
---	D50 (mm)
---	D84 (mm)
98	threshold grain size (mm):

Bankfull Flow	
1.7	velocity (ft/s)
23.2	discharge rate (cfs)
0.34	Froude number

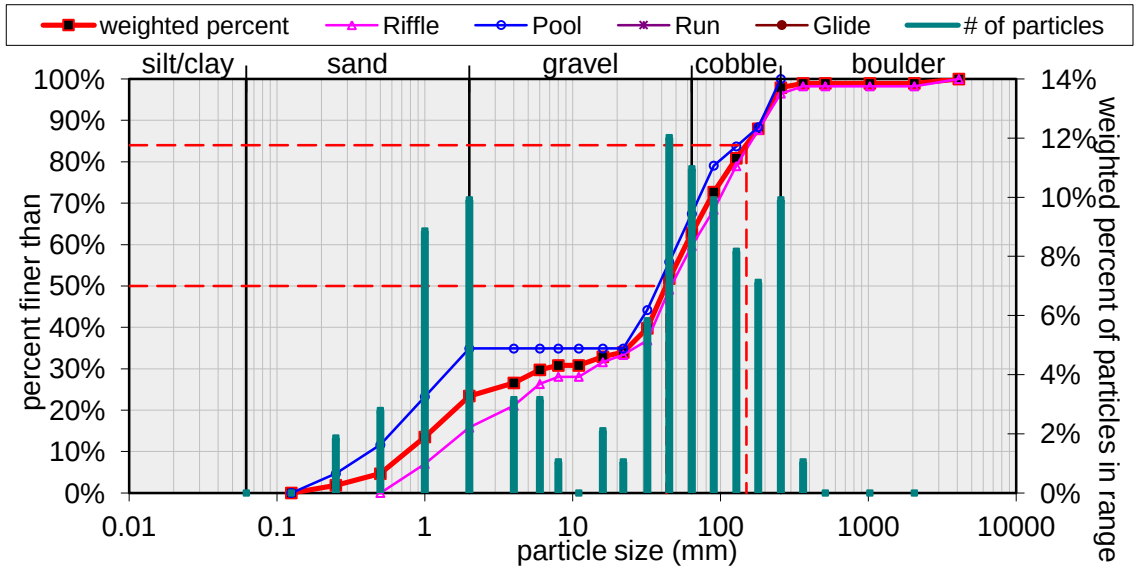
Flow Resistance	
0.150	Manning's roughness
2.82	D'Arcy-Weisbach fric.
---	resistance factor u/u*
---	relative roughness

Forces & Power	
4	channel slope (%)
1.99	shear stress (lb/sq.ft.)
1.01	shear velocity (ft/s)
3.5	unit strm power (lb/ft/s)


Pattern
East West Distance
-200
-150
-100
-50
0
50
100
150
0
-50
-100
-150
-200
-250
-300
-350
North South Distance

Typical weighted pebble count by bed features

60% riffle 40% pool

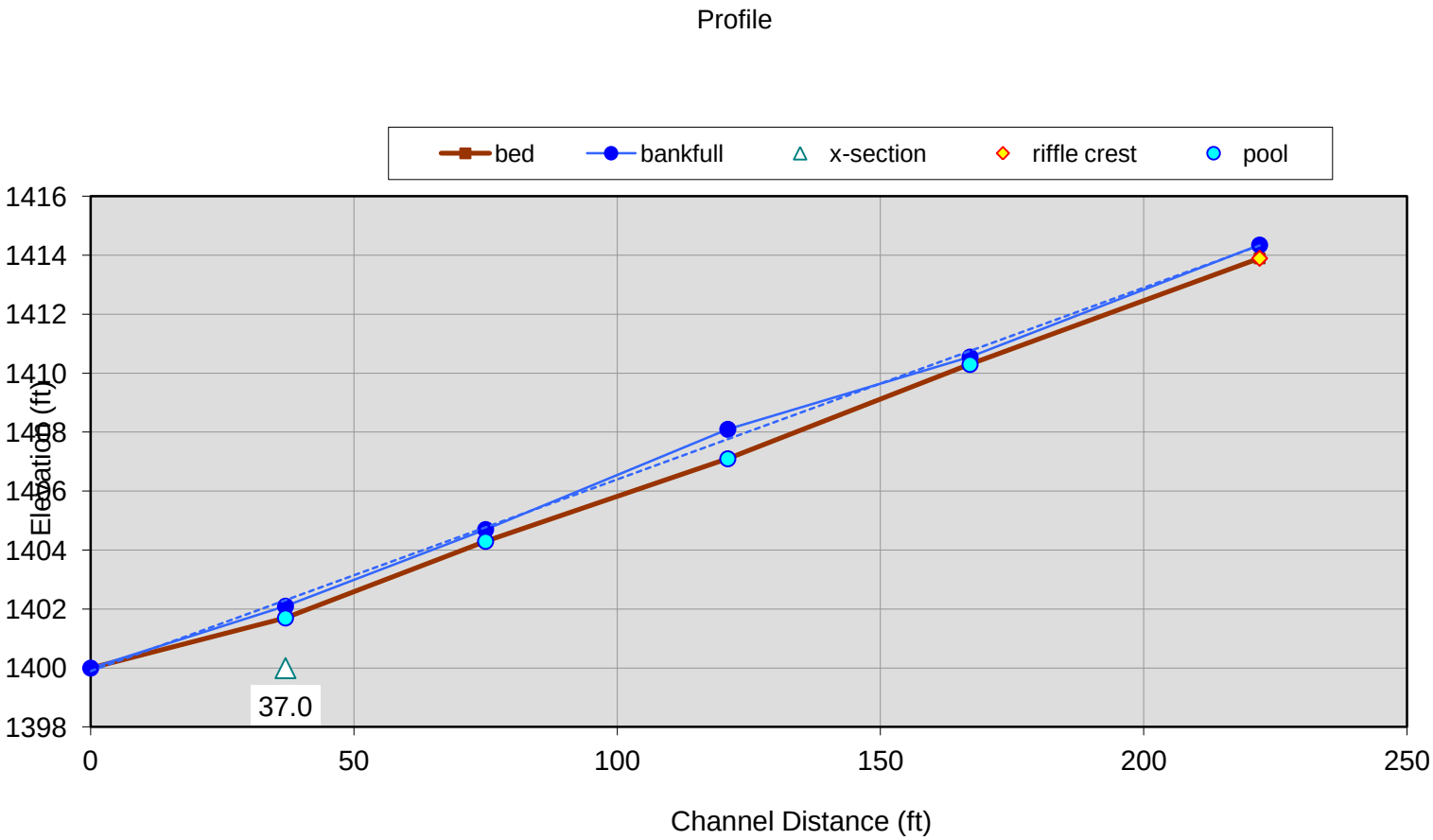


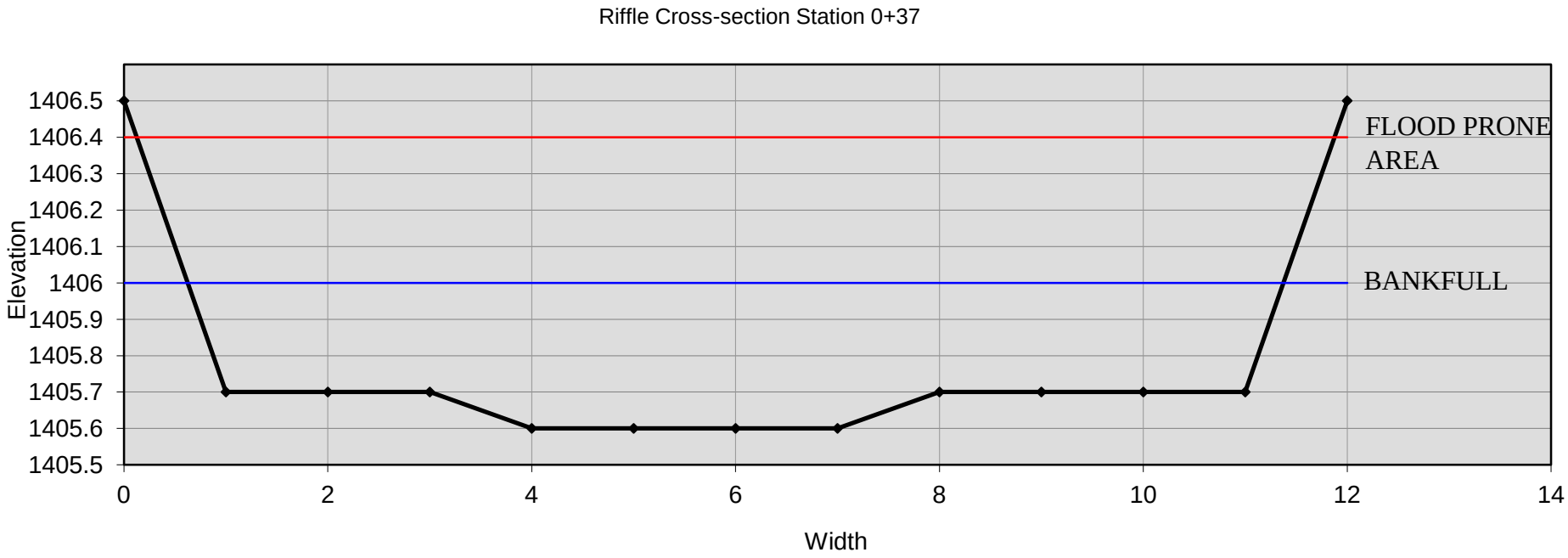
Size (mm)	
D16	1.2
D35	24
D50	43
D65	69
D84	150
D95	230

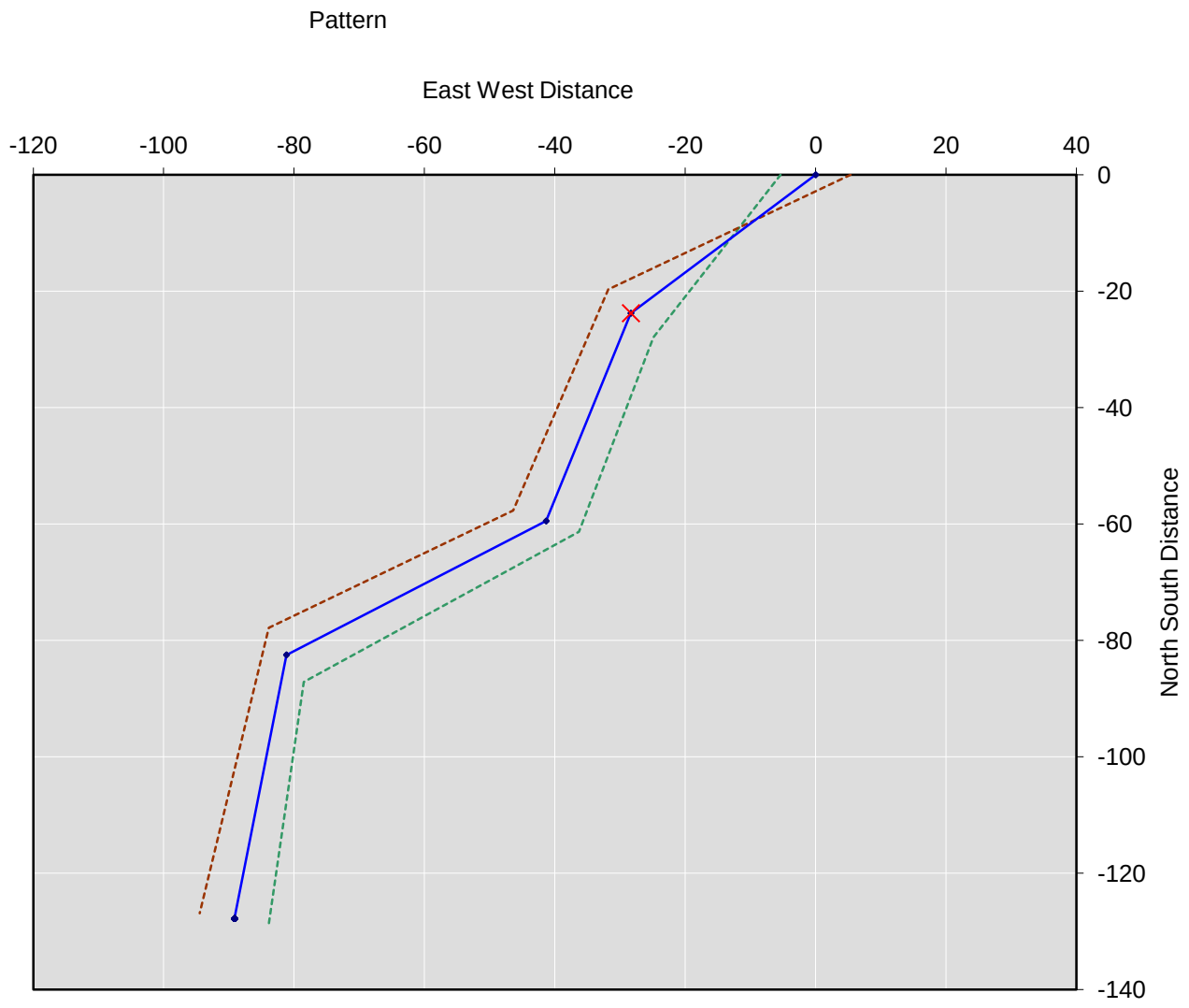
Size Distribution	
mean	13.4
dispersion	19.7
skewness	-0.35

Type	
silt/clay	0%
sand	23%
gravel	39%
cobble	35%
boulder	2%

EXISTING AND PROPOSED PATTERN AND PROFILE INFORMATION FOR MITIGATION AREA J

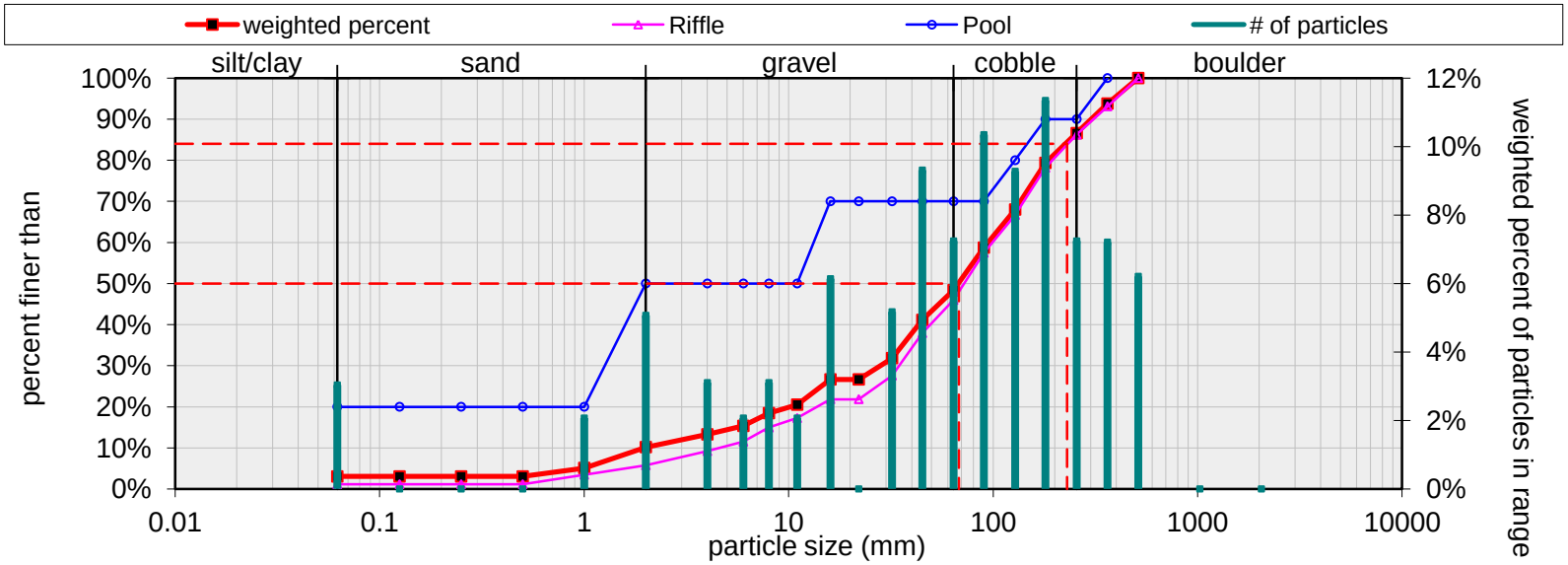



Riffle Cross-section Station 0+37
Elevation
1406.5
1406.4
1406.3
1406.2
1406.1
1406
1405.9
1405.8
1405.7
1405.6
1405.5
0
2
4
6
8
10
12
14
Width
FLOOD PRONE AREA
BANKFULL


Pattern
East West Distance
-120
-100
-80
-60
-40
-20
0
20
40
0
-20
-40
-60
-80
-100
-120
-140
North South Distance

Weighted pebble count by bed features

90% riffle 10% pool



Size (mm)	
D16	6.4
D35	36
D50	68
D65	110
D84	230
D95	390

Size Distribution	
mean	38.4
dispersion	7.0
skewness	-0.20

Type	
silt/clay	3%
sand	7%
gravel	38%
cobble	38%
boulder	13%