



Fagnotat Hydrologi E6 Sjoa-Bredevangen

NV34E6ØØ-VAA-NOT-1203

Dimensjonerende vannmengder i vassdragskrysninger og andre hydrologiske problemstillinger

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Revisjonsoversikt

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02	12.01.2026	Nytt avsnitt 6.1 + tilføyd tekst i kap.6.	JBZ	HMK	OSB
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Forord

E6 mellom Sjoa og Otta i Sel kommune er en del av hovedveiforbindelsen mellom Oslo til Trondheim. Nye Veier AS har ansvar for planlegging, bygging og drift av veistrekningen.



Figur 0-1 Oversiktskart over strekningen med varslingsgrense.

På vegne av Nye Veier AS har Plan AAV ANS planlagt og utredet ny veitrasé og nødvendig kompletterende tiltak for ny E6 Sjoa-Bredevangen-Solhjem og krysset E6 x rv.15. Vurderingene og foreslåtte oppfølgingspunkter er en del av planarbeidet og inngår som grunnlag for detaljreguleringen av ny E6 Sjoa-Bredevangen-Solhjem og rundkjøring E6 x rv.15.

Prosjektleder plan for Nye Veier er Stian Blindheim. En rådgivergruppe med Asplan Viak AS og Dr. Ing. A. Aas-Jakobsen AS som hovedkonsulenter har utført arbeidet for Nye Veier. Ola S. Brandvold fra Asplan Viak er oppdragsleder for rådgivergruppen.

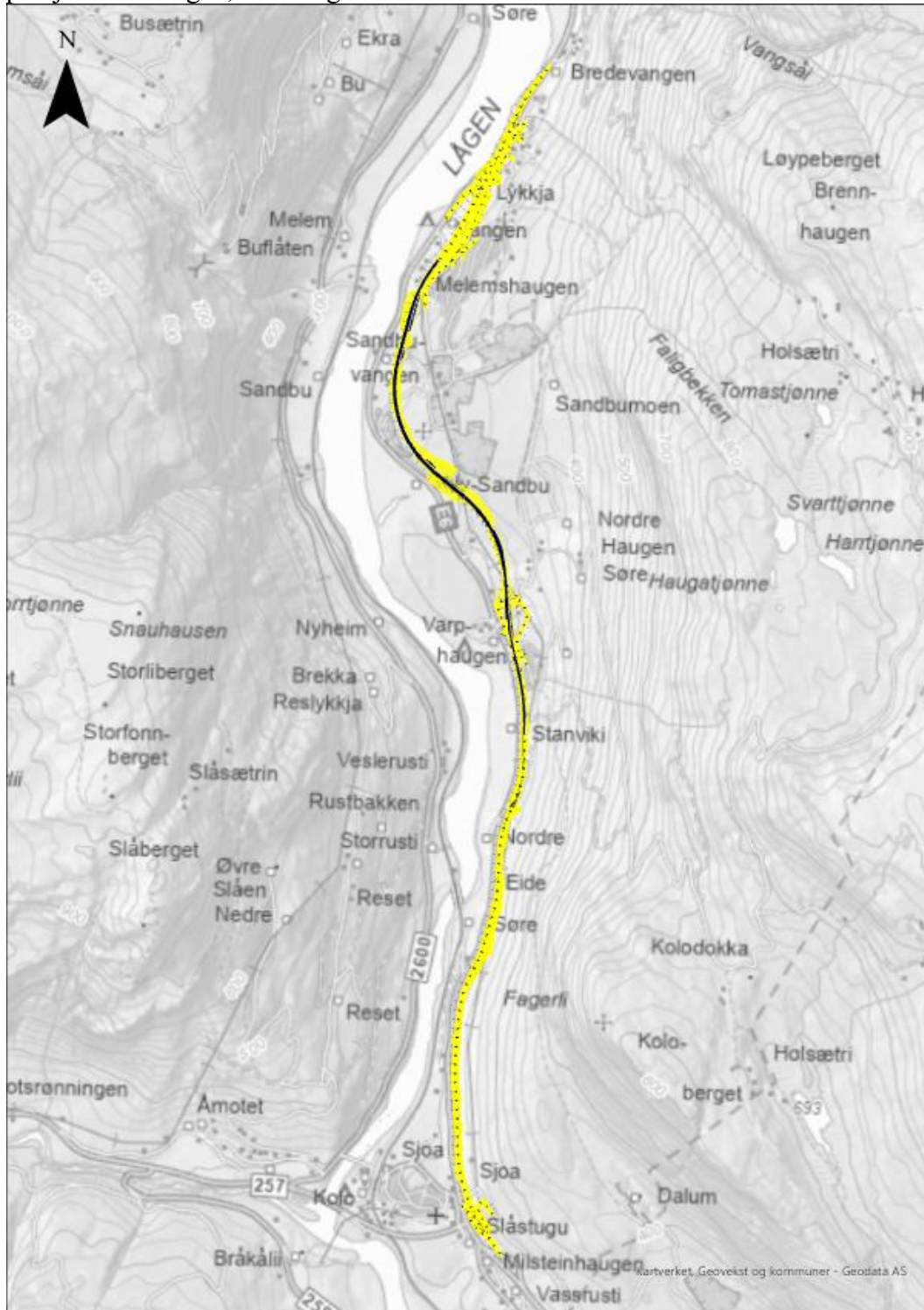
Notatet er utarbeidet av Asplan Viak AS ved Jon B. Zeigler.

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1 Innledning

Hensikten med notatet er å redegjøre for dimensjonerende vannmengder i vassdragskryssninger, samt svare ut andre relevante hydrologiske problemstillinger for prosjektstrekningen, vist i Figur 1-1.



Figur 1-1. Veglinje for prosjektstrekningen Sjoa-Bredevangen, datert 6. mai 2025.

2 Grunnlag

2.1 Datagrunnlag

Terrengdata er basis for alle analysene som skal gjøres. Avrenning så vel som kapasitetsberegninger. Terrenggrunnlag for analysene hentes først og fremst fra Kartverkets laserinnsynstjeneste. Det benyttes Nasjonal høydemodell NDH DTM1.

Vegmodell fra 6. mai 2025 er så innarbeidet i eksisterende terreng for videre bruk i avrenningsanalyse og modellering av foreløpige vassdragskrysninger. Ved kryss og underganger er det *laveste* vegflatenivå som brukes i endelig terrengmodell. (Bunn undergang overstyrer f.eks. topp hovedveg).

2.2 Forutsetninger

2.2.1 Vegnormal N200

Vegnormal N200 har kommet i flere nye utgaver siden det opprinnelige E6 Øyer-Otta -prosjektet startet. Det tas derfor utgangspunkt i siste gjeldende utgave, 20.12.2024. De viktigste føringene er som følger:

- Det skal benyttes klimafaktor $F_k=1,4$ for alle nedbørfelt under 10 km² (Krav 2.4.1.1-2)
- Sikkerhetsfaktor F_s er nå bestemt av kvaliteten på det hydrologiske datagrunnlaget, samt vegklasse. Høyeste påslag er 1,4. (Krav 2.4.1.1-3)
- Det skal regnes med gjentetting av 1/3 av høyden i gjennomløp (rør/stikkrenner/kulverter). For et Ø1200-rør skal f.eks. nederste 40 cm regnes som gjentettet.
- Det kreves at det brukes minst tre forskjellige flomberegningsmetoder, og at Q_{dim} defineres innenfor spekteret av disse.
- Det skal påvises om gjennomløpet har inn- eller utløpskontroll for Q_{dim} . Dette gjøres gjennom modellering i HEC-RAS for større krysning og HY-8 for mindre krysninger. Geometri for vanngjennomløp er riktignok ikke endelig fastsatt for alle krysningpunkter per 16.05.2025.
- Det er også krav om erosjonssikring. Dette er foreløpig ikke vurdert, da geometri for vanngjennomløpene ikke er endelig fastsatt.

Vegklasse er ikke eksplisitt fastsatt for de ulike delstrekningene, så det legges til grunn klasse V3 for flomberegningene. Denne klassen gjelder for sterkt trafikkerte veier uten omkjøringsmulighet. Dette betyr at gjennomløp dimensjoneres for 200-årsflom.

Klima- og sikkerhetsfaktor legges først på når endelige flomverdier er definert.

2.2.2 Vegnormal N400

Denne vegnormalen gjelder bruer, og kommer i spill når et gjennomløp er for bredt til å kunne regnes som kulvert (spennvidde ≥ 2.5 meter). Dette vil trolig gjelde krysningen ved Sel sjukeheim/Haredalsbekken. For bruer gjelder ikke gjentettingskravet fra N200. Til gjengjeld må underkant overbygning ha minst 0,5 m fribord til dimensjonerende flomvannstand. Her vil

det for enkelte kryssninger (bl.a. Sel sjukeheim/Haredalsbekken) være flommen i Lågen og ikke i det kryssende sidevassdraget som i teorien blir bestemmende. Bruer skal iht. N400 dimensjoneres for 200-årsflom, uavhengig av vegklasse.

2.2.3 Øvrige forutsetninger

For stikkrenner er det tatt utgangspunkt i plasseringer fra 2. mai 2025. Grunnlaget er ikke endelig låst, og det kan bli behov for flere justeringer i den forbindelse. Ved de større kryssningene vil det også være byggetekniske og landskapsmessige føringer som spiller inn. Disse er heller ikke endelig låst.

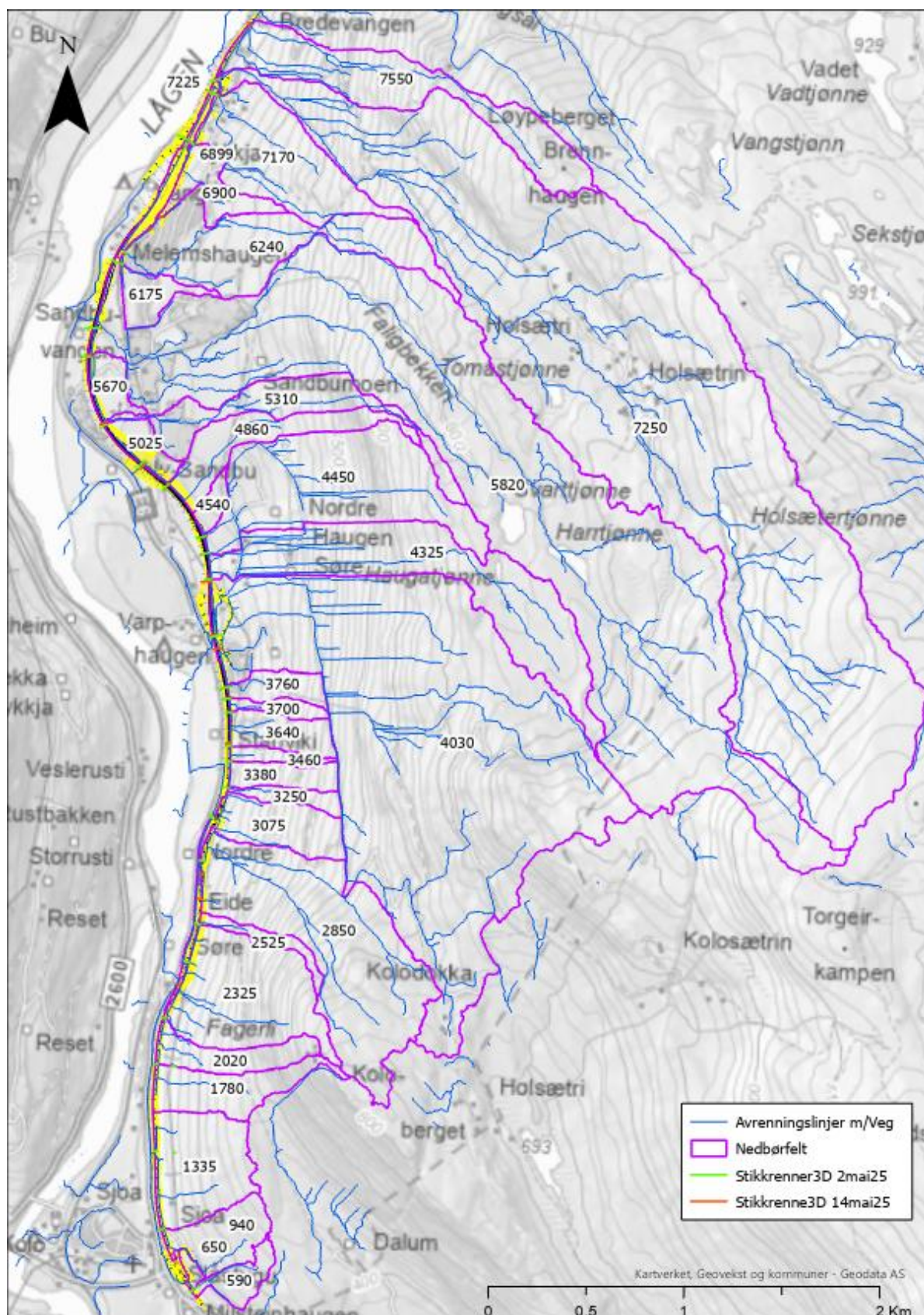
Terrenggrunnlaget inkluderer ikke bekk-/eluebunn og det er derfor ikke mulig å modellere vanngjennomløp eksakt. Overflaten fra terrenggrunnlaget brukes som den er (høyere enn reelt for bekkbunn), med noen skjønnsmessige justeringer for å få kjørbare modeller. For eluebunn i Lågen tas det utgangspunkt i det batymetriske grunnlaget fra Blasy-Øverlands modeller. For beregningene i dette notatet er det riktignok ikke nødvendig med detaljert grunnlag for bunnforhold i Lågen.

3 Nedbørfelt for kryssninger

Resultat fra avrenningsanalyse i ArcGIS er vist i Figur 3-1. Det er generert avrenningslinjer med det bearbejdede terrenggrunnlaget (DTM1), som inkluderer vegmodell fra 6. mai 2025. Ut fra disse er det definert dreneringspunkter nær stikkrenneplasseringene slik de forelå 2. mai 2025. (Noen flere kryssningspunkter har kommet til i ettertid). Det er så generert nedbørfelt oppstrøms disse dreneringspunktene. Hvert nedbørfelt er gitt ID ut fra omtrentlig vegprofilnummer for den korresponderende kryssningen (stikkrenneplasseringen).

Nøkkeldata for resulterende nedbørfelt/kryssninger er vist i Tabell 3-1. Effektiv sjøprosent lik 0,0 og normalavrenning 1961-90 (qN 6190) lik 10,0 betyr at verdien er tilordnet etter skjønn fordi den ikke var mulig, eller ikke relevant å beregne eksakt. Dette er konservative antagelser.

Største nedbørfelt/vassdrag er kryssning Haredalsbekken (7250), etterfulgt av kryssning Sandbuvangbekken (5820), kryssning Varphaugen (4030), Nordre Eide (2850), Haugen (4325) og Myrvang (4450).



Tabell 3-1. Nøkkeldata for genererte nedbørfelt/krysningspunkter (sortert nordre til søndre).

Profilnr	Navn/krysningssted	A (km ²)	A (ha)	Eff sjø (%)	q _{N 61-90} (l/s·km ²)
7550	-	0.41	40.81	0.1	10.0
7250	Haredalsbekken	3.71	370.90	0.0	10.7
7225	-	0.01	1.22	0.0	10.0
7170	-	0.35	34.69	0.0	10.0
6900	-	0.10	9.94	0.0	10.0
6899	-	0.04	3.59	0.0	10.0
6240	-	0.43	43.05	0.0	10.0
6175	-	0.07	7.20	0.0	10.0
5820	Sandbuvangbekken	2.83	283.46	0.2	8.3
5670	-	0.06	6.22	0.0	10.0
5310	-	0.23	22.81	0.0	10.0
5025	-	0.06	5.99	0.0	10.0
4860	-	0.18	18.05	0.0	10.0
4540	-	0.03	3.06	0.0	10.0
4450	Myrvang	0.56	55.83	0.0	7.0
4325	Haugen	0.59	59.32	0.0	6.9
4030	Varphaugen	2.39	238.87	0.0	8.2
3760	-	0.07	6.72	0.0	10.0
3700	-	0.03	3.43	0.0	10.0
3640	-	0.10	9.81	0.0	10.0
3460	-	0.03	3.32	0.0	10.0
3380	-	0.07	7.01	0.0	10.0
3250	-	0.04	4.41	0.0	10.0
3075	-	0.18	17.67	0.0	10.0
2850	Nordre Eide	0.71	71.11	0.0	6.5
2525	-	0.05	4.60	0.0	10.0
2325	-	0.38	37.89	0.0	10.0
2020	-	0.11	11.29	0.0	10.0
1780	-	0.16	15.85	0.0	10.0
1335	-	0.26	25.64	0.0	10.0
940	-	0.13	12.87	0.0	10.0
650	-	0.01	1.33	0.0	10.0
590	-	0.06	6.21	0.0	10.0

4 Flomberegninger

4.1 Grunnlag

De genererte nedbørsfeltene danner basis for flomberegningene. Avrenningsanalysen tar utgangspunkt i ren overflateavrenning, der stikkrenner og gjennomløp anses som tette, som de typisk vil være ved en ekstrem flomhendelse. Dette er standard. ArcGIS-analysen bruker også relativt fin oppløsning på terrengmodellen. Dette vil kunne gi nedbørfelt som avviker fra mer grovmaskede verktøy som Nevina, ved at vann f.eks. avskjæres av veier i fjellsider. Nevina er primært for å generere nedbørfelt og parametere i større etablerte vassdrag.

Nevina vil ellers brukes som grunnlag for nedbørfeltparametere der det er mulig, hovedsakelig for større kryssninger/etablerte vassdrag.

Nedbørsdata hentes fra Lillehammers IVF-kurve (Tabell 4-1). Dette brukes for beregning med rasjonelle metode. Det er tidligere vedtatt at prosjektet skal benytte denne kurven.

Tabell 4-1. IVF-kurve for Lillehammer (l/s/ha).

		Varighet (min)															
		1	2	3	5	10	15	20	30	45	60	90	120	180	360	720	1440
Returperiode (år)	2	250.0	225.0	194.4	163.3	115.0	88.9	72.5	53.9	40.7	33.9	25.9	21.5	16.9	10.9	6.9	4.4
	5	333.3	291.7	255.6	213.3	153.3	117.8	95.8	72.2	54.8	45.8	34.3	27.8	21.6	13.7	8.8	5.8
	10	383.3	333.3	300.0	246.7	178.3	137.8	112.5	83.9	63.7	53.6	39.6	31.9	24.5	15.5	10.0	6.6
	20	416.7	375.0	338.9	276.7	201.7	157.8	128.3	95.6	73.0	61.1	44.6	36.1	27.3	17.3	11.2	7.5
	25	433.3	391.7	350.0	286.7	210.0	163.3	133.3	99.4	75.6	63.6	46.5	37.5	28.2	17.9	11.6	7.8
	50	483.3	425.0	388.9	320.0	233.3	183.3	149.2	111.1	84.1	70.8	51.7	41.7	31.2	19.6	12.7	8.6
	100	516.7	466.7	427.8	350.0	255.0	202.2	164.2	122.2	93.0	78.3	56.7	45.8	34.3	21.3	13.7	9.4
	200	566.7	508.3	461.1	380.0	278.3	221.1	180.0	133.3	100.7	84.7	61.5	50.0	37.5	22.9	14.8	10.3

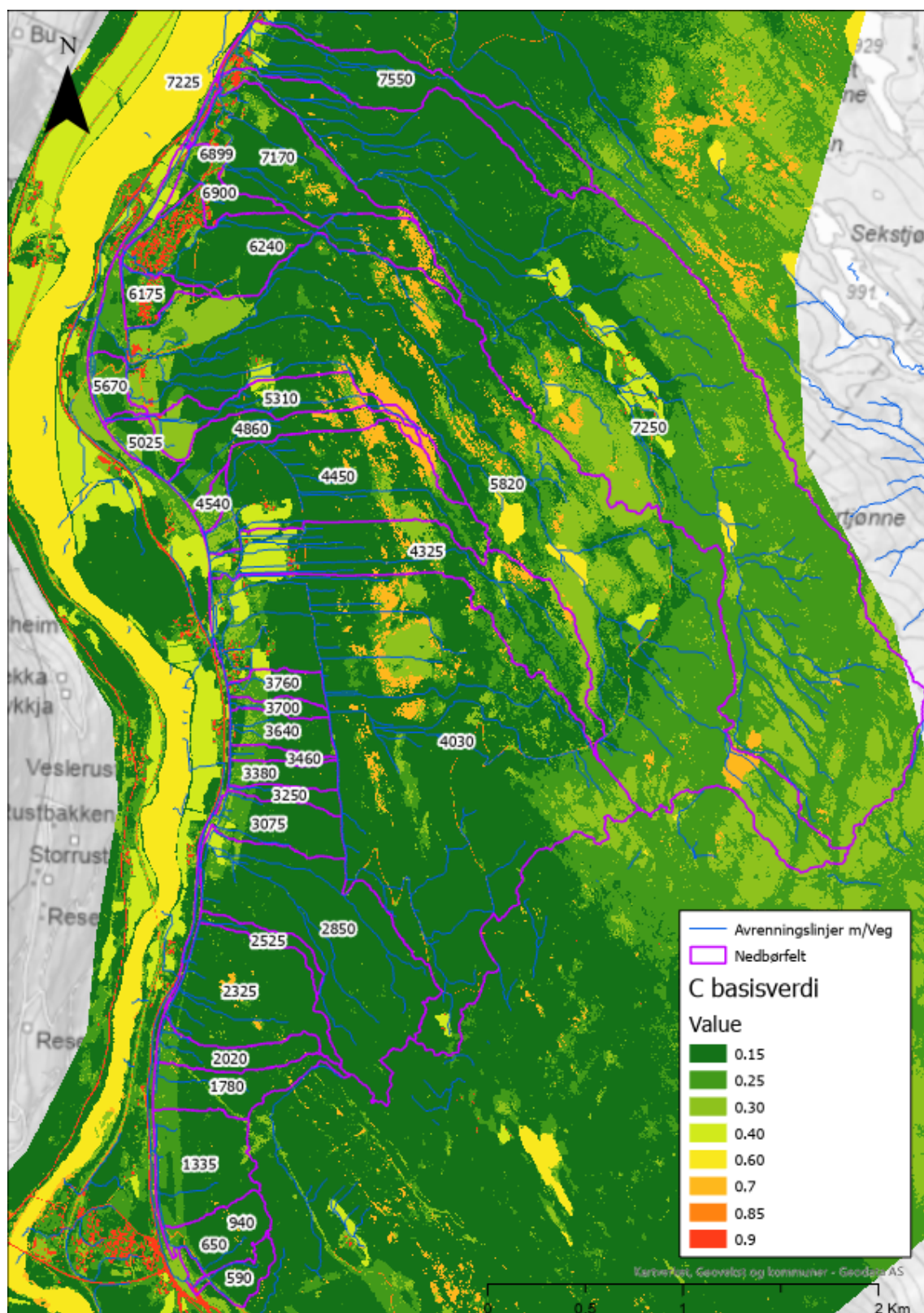
Vannføringsdata fra aktuelle målestasjoner hentes fra Hydra II (NVE). Disse brukes i flomfrekvensanalyse.

4.2 Rasjonelle metode

Den rasjonelle metode ($C \times I \times A$) tar utgangspunkt i feltstørrelse A (ha), avrenningskoeffisient C (-), og dimensjonerende nedbørsintensitet I (l/s/ha). Det henvises til Vegvesenets N-V240 for nærmere beskrivelse av metoden. Den rasjonelle metode gjelder primært for mikrofelt ($<1 \text{ km}^2$) men kan brukes med forsiktighet for større felt.

Konsentrasjonstid estimeres med formel 7.4.1-1 i N-V240, forutsatt naturlig nedbørfelt. Konsentrasjonstiden brukes så for å tilordne dimensjonerende nedbørsintensitet (l/s/ha), som brukes i formelen.

C-verdier for bruk i rasjonelle metode baseres på arealtyperaster fra Scalgo. Hver arealkategori tilordnes C-verdier ut fra best egnede standardverdi i N-V240 tabell 7.4.2-2. Det gjøres så en GIS-analyse som beregner gjennomsnittlig C-verdi innenfor hvert definerte nedbørfelt. Grunnverdier for C er vist i form av tilpasset arealtyperaster i Figur 4-1.



Figur 4-1. Grunnverdier for avrenningskoeffisienten C, tilordnet Scalgos arealtypeaster.

Eventuelle andre nødvendige feltparametere estimeres. C-verdier oppjusteres så med 30 % iht. tabell 7.4.2-1 i N-V240, for å ta høyde for økt metningsgrad i bakken ved større flomhendelser. Resultater for de aktuelle nedbørfeltene er vist i Tabell 4-2.

Tabell 4-2. Inngangsdata og resultater (uten klima-/sikkerhetsfaktor) for Rasjonelle metode.

Profilnr	A (ha)	Eff sjø (%)	Lengde (m)	H diff (m)	Tc (min)	I ₂₀₀ (l/s·ha)	C-verdi		Q ₂₀₀ (m³/s)
							Basis (-)	+30% (-)	
7550	40.81	0.1	1977	674.6	45.7	100.7	0.19	0.24	0.99
7250	370.90	0.0	5049	891.0	101.5	61.5	0.24	0.31	7.08
7225	1.22	0.0	367	13.1	60.9	84.7	0.44	0.57	0.06
7170	34.69	0.0	1210	417.7	35.5	133.3	0.21	0.27	1.25
6900	9.94	0.0	595	155.1	28.7	133.3	0.24	0.32	0.42
6899	3.59	0.0	695	22.1	88.8	61.5	0.35	0.45	0.10
6240	43.05	0.0	1731	491.1	46.9	100.7	0.26	0.34	1.46
6175	7.20	0.0	537	76.3	36.9	133.3	0.32	0.42	0.40
5820	283.46	0.2	4687	868.4	95.4	61.5	0.25	0.33	5.77
5670	6.22	0.0	424	44.2	38.2	100.7	0.24	0.31	0.20
5310	22.81	0.0	1895	527.7	49.5	100.7	0.27	0.35	0.80
5025	5.99	0.0	253	35.5	25.5	133.3	0.21	0.27	0.22
4860	18.05	0.0	1311	467.6	36.4	133.3	0.24	0.31	0.75
4540	3.06	0.0	392	47.6	34.1	133.3	0.25	0.32	0.13
4450	55.83	0.0	1430	537.4	37.0	133.3	0.23	0.30	2.23
4325	59.32	0.0	2189	642.4	51.8	100.7	0.25	0.32	1.91
4030	238.87	0.0	2479	445.0	70.5	84.7	0.21	0.27	5.47
3760	6.72	0.0	527	201.9	22.3	180.0	0.21	0.27	0.32
3700	3.43	0.0	521	206.4	21.8	180.0	0.18	0.23	0.14
3640	9.81	0.0	591	231.6	23.3	180.0	0.19	0.24	0.43
3460	3.32	0.0	551	233.2	21.7	180.0	0.19	0.25	0.15
3380	7.01	0.0	570	249.4	21.7	180.0	0.18	0.23	0.29
3250	4.41	0.0	597	260.7	22.2	180.0	0.17	0.22	0.17
3075	17.67	0.0	720	295.8	25.1	133.3	0.20	0.26	0.62
2850	71.11	0.0	1549	517.8	40.8	100.7	0.16	0.21	1.48
2525	4.60	0.0	706	428.7	20.5	180.0	0.15	0.20	0.16
2325	37.89	0.0	955	501.0	25.6	133.3	0.16	0.21	1.08
2020	11.29	0.0	815	468.7	22.6	180.0	0.17	0.23	0.46
1780	15.85	0.0	978	494.4	26.4	133.3	0.18	0.23	0.49
1335	25.64	0.0	575	159.2	27.3	133.3	0.18	0.23	0.80
940	12.87	0.0	548	137.3	28.1	133.3	0.18	0.23	0.40
650	1.33	0.0	180	19.0	25.5	133.3	0.27	0.35	0.06
590	6.21	0.0	479	117.4	26.5	133.3	0.19	0.24	0.20

4.3 NIFS-formelverk

NIFS-formelverk gjelder for naturlige uregulerte nedbørfelt mellom ca. 0,2 – 60 km². Inngangsdata er normalavrenning 1961-90 (l/s/km²), effektiv sjøprosent (-) og feltareal (km²). For nedbørfelt/vassdrag som er for små til å kunne beregnes i Nevina antas effektiv sjøprosent lik null og normalavrenning 1961-90 lik 10,0 l/s/km². Inngangsparametere og resultater er vist i Tabell 4-3. Det er primært medianestimatet som tas med til videre evaluering. Maksestimatet (97,5 % konfidensintervallet) er med til orientering.

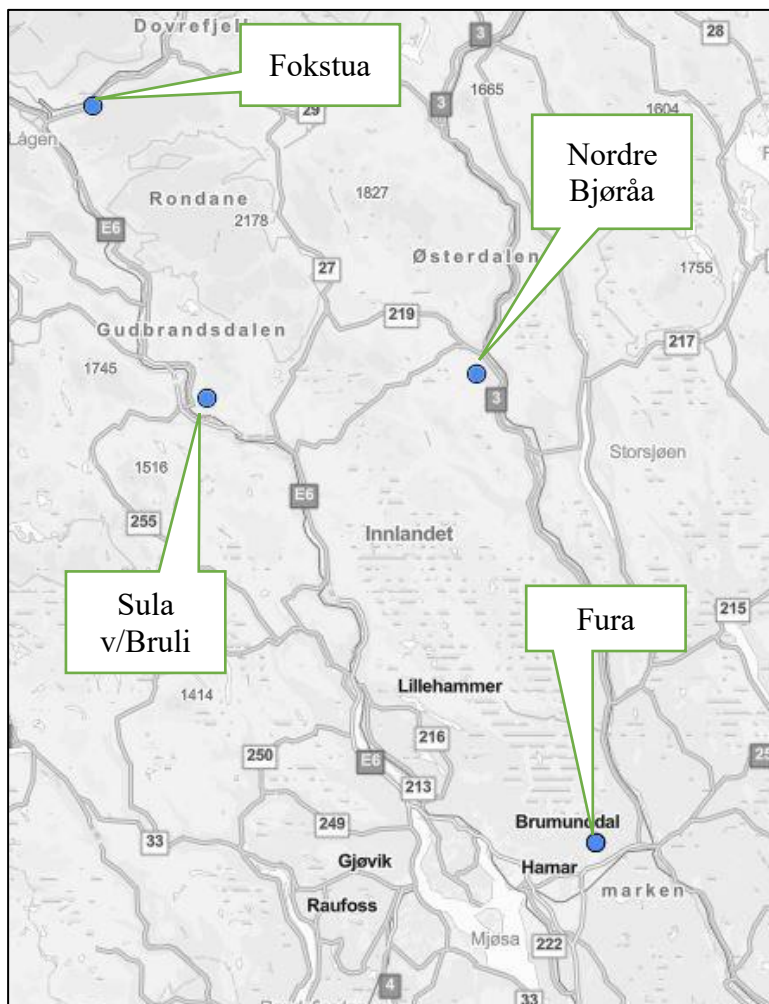
Tabell 4-3. Inngangsparametere og resultater fra NIFS-formelverk.

Profilnr	Navn	A (km ²)	Eff sjø (%)	q _{N 6190} (l/s·km ²)	q _M (l/s·km ²)	Q ₂₀₀ /Q _M (-)	Q ₂₀₀ median (m ³ /s)	Q ₂₀₀ maks (m ³ /s)
7550	-	0.41	0.1	10.0	370	3.00	0.45	0.91
7250	Haredalsbekken	3.71	0.0	10.7	315	2.98	3.48	6.95
7225	-	0.01	0.0	10.0	646	3.00	0.02	0.05
7170	-	0.35	0.0	10.0	410	3.00	0.43	0.85
6900	-	0.10	0.0	10.0	486	3.00	0.14	0.29
6899	-	0.04	0.0	10.0	558	3.00	0.06	0.12
6240	-	0.43	0.0	10.0	398	3.00	0.51	1.03
6175	-	0.07	0.0	10.0	508	3.00	0.11	0.22
5820	Sandbuvangbekken	2.83	0.2	8.3	234	3.06	2.03	4.06
5670	-	0.06	0.0	10.0	518	3.00	0.10	0.19
5310	-	0.23	0.0	10.0	434	3.00	0.30	0.59
5025	-	0.06	0.0	10.0	520	3.00	0.09	0.19
4860	-	0.18	0.0	10.0	448	3.00	0.24	0.48
4540	-	0.03	0.0	10.0	570	3.00	0.05	0.10
4450	Myrvang	0.56	0.0	7.0	282	3.10	0.49	0.98
4325	Haugen	0.59	0.0	6.9	276	3.10	0.51	1.02
4030	Varphaugen	2.39	0.0	8.2	266	3.05	1.93	3.87
3760	-	0.07	0.0	10.0	512	3.00	0.10	0.21
3700	-	0.03	0.0	10.0	562	3.00	0.06	0.12
3640	-	0.10	0.0	10.0	487	3.00	0.14	0.29
3460	-	0.03	0.0	10.0	564	3.00	0.06	0.11
3380	-	0.07	0.0	10.0	509	3.00	0.11	0.21
3250	-	0.04	0.0	10.0	543	3.00	0.07	0.14
3075	-	0.18	0.0	10.0	449	3.00	0.24	0.48
2850	Nordre Eide	0.71	0.0	6.5	256	3.12	0.57	1.14
2525	-	0.05	0.0	10.0	539	3.00	0.07	0.15
2325	-	0.38	0.0	10.0	405	3.00	0.46	0.92
2020	-	0.11	0.0	10.0	477	3.00	0.16	0.32
1780	-	0.16	0.0	10.0	456	3.00	0.22	0.43
1335	-	0.26	0.0	10.0	427	3.00	0.33	0.66
940	-	0.13	0.0	10.0	469	3.00	0.18	0.36
650	-	0.01	0.0	10.0	639	3.00	0.03	0.05
590	-	0.06	0.0	10.0	518	3.00	0.10	0.19

4.4 Flomfrekvensanalyse (FFA)

Flomfrekvensanalyse tar utgangspunkt i vannføringsdata fra representative nærliggende målestasjoner, hvis data så tilpasses/skaleres for å kunne representere prosjektfeltet/feltene. Da det er mange nedbørfelt som skal beregnes her vil frekvensanalysen kun lande på *en* spesifikk 200-årsflomverdi, som så benyttes på alle feltene.

Aktuelle målestasjoner i regionen er vist i Figur 4-2. Disse har alle feltareal under 60 km² og effektiv sjøprosent under 2 %. Av disse stasjonene er Sula nærmest (ved Vinstra), tett fulgt av Fokstua. Fura har ellers lengst måleserie. Nordre Bjøråa måtte forkastes da Hydra II ikke kunne hente data for denne stasjonen. Nøkkeltall for resterende stasjoner er vist i Tabell 4-4. Spesifikk 200-årsflom er analysert i programmet FlomAnalyse i Hydra II. Det benyttes timesverdier (kulminasjonsverdier).



Figur 4-2. Aktuelle vannføringsmålestasjoner.

Tabell 4-4. Feltparametere og nøkkeltall for FFA.

Stasjonsnr	Stasjons-navn	A (km ²)	Eff. sjø (%)	q _N (l/s·km ²)	Antall år	Kurvekvalitet flom	Metode	q _M (l/s·km ²)	q ₂₀₀ (l/s·km ²)
2.323.0	Fura	36.41	0	20.91	54	Bra	GEV	601	1628
2.592.0	Fokstua	26.54	0	20.12	36	Middels	Gumbel	315	839
2.1191.0	Sula v/Bruli	33.22	0.2	9.69	9	Middels	Gumbel	340	1202

For fastsettelse av 200-årsflomverdi er serielengde og flomkurve viktige faktorer. Fura vektet derfor 40 % (god serie, men langt unna), Fokstua 50 % (nær, med OK serie) og Sula 10 % (kort serie). Dette gir endelig spesifikk 200-årsflomverdi på $q_{200} = 1200 \text{ l/s·km}^2$ (rundet oppover).

4.5 Oppsummering og endelige flomtall

Flomtall fra de forskjellige metodene er listet i Tabell 4-5, sammen med den endelige valgte flomverdien for hvert nedbørfelt. Den endelige flomverdien er satt ut fra skjønn, basert på resultatene, samt gyldighetsintervall og egnethet for de forskjellige metodene.

En annen faktor som spiller inn, er erfaringstall for 200-årsflom i mikrofelt. NVE har i enkelte veiledere operert med 2000 l/s/km² som en nedre grense for hvor en kulminert spesifikk 200-årsflom bør befinne seg. Hvis samtlige beregningsmetoder gir under dette, settes endelig verdi til minimum 2000 l/s/km² for felt under 1 km².

Tabell 4-5. Samlede resultater fra forskjellige metoder (blå kolonner) og endelige flomverdier uten påslag (lysegrønn kolonne). $Q_{200\ dim}$ (mørkegrønn kolonne) lengst til høyre er inkludert klima- og sikkerhetspåslag.

Profilnr	Navn	A (km ²)	Q ₂₀₀ (uten påslag) (m ³ /s)				Valgt Q ₂₀₀		Q _{200 dim} (m ³ /s)
			Rasjonelle	NIFS med.	FFA	NIFS maks	(m ³ /s)	(l/s·km ²)	
7550	-	0.41	0.99	0.45	0.49	0.91	0.99	2432	1.95
7250	Haredalsb.	3.71	7.08	3.48	4.45	6.95	4.96	1337	9.72
7225	-	0.01	0.06	0.02	0.01	0.05	0.06	4857	0.12
7170	-	0.35	1.25	0.43	0.42	0.85	1.25	3617	2.58
6900	-	0.10	0.42	0.14	0.12	0.29	0.42	4217	1.02
6899	-	0.04	0.10	0.06	0.04	0.12	0.10	2789	0.20
6240	-	0.43	1.46	0.51	0.52	1.03	1.46	3381	2.85
6175	-	0.07	0.40	0.11	0.09	0.22	0.40	5613	3.65
5820	Sandbuvang	2.83	5.77	2.03	3.40	4.06	3.20	1129	6.27
5670	-	0.06	0.20	0.10	0.07	0.19	0.20	3135	0.38
5310	-	0.23	0.80	0.30	0.27	0.59	0.80	3519	1.57
5025	-	0.06	0.22	0.09	0.07	0.19	0.22	3654	0.43
4860	-	0.18	0.75	0.24	0.22	0.48	0.75	4178	1.48
4540	-	0.03	0.13	0.05	0.04	0.10	0.13	4251	0.25
4450	Myrvang	0.56	2.23	0.49	0.67	0.98	2.23	3998	4.37
4325	Haugen	0.59	1.91	0.51	0.71	1.02	1.91	3219	3.74
4030	Varphaugen	2.39	5.47	1.93	2.87	3.87	2.90	1214	5.68
3760	-	0.07	0.32	0.10	0.08	0.21	0.32	4816	0.63
3700	-	0.03	0.14	0.06	0.04	0.12	0.14	4101	0.28
3640	-	0.10	0.43	0.14	0.12	0.29	0.43	4364	0.84
3460	-	0.03	0.15	0.06	0.04	0.11	0.15	4474	0.29
3380	-	0.07	0.29	0.11	0.08	0.21	0.29	4209	0.58
3250	-	0.04	0.17	0.07	0.05	0.14	0.17	3904	0.34
3075	-	0.18	0.62	0.24	0.21	0.48	0.62	3506	1.21
2850	Nordre Eide	0.71	1.48	0.57	0.85	1.14	1.48	2075	2.89
2525	-	0.05	0.16	0.07	0.06	0.15	0.16	3546	0.32
2325	-	0.38	1.08	0.46	0.45	0.92	1.08	2844	2.11
2020	-	0.11	0.46	0.16	0.14	0.32	0.46	4073	0.90
1780	-	0.16	0.49	0.22	0.19	0.43	0.49	3079	0.96
1335	-	0.26	0.80	0.33	0.31	0.66	0.80	3117	1.57
940	-	0.13	0.40	0.18	0.15	0.36	0.40	3117	0.79
650	-	0.01	0.06	0.03	0.02	0.05	0.06	4657	0.12
590	-	0.06	0.20	0.10	0.07	0.19	0.20	3237	0.39

5 Dimensjonering av krysninger, alt. 1c

5.1 Grunnlag

Det finnes i hovedsak ikke innmålingsdata for de aktuelle vassdragene, utover enkelte punkter målt vår/sommer 2025. Aktuelle krysningspunkter er heller ikke landskapsmodellert/prosjektert enda. Inn- og utløpshøyder for nye krysninger er derfor definert ut fra skjønn ift. foreliggende vegmodell 6. mai 2025, eller hentet fra VAs foreløpige prosjektering.

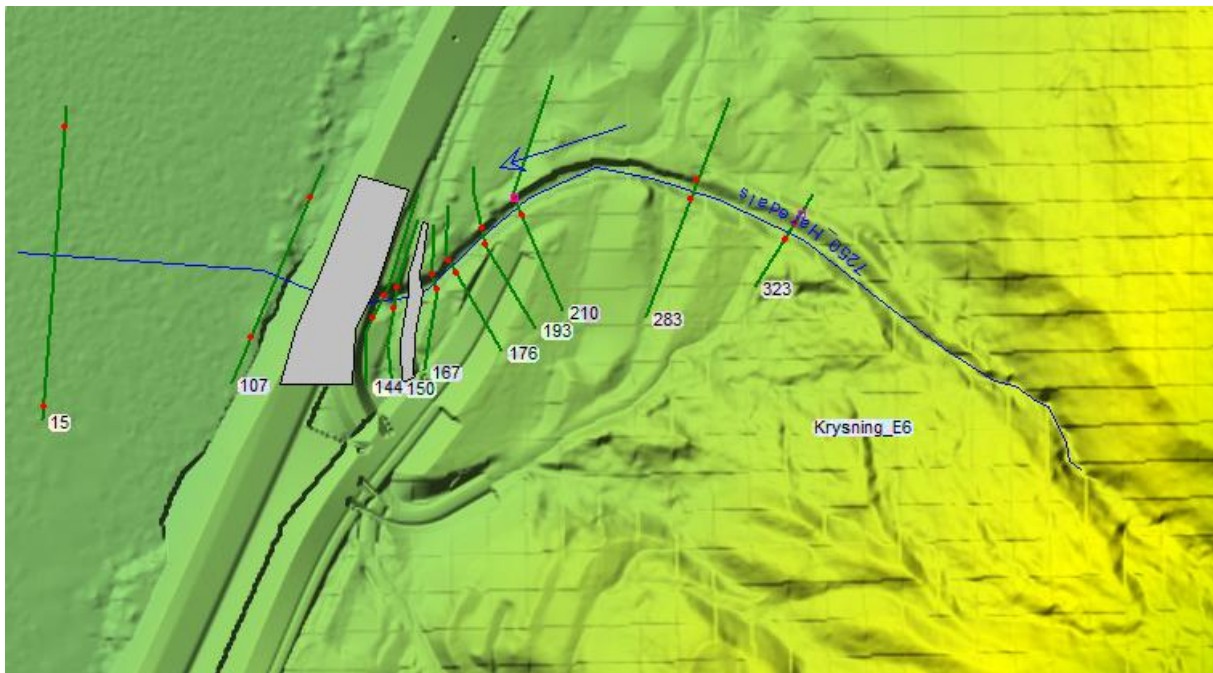
5.2 Forutsetninger

Følgende gjelder for hydraulisk modellering/dimensjonering:

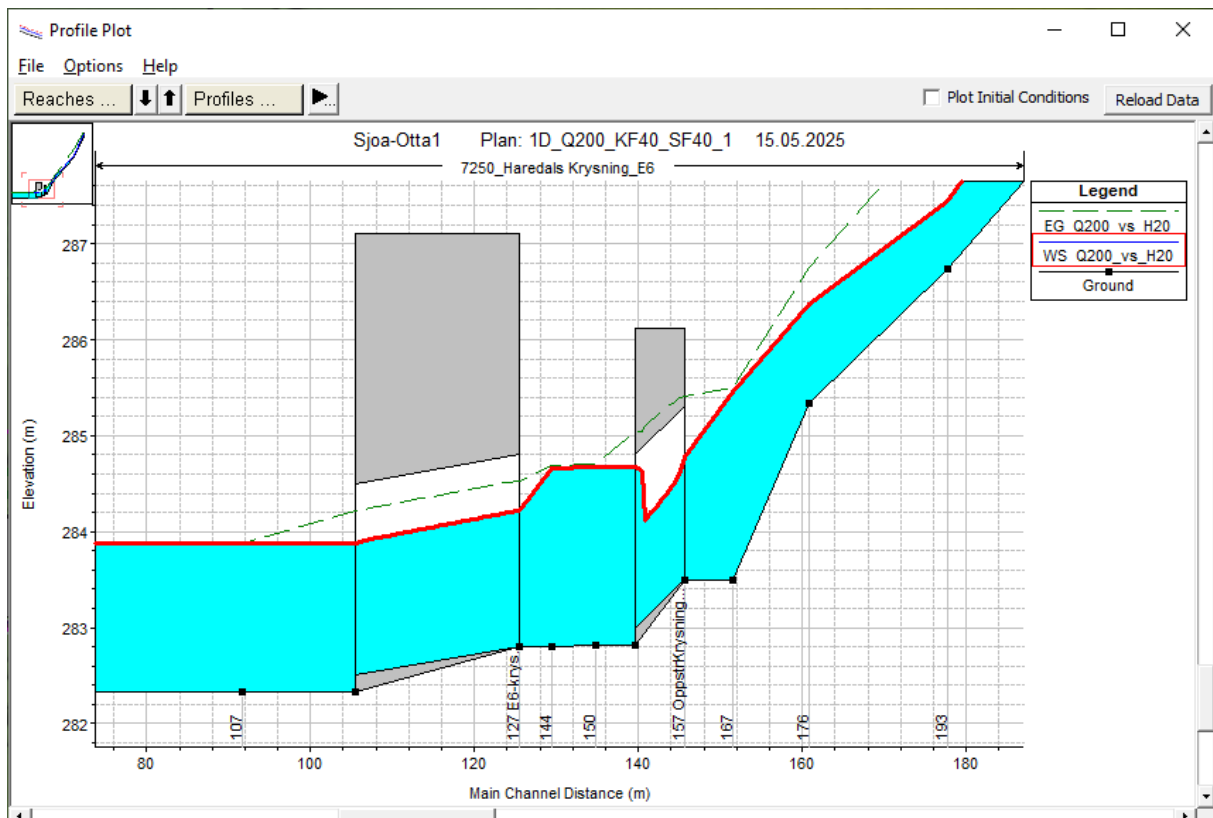
- Det dimensjoneres etter følgende krav i N200 (og N400):
 - Innløpsvannstand ikke høyere enn topp rør for stikkrenner/kulverter (krav 2.5.2.2-3)
 - For situasjoner der innløpsvannstand likevel må stå over innløpet, forutsettes tett sikring, ref. krav 2.5.2.2-4.
 - Nedre 1/3 av tverrsnittet i stikkrenner/kulverter forutsettes gjentettet (krav 2.5.2.2-6)
 - For Haredalsbekken skal det være minst 0,5 m fribord mellom dimensjonerende vannstand og topp kulvert/underkant bru (konstruksjonstype ikke avklart), ref. N400.
- Større krysninger modelleres i HEC-RAS 1D, og mindre krysninger i HY-8.
- For HEC-RAS benyttes 20-årsvannstand i Lågen (fra Blasy-Øverlands modell) som nedstrøms betingelse, sammen med dimensjonerende 200-årsvannføring i det aktuelle sidevassdraget. 20-årsvannstand er satt til +283,88 ved Sel Sjukeheim. For HY-8 benyttes normalstrømning tilsvarende estimert terrenghelning nedstrøms som nedre grensebetingelse.
- Manningverdier (hydraulisk ruhet) settes til $n = 0,06$ for vannløp/kanal og $0,05 - 0,08$ for sideareal. For bunn rør benyttes $n = 0,02$ for å reflektere at nedre 1/3 skal regnes som gjenslammet. Det tas ellers utgangspunkt i betongrør.
- Det antas innløpstype «A» (frontmur, ca. vinkelrett på rørets lengdeakse) i både Hec-RAS og HY-8. (I praksis innløpstapskoeffisient = 0,5).
- Behov for erosjonssikring vurderes ikke i denne runden, da geometri og detaljløsning for krysningene (særlig nedstrøms side) ikke er endelig låst.

5.3 Haredalsbekken/Sel Sjukeheim (prof. 7250)

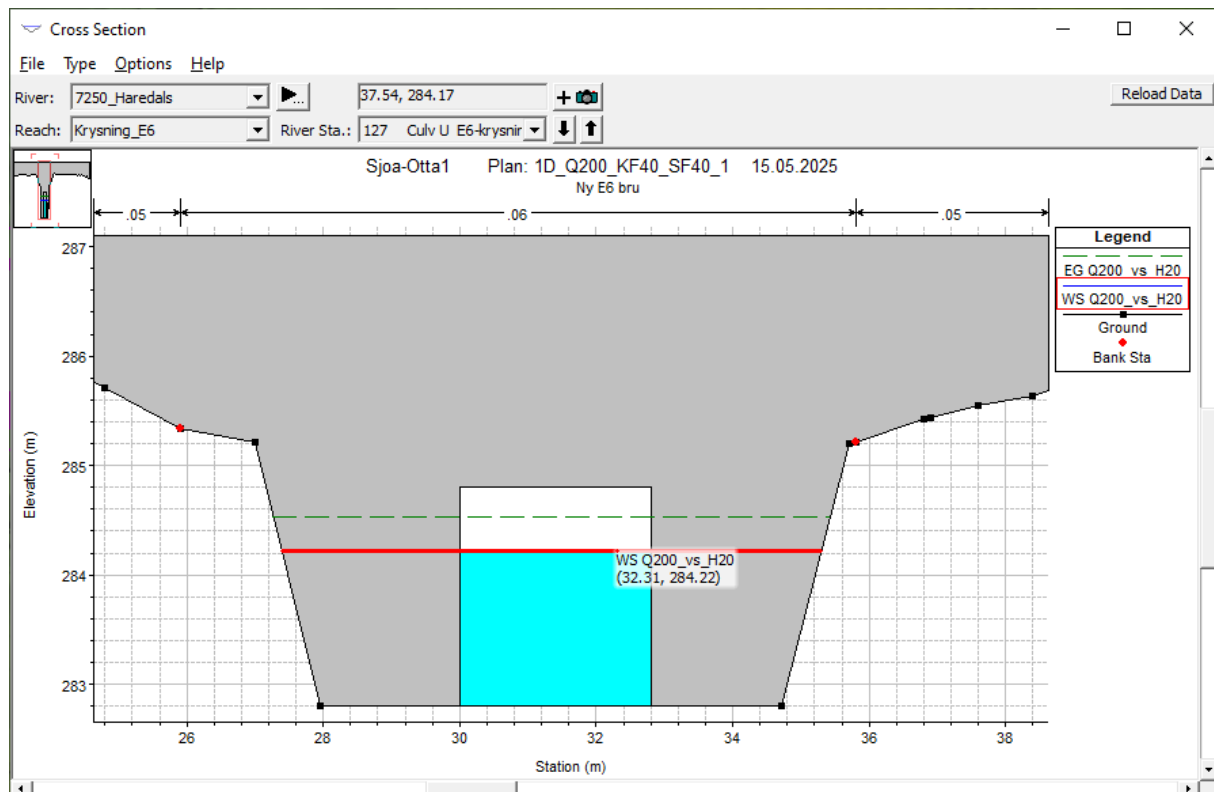
Dette er en masseførende elv som allerede er erosjonssikret/plastret av NVE oppstrøms krysningspunktet med nye E6. Layout for HEC-RAS-modellen vises i Figur 5-1, med lengdeprofil for scenario med 20-årsflom nedstrøms i Figur 5-2. Trasé og geometri er ikke endelig avklart, så det tas utgangspunkt i eksisterende trasé og et rektangulært gjennomløp. Dette gir minimum innvendig bredde 2,8 m og høyde 2 m for hovedkrysningen med ny E6. Krysningen vil dermed klassifiseres som bru. Tverrsnitt (oppstrøms side) av E6-krysningen vises i Figur 5-3. For krysningen med lokalveg oppstrøms er det landet på minimum bredde 2,2 m og høyde 1,8 m. Det brukes for øvrig Mannings $n = 0,05$ for sideareal her.



Figur 5-1. Layout for modell Haredalsbekken (ved Sel sjukeheim).



Figur 5-2. Lengdeprofil Haredalsbekken med foreslått ny kulvert/bru 2,8 x 2 m (E6-krysning) og 2,2 x 1,8 m (oppstrøms lokalvegkrysning).



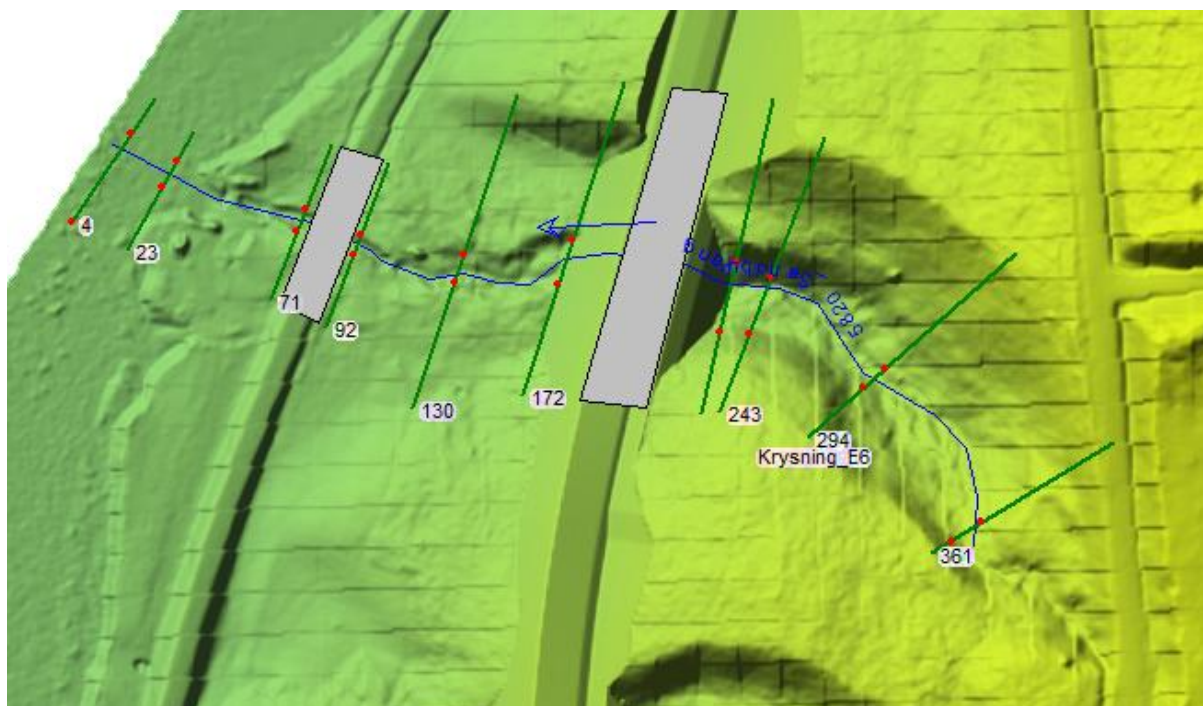
Figur 5-3. Oppstrøms tverrprofil av modellert nytt gjennomløp (krysning E6).

200-årsvannstand fra Blasy-Øverland-modellen ca. i krysningspunktet er +285,31 moh. Klimajustert 200-årsvannstand fra Norconsults kartlegging i 2024 er +286,71 på samme sted. Om N400 skal følges må underkant overbygning ligge minst 0,5 m over dimensjonerende vannstand i området. Det er riktignok ikke gitt at Norconsults tall fra 2024 skal benyttes, da deres prosjektavgrensning var Otta sentrum og oppstrøms. Resultater nedstrøms er ikke inkludert i deres offisielle flomsonekart, men finnes i den hydrauliske modellen, som vi har fått tilgang til på eget ansvar.

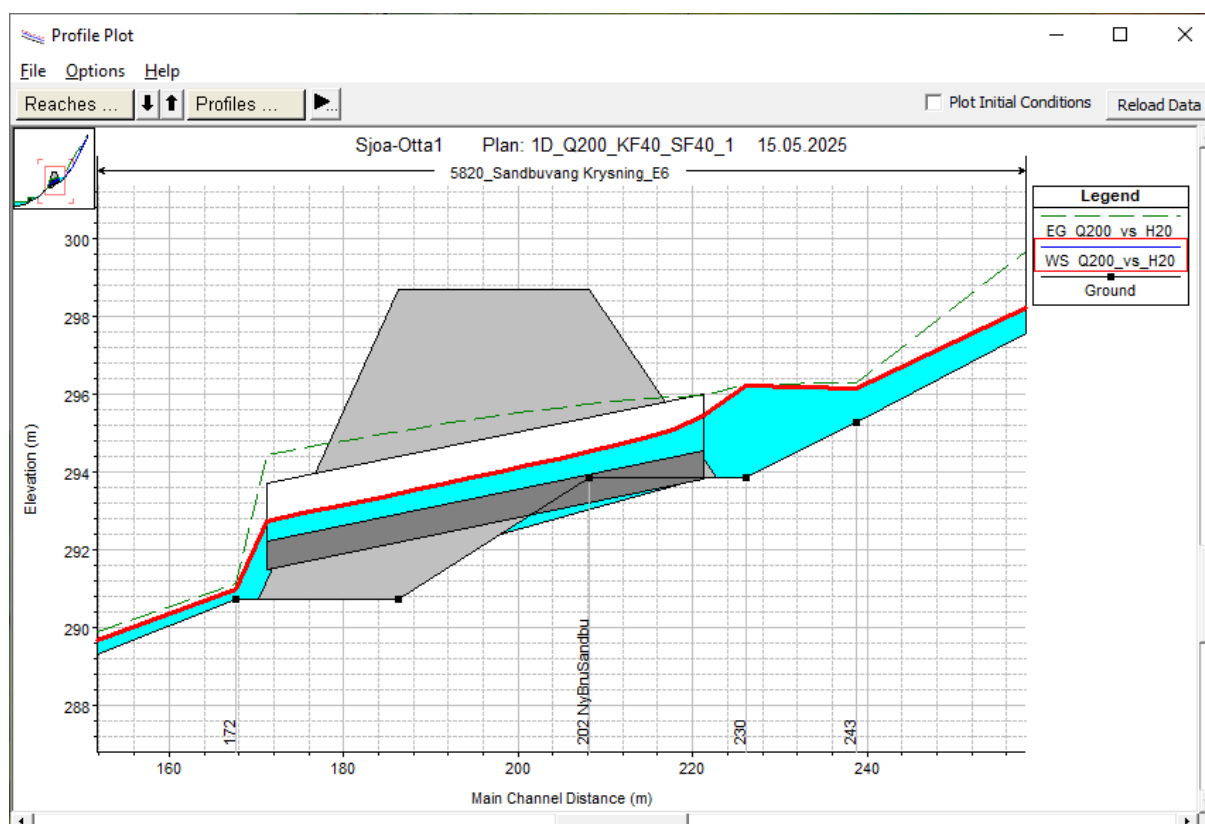
Angående eventuell flytting av hele krysningen nordover, vil dette kunne være gunstig for hydraulikken, da man får rettet ut elveløpet. Det kan potensielt også forenklet byggefasen. Dette er riktignok ikke vurdert nærmere i denne omgang.

5.4 Sandbuvangbekken (prof. 5820)

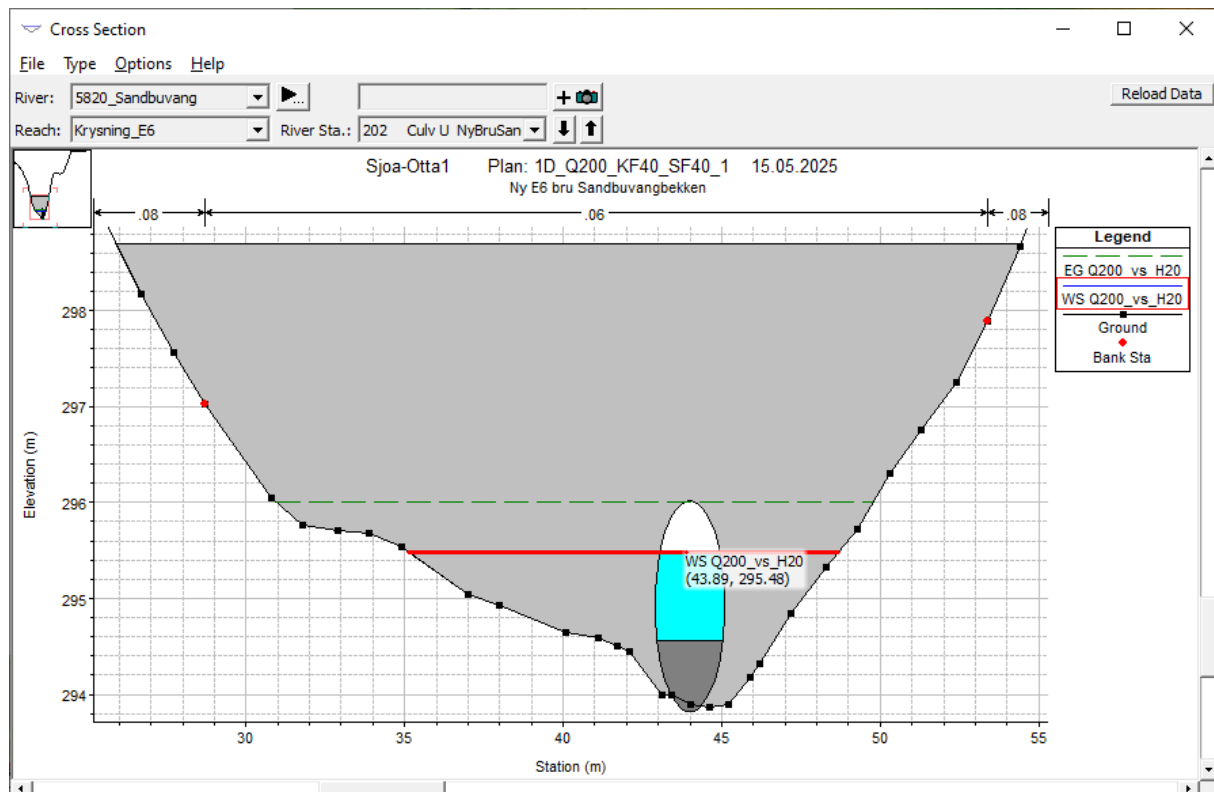
Layout for HEC-RAS-modellen vises i Figur 5-4, med lengdeprofil i Figur 5-5. Det er landet på et sirkulært gjennomløp med diameter 2200 mm. Dette tverrsnittet (oppstrøms side) vises i Figur 5-6. Gjentetting av nedre 1/3 er inkludert.



Figur 5-4. Layout modell Sandbuvangbekken.



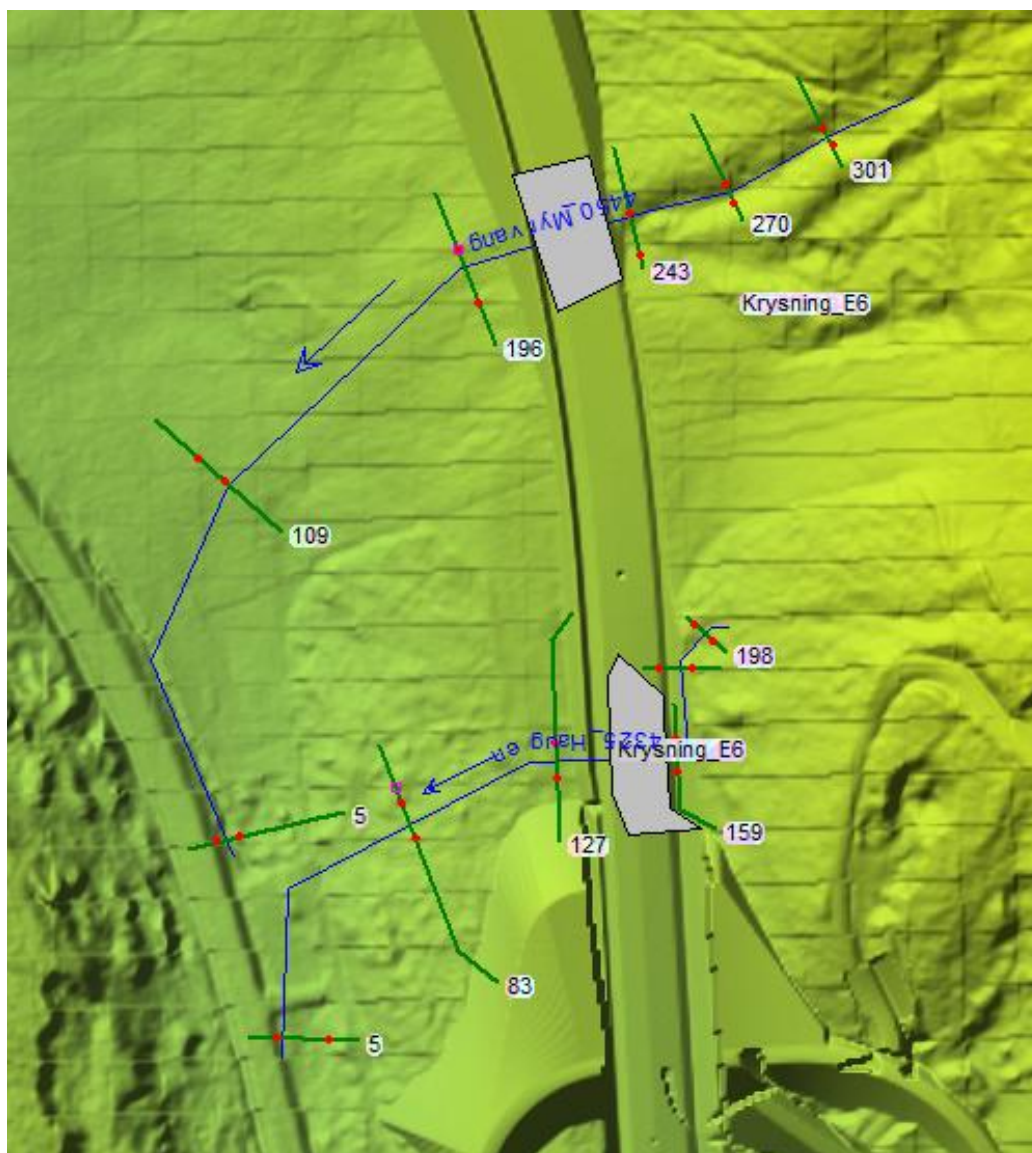
Figur 5-5. Lengdeprofil for krysning Sandbuvangbekken.



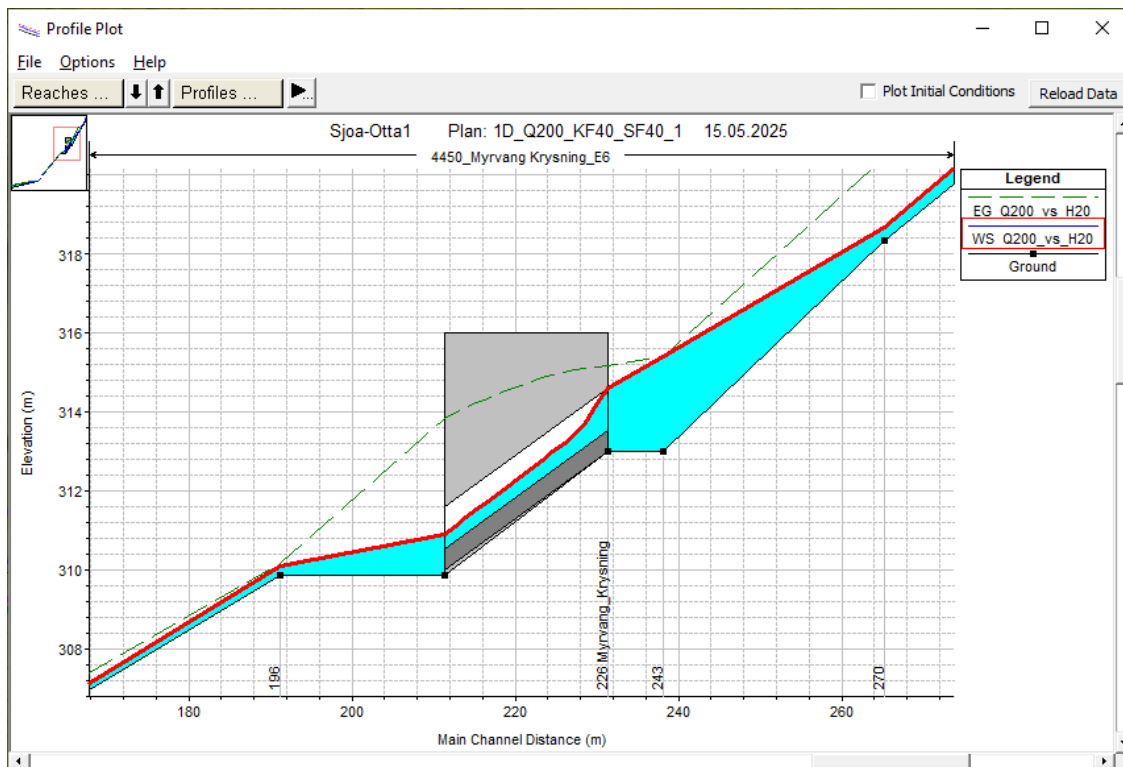
Figur 5-6. Tverrprofil for foreslått kulvertkrysning Sandbuvangbekken.

5.5 Myrvang (prof. 4450)

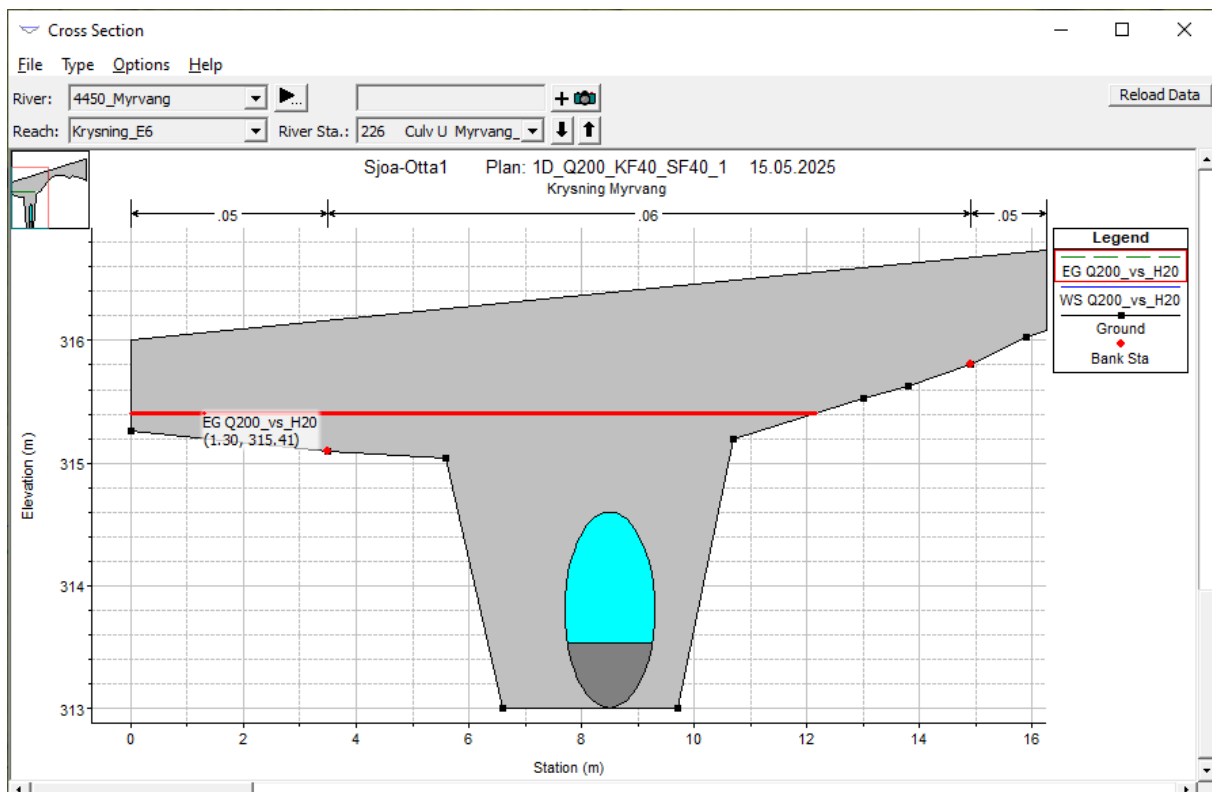
Layout for HEC-RAS-modellen vises i Figur 5-7, med lengdeprofil i Figur 5-8. Det er landet på et sirkulært gjennomløp med diameter 1600 mm. Dette tverrsnittet (oppstrøms side) vises i Figur 5-9. Gjentetting av nedre 1/3 er inkludert. For denne modellen er nedstrøms betingelse satt til normalstrømning med helning 0,01.



Figur 5-7. Layout for modell 4450 Myrvang (nord) sammen med modell for 4325 Haugen (sør).



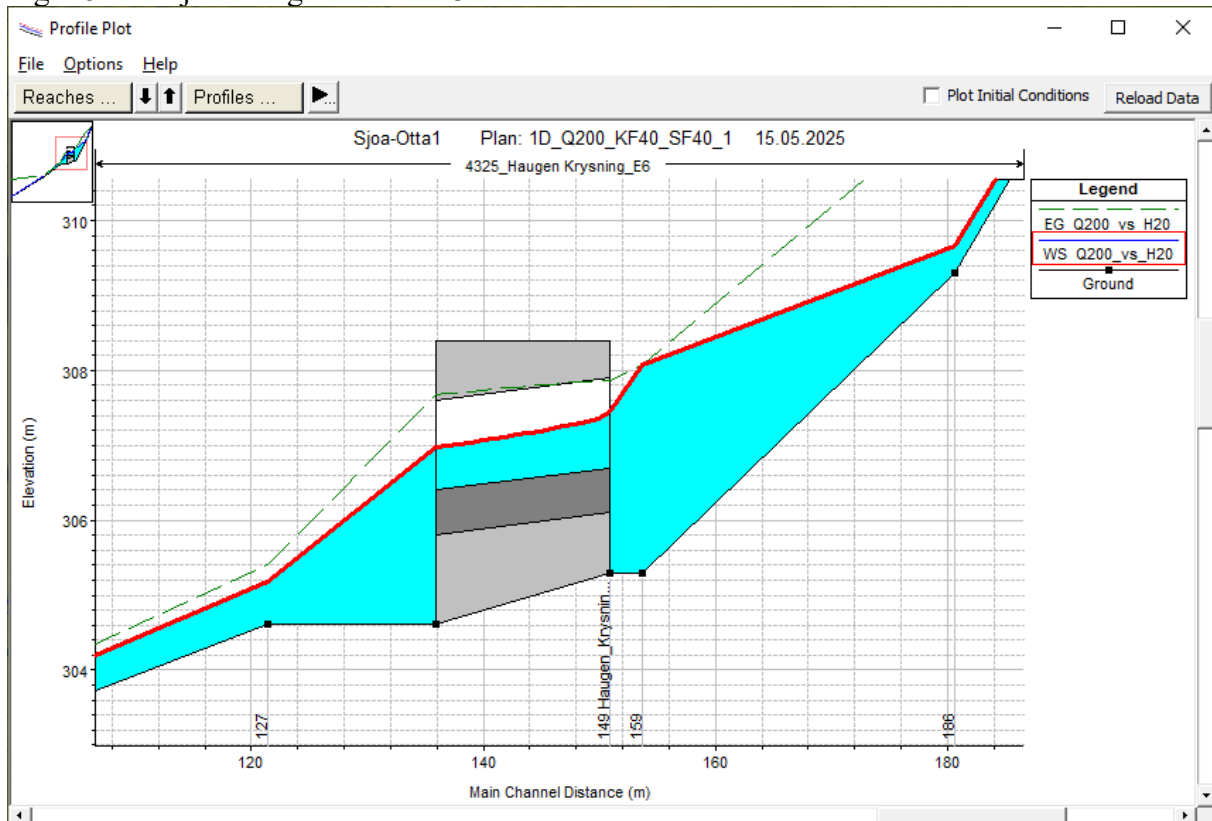
Figur 5-8. Lengdeprofil for krysning Myrvang.



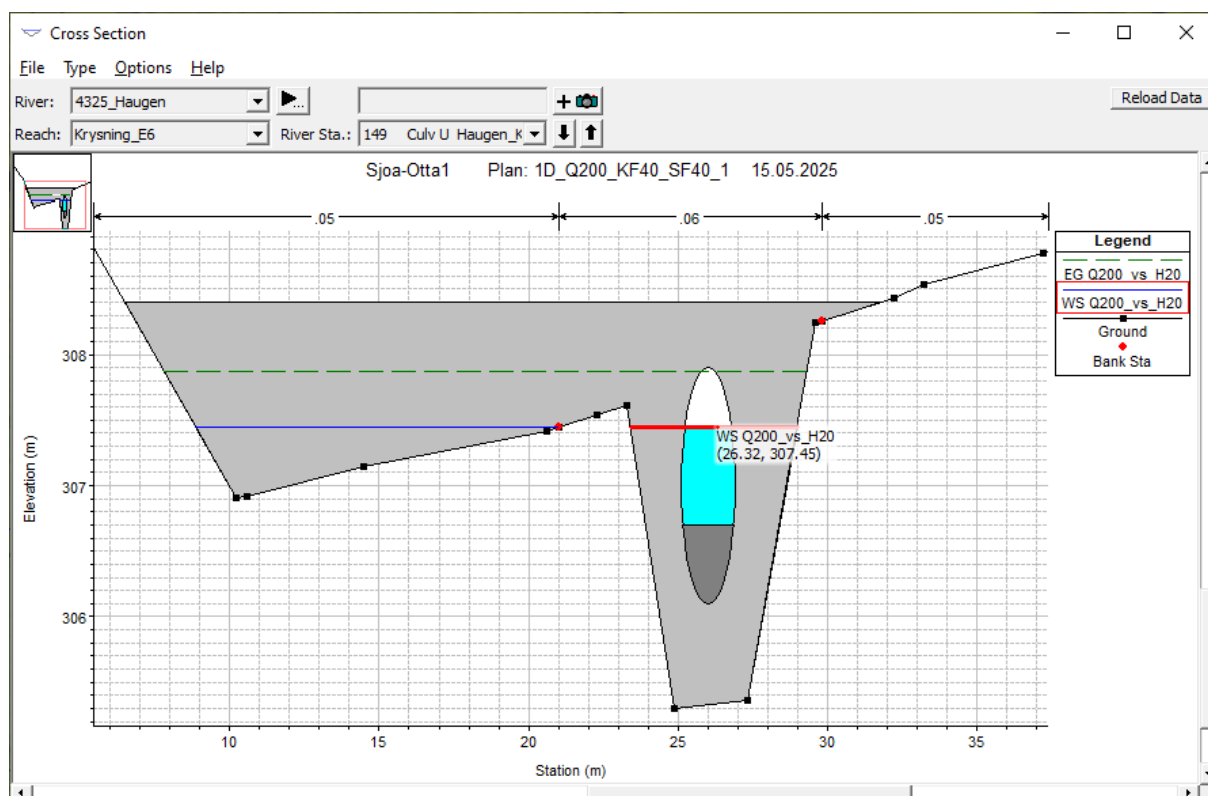
Figur 5-9. Tverrprofil for foreslått kulvertkrysning Myrvang.

5.6 Haugen (prof. 4325)

Layout for HEC-RAS-modellen vises i Figur 5-7, med lengdeprofil i Figur 5-10. Det er landet på et sirkulært gjennomløp med diameter 1800 mm. Dette tverrsnittet (oppstrøms side) vises i Figur 5-11. Gjentetting av nedre 1/3 er inkludert.



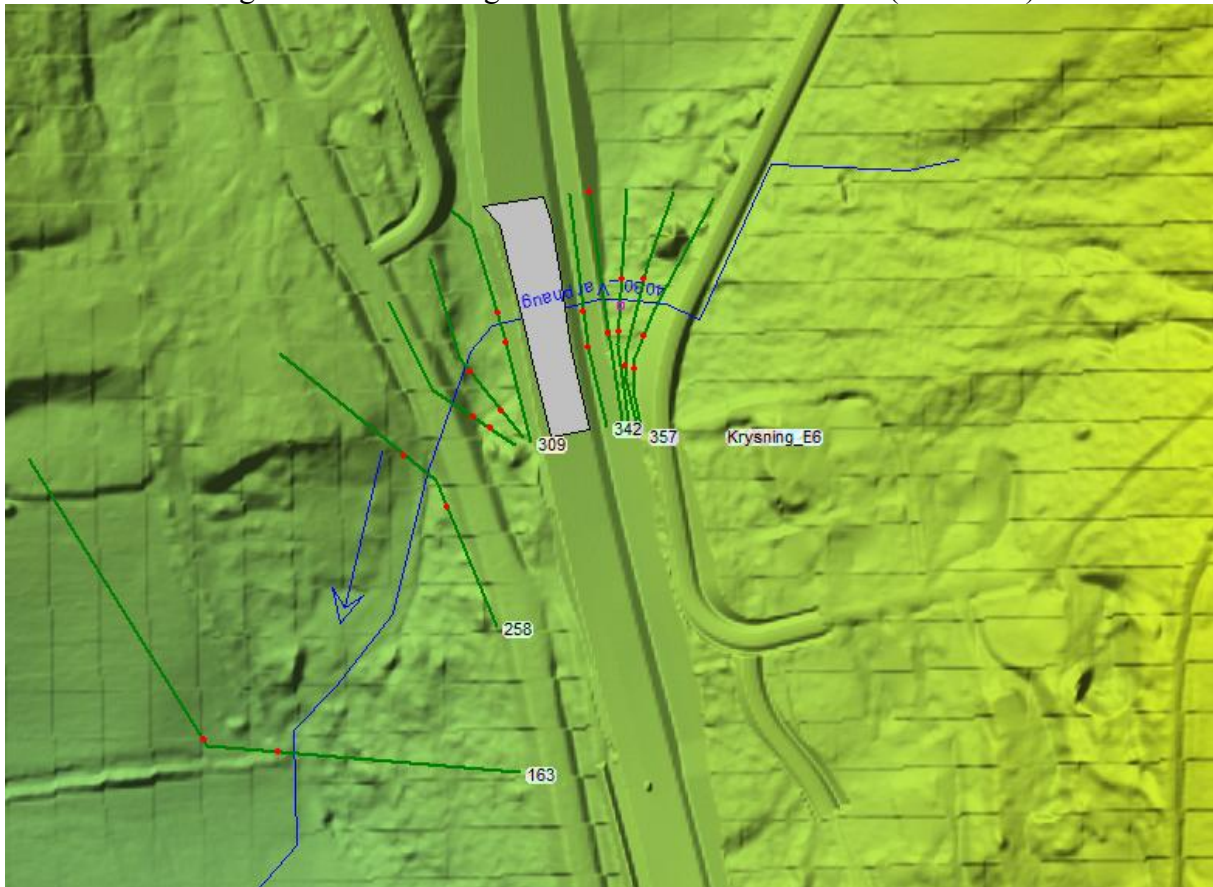
Figur 5-10. Lengdeprofil for krysning Haugen



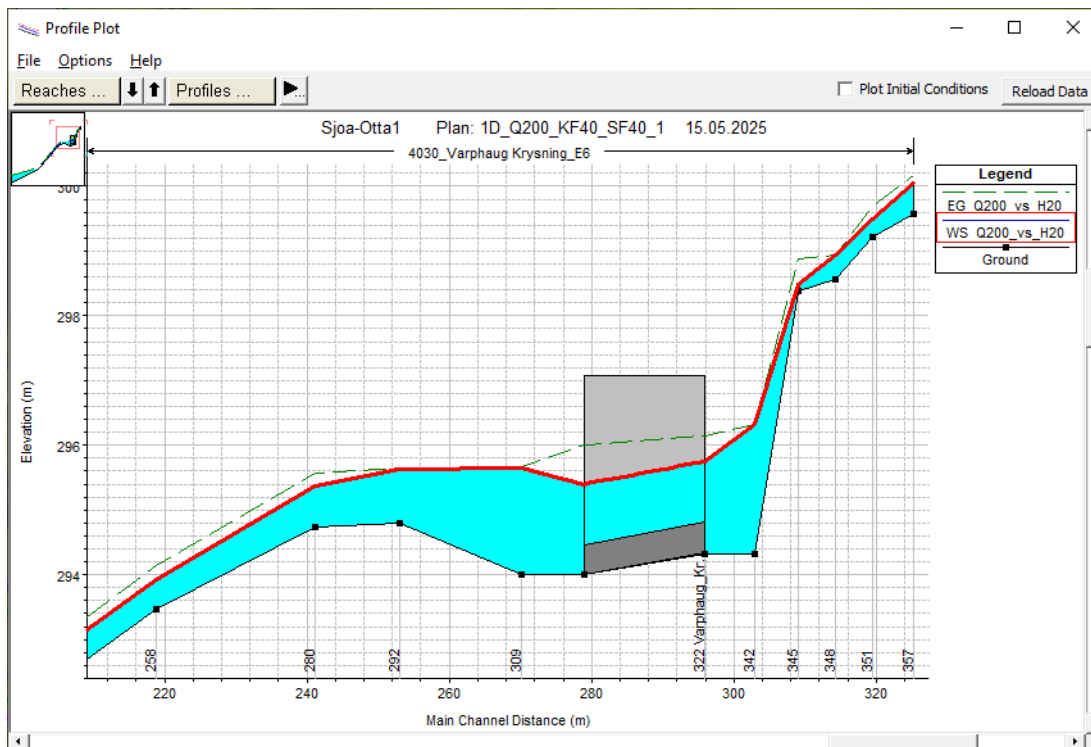
Figur 5-11. Tverrprofil for foreslått kulvertkrysning Haugen.

5.7 Varphaugen (prof. 4030)

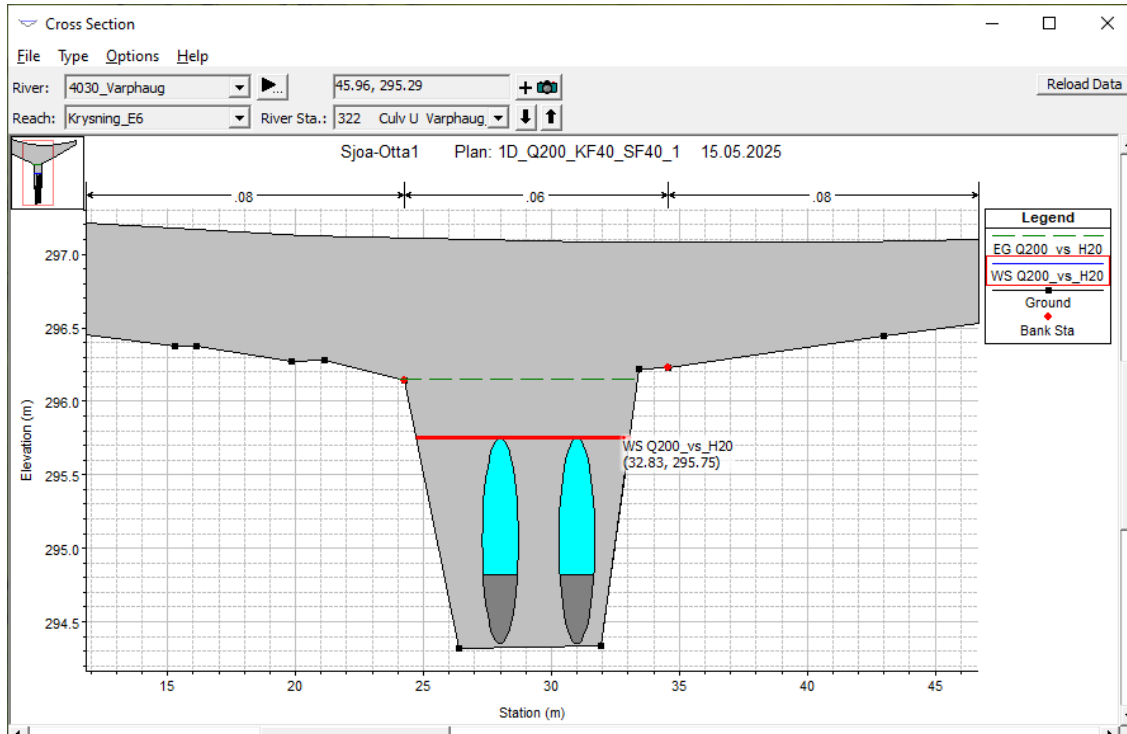
Layout for HEC-RAS-modellen vises i Figur 5-13, med lengdeprofil i Figur 5-14. Det ble i første omgang landet på et sirkulært gjennomløp med diameter 2000 mm. Dette viste seg i praksis lite gjennomførbart pga. stedlige forhold. Det er derfor testet et gjennomløp på 2 x 1400 mm. Dette tverrsnittet (oppstrøms side) vises i Figur 5-15. Gjentetting av nedre 1/3 er inkludert. Det er også testet en rektangulær variant 4000 x 1400 mm (vises ikke).



Figur 5-13. Layout for modell Varphaugen.



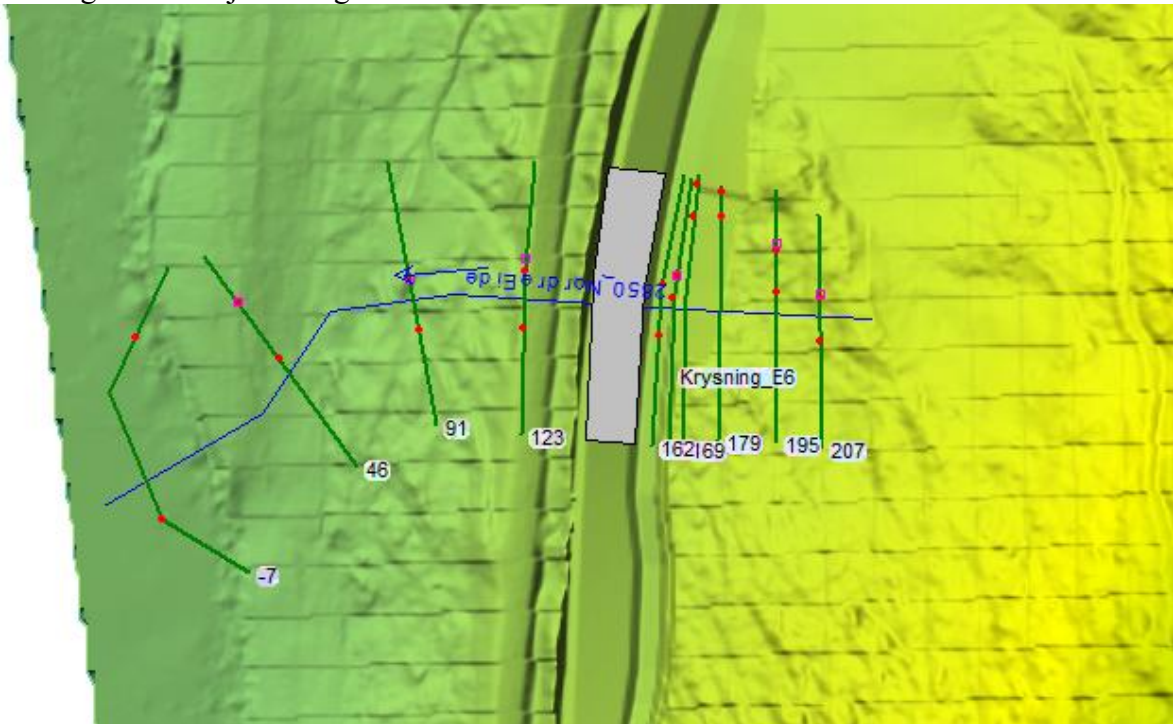
Figur 5-14. Lengdeprofil for krysnning Varphaugen (2 x 1400).



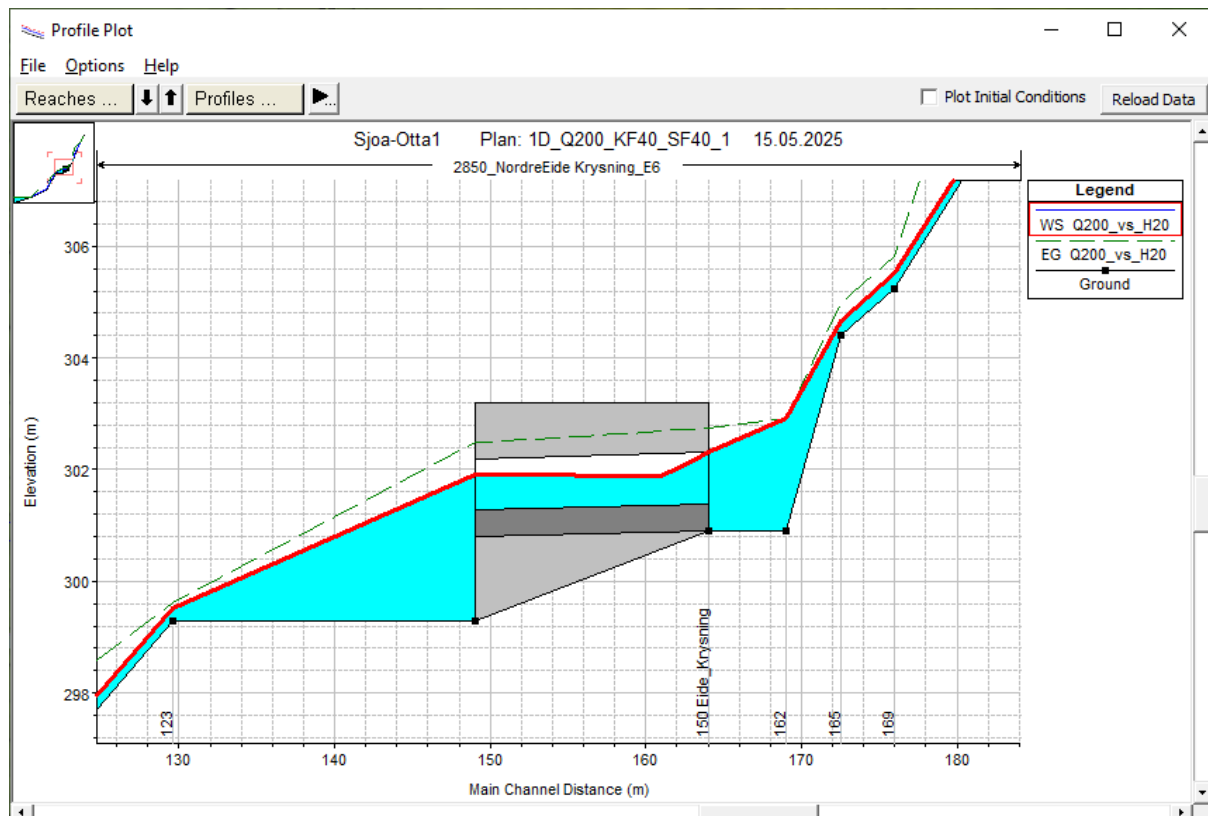
Figur 5-15. Tverrprofil for foreslått kulvertkrysnning Varphaugen.

5.8 Nordre Eide (prof. 2850)

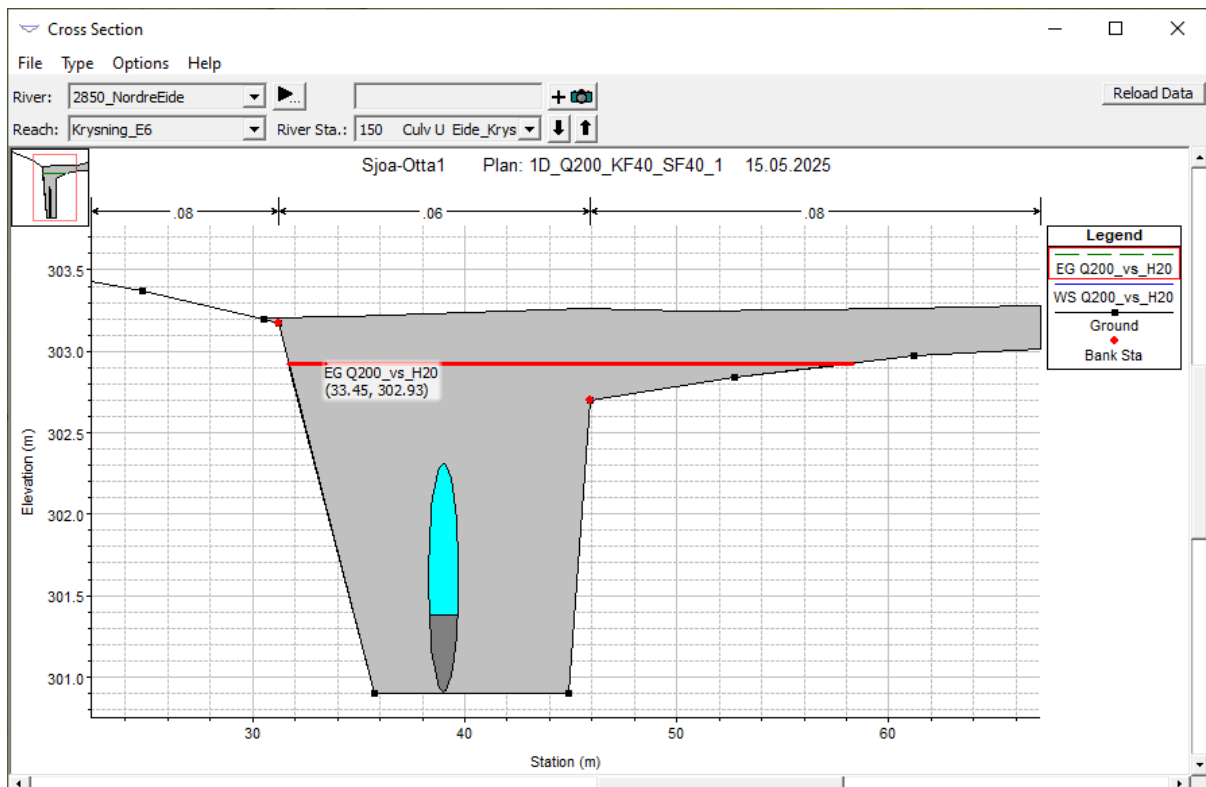
Layout for HEC-RAS-modellen vises i Figur 5-16, med lengdeprofil i Figur 5-17. Det er landet på et sirkulært gjennomløp med diameter 1400 mm. Dette tverrsnittet (oppstrøms side) vises i Figur 5-18. Gjentetting av nedre 1/3 er inkludert.



Figur 5-16. Layout for modell Nordre Eide.



Figur 5-17. Lengdeprofil for krysning Nordre Eide.



Figur 5-18. Tverrprofil for foreslått kulvertkrysning Nordre Eide.

5.9 Øvrige vassdragskrysninger

Øvrige krysninger dimensjoneres med HY-8. I tillegg til krysningene listet så langt i notatet har det kommet til enkelte nye stikkrennekrysninger fra VA på tampen. Disse er forsøkt innarbeidet så langt det har vært mulig. Noen av disse vil kreve ytterligere detaljering og sparring mot andre fag for å kunne landes.

Beregnete minimumsdimensjoner for alle krysninger (inkl. de beregnet i HEC-RAS) er listet i Tabell 5-1, sammen med dimensjonerende vannføring. Det er også generert detaljrapport fra HY-8 for resterende krysninger, vedlagt som Vedlegg 1.

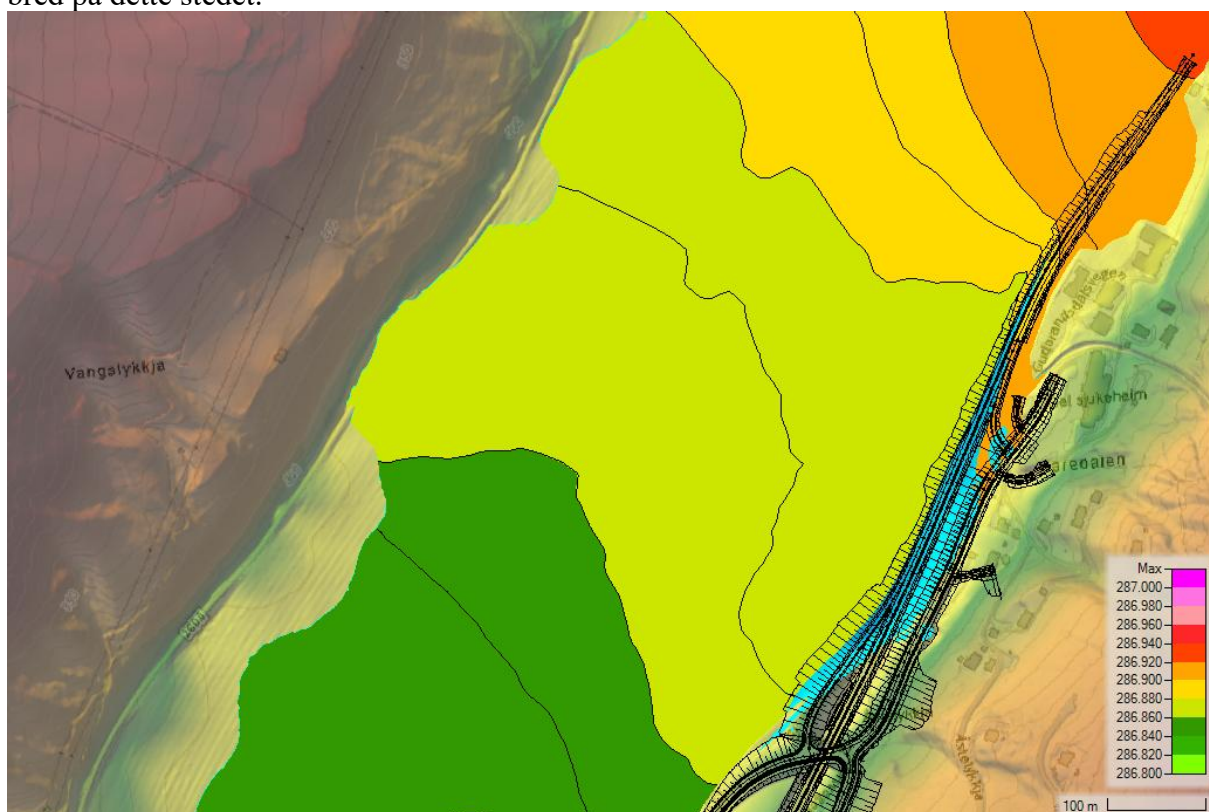
Tabell 5-1. Minimumsdimensjoner for kryssninger.

Profilnr.	Navn	Q _{200 dim} (m ³ /s)	Dim. minimum (mm)	Kommentar	Innløps-/ utløps- kontroll
7550	-	1.95	1600	Nordligste	Innløp
7250	Haredals- bekken	9.72	2800 x 2000	Lokalvegkryssning oppstrøms: 2200 x 1800	Utløp
7225	-	0.12	600	Modelleres ikke. Føres til 7170	-
7170	-	2.58	1800		Innløp
6900	-	1.02	1200	Får bidrag fra 6899. Oppstrøms kryssning: Også Ø1200	Innløp
6899	-	0.20	600	Skal videre til 6900	Utløp
6240	-	2.85	1800		Innløp
6175	-	3.65	2000	Får bidrag fra 6240	Innløp
5820	Sandbuvang- bekken	6.27	2200		Utløp
5670	-	0.38	800		Utløp
5310	-	1.57	1400		Innløp
5025	-	0.43	800		Innløp
4860	-	1.48	1400		Innløp
4540	-	0.25	800		Utløp
4450	Myrvang	4.37	1600		Innløp
4325	Haugen	3.74	1800		Utløp
4030	Varphaugen	5.68	2 x 1400	Eventuelt Ø2000 eller 4000 x 1400.	Utløp
3960	-	Ca. 3.6	6000 x 800/ 2 x 1400	Ny kryssning. Eksist bekkeløp. I tilfelle feltet ikke avskjæres oppstrøms.	Utløp
3760	-	0.63	1000		Innløp
3700	-	0.28	800		Innløp
3640	-	0.84	1200		Innløp
3460	-	0.29	800		Innløp
3380	-	0.58	1000		Innløp
3250	-	0.34	800		Innløp
3075	-	1.21	2x1000		Innløp
2850	Nordre Eide	2.89	1400		Innløp
2660 + 2790	-	0.27	2x600	Nye kryssninger. 1x600 per kryssning.	Utløp
2525	-	0.32	800		Innløp
2325	-	2.11 (1.0)	2x1000	Uten avlastning i pr. 2200: 2x1200 (2,11 m ³ /s)	Innløp
2200	-	1.11	1x1200	Ny kryssning. Avlaster 2325	Innløp
2020	-	0.90	1200		Innløp
1780	-	0.96	1200		Innløp
1335	-	1.57	1400		Innløp
940	-	0.79	1000		Utløp
650	-	0.12	-	Modelleres ikke. Går åpent gjennom undergang	-
590	-	0.39	800	Sydligste	Utløp

6 Nærføring/utfylling i Lågen ved Sandbumoen

Vegfylling vil gå delvis ut i Lågen ved det nye krysset ved Sandbumoen. Dette utgjør en relativt liten reduksjon av Lågens tverrsnitt på stedet. Den er gjort hydrauliske beregninger med en forenklet/kompakt utgave av Norconsults 2D-modell for Otta sentrum, der ny vegfylling og utfylling er lagt inn. Forenklingene er gjort for å redusere beregningstid ifm. uttesting av ulike terrengutformingsalternativer i denne fasen. Beregningene viser lokale vannstandsendringer på <1 cm og hastighetsøkninger på <0,05 m/s. Dette er så lite at det er innenfor vanlig modellusikkerhet. En kan dermed ikke konkludere direkte fra modellresultatene at det skjer noen endring verken ene eller andre veien. På generelt grunnlag må det riktignok legges til grunn at enhver form for innsnevring av elvers tverrsnitt kan gi negativ konsekvens mtp. vannstand og/eller hastighet/erosjon.

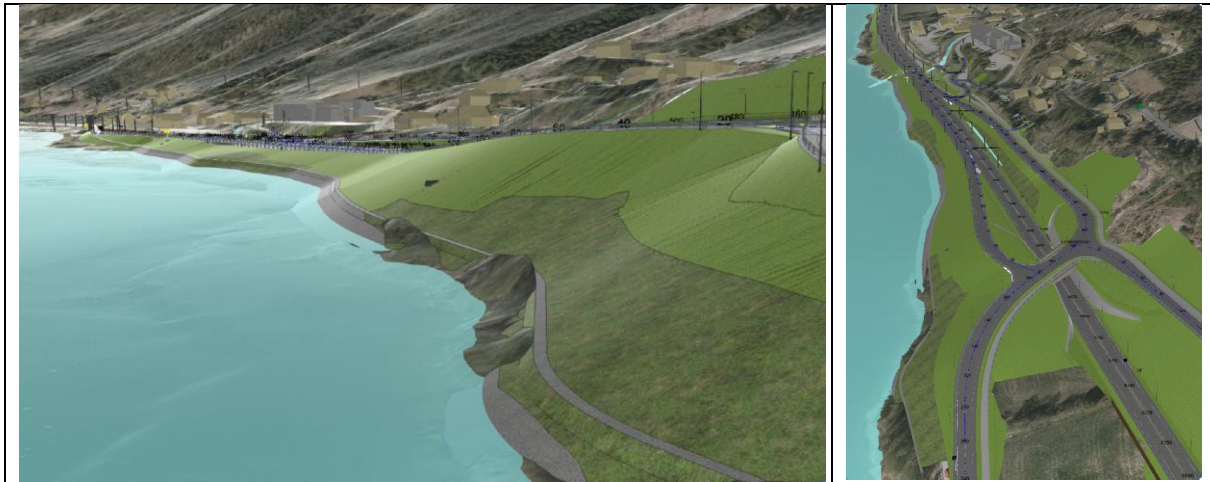
Eventuelle endringer i dette flate partiet av Lågen kan potensielt forplante seg 2,5 km oppstrøms. Derfra og lengre oppstrøms stiger vannstanden, og eventuelle endringer blir nøytralisert. Otta sentrum ligger ca. 4 km oppstrøms utfyllingsområdet. Dette må riktignok verifiseres når endelig utforming av utfyllingen foreligger. Foreløpig modellert «fortrengt» flomareal ved 200-årsflom som følge av vegfyllinga er vist i Figur 6-1. Lågen er ca. 300 m bred på dette stedet.



Figur 6-1. Foreløpig modellering med ny vegfylling ved Sandbumoen/Bredevangen. Blått areal er eksisterende 200-årsflomareal som fortrenses av veganlegget. Farget areal er 200-årsflomsone med vegfylling inkludert.

Utsnitt fra utfylling som er lagt til grunn for vurderingen vises i Figur 6-2. Utfylling i elver som Lågen frarådes på generelt grunnlag, da det som oftest har negativ effekt på biologisk mangfold/vannmiljø og flomforhold. Beregningene med Norconsults 2D-modell for Otta viser

imidlertid at utfyllingen er så liten at den ikke vil medføre vesentlig endringer i flomforholdene.

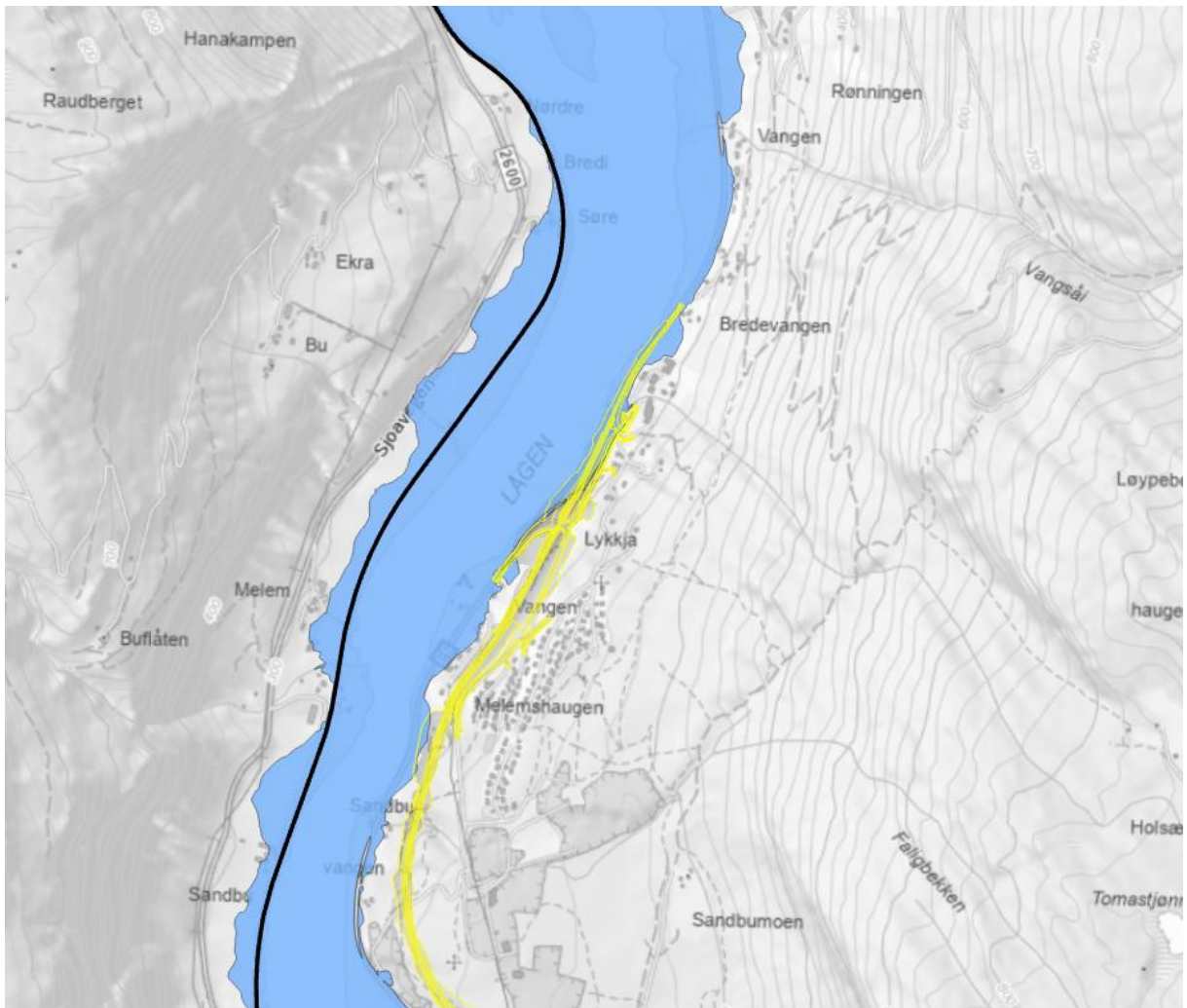


Figur 6-2. Utfyllingsforslag fra visningsmodell september 2025.

En fyllingsskråning må også erosjonssikres, og dette kan by på enkelte utfordringer. Sikring i form av tradisjonell steinfylling/rauset stein forutsetter at skråningen er slakere enn 1:1,5 (bratteste tillatt). Om det ikke er mulig må det vurderes enten plastring eller mur. Plastring kan deles i to hovedtyper: Flatplastring, der steinens største/flateste side plasseres mot vannet, eller damplastring, der steinens lengste akse peker innover i sikringen og kortsiden mot vannet. Damplastring er dermed mer stabilt og motstandsdyktig enn flatplastring. Plastring er i seg selv ikke tryggere enn rause stein, pga. risikoen for brudd som følge av enkeltstein som faller ut. Erosjonssikring i form av mur er det sikreste, men utgjør også en mer omfattende konstruksjon, som må avpasses mot kravene til selve vegen.

6.1 Konsekvenser for jernbanen

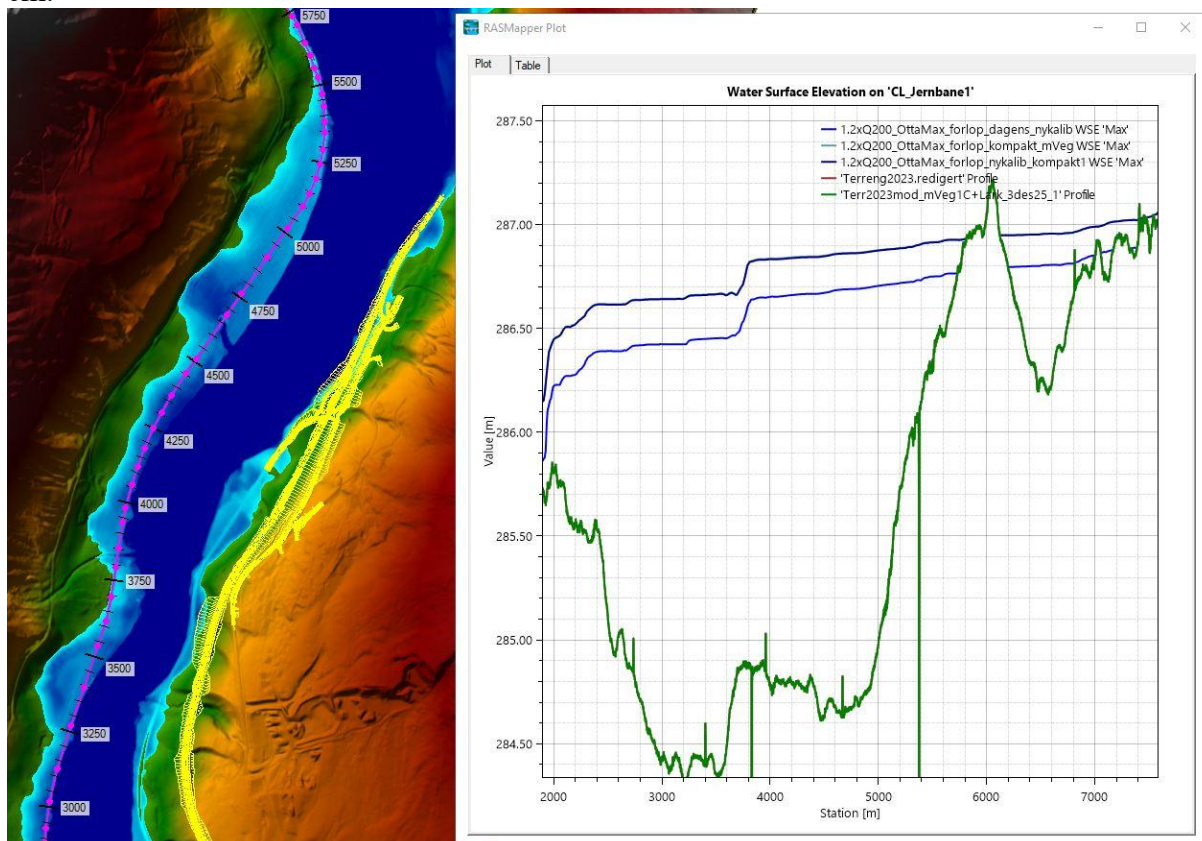
Ut fra Norconsults hydrauliske modell for Otta sentrum, vil jernbanelinja være flomutsatt ved 200-årsflom på mye av strekningen mellom Sjoa og Otta (Figur 6-3). Det må riktignok understrekes at modellen er bygd og kalibrert for å simulere flomforhold ved Otta sentrum, *ikke* videre nedover Lågen. Selv om modellområdet strekker seg ned til Sjoa må det antas at usikkerheten øker jo lengre man er fra selve *analyseområdet* Otta sentrum. Likevel må det kunne antas at modellen gir et noenlunde realistisk bilde av flomsituasjonen også nedstrøms Otta, selv med denne ukvantifiserbare usikkerheten.



Figur 6-3. Flomsone for klimajustert 200-årsflom ved Bredevangen fra Norconsults modell for Otta sentrum. Det må understrekes at dette området er utenfor flomsoneprosjektets analyseområde, og at resultatene dermed er mer usikre enn de innenfor analyseområdet. Jernbanelinja vises i svart og veglinjer for nye E6 (Alt.C) i gult.

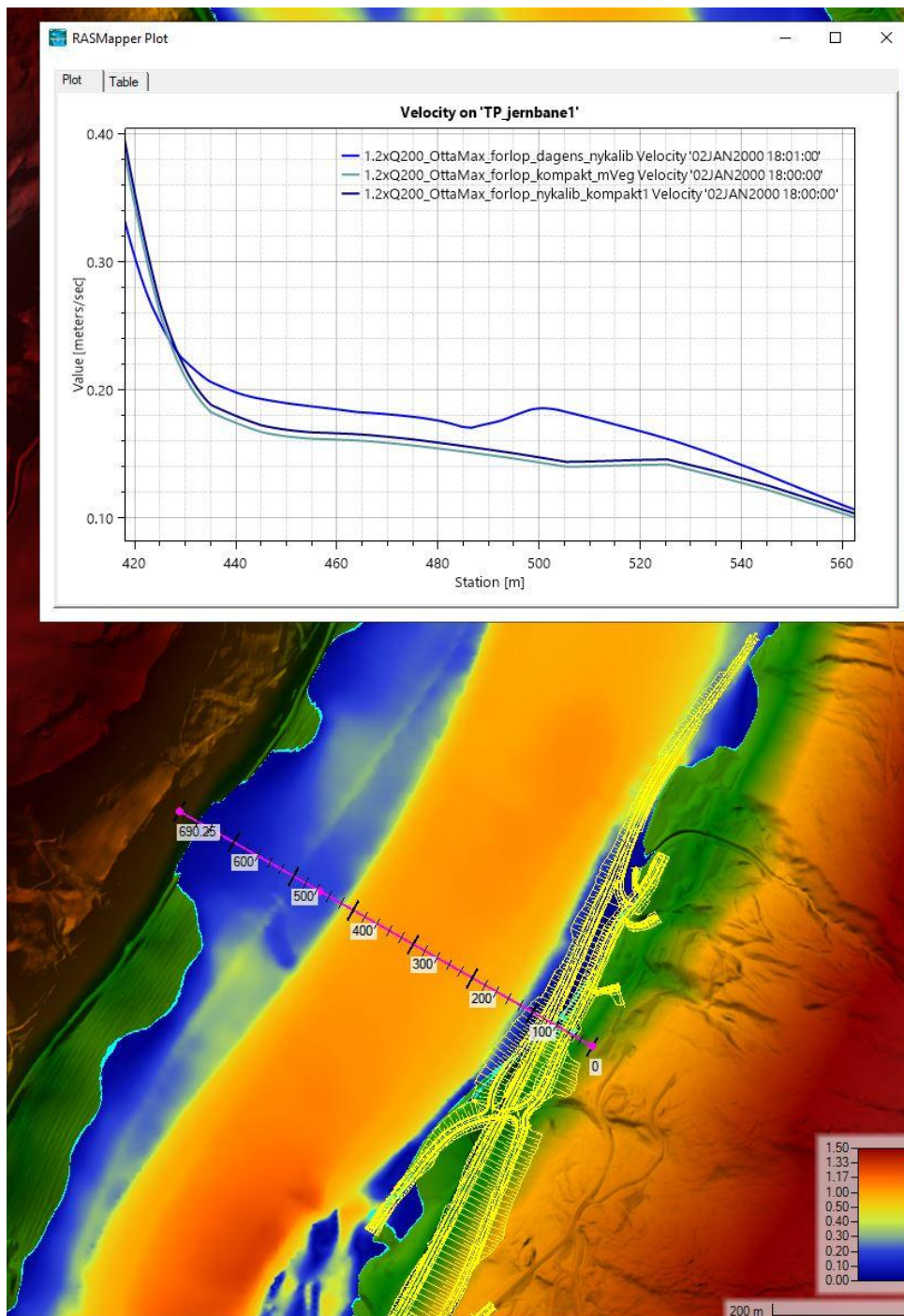
Lengdeprofil for jernbanen forbi Bredevangen er vist i Figur 6-4. Denne viser 200-årsflomvannstand fra originalmodellen, samt to forenklete/kompakte modeller utledet av førstnevnte, hvorav en med veganlegg/utfylling lagt inn. De forenklete modellene er som nevnt etablert for å redusere beregningstid ved uttesting av ulike terrengutformingsalternativer.

Selv om resultatet fra de forenklete modellene form avviker fra originalmodellen, er det tydelig at jernbanen allerede er flomutsatt på stekningen. (Avviket fra originalmodellen skyldes for øvrig at de hydrauliske ruhetsverdier må oppdateres gjennom rekallibrering, som er tidkrevende). Påvirkning fra det nye veganlegget vil sann sett ikke påvirke denne situasjonen i signifikant grad. Jernbanen vil fortsatt være flomutsatt med dagens/eksisterende E6. Forskjellen i vannlinjer for forenklete modeller med og uten veganlegget er som nevnt ca. 1 cm.



Figur 6-4. Simulert 200-årsflomvannstand langs jernbanelinja (grønn profil) forbi Bredevangen. Nederste blå linje representerer vannlinje fra originalmodellen. Grønn linje representerer jernbanetraséen.

Vannhastighet over jernbanetraséen ved 200-årsflom vil være lav uansett modellscenario (Figur 6-5). Hastigheten vil ligge omkring 0,15-0,20 m/s. Modellen med det nye veganlegget gir litt lavere hastighet enn eksisterende situasjon.



Figur 6-5. Hastighetsplott ved 200-årsflom for originalmodell (dagens situasjon) og maksimal vannhastighet langs tverrprofil nær Sel sjukeheim. Jernbanelinja befinner seg ved stasjon 500m. Øvre blå linje: Originalmodell. Lys grønn linje: Kompaktmodell med nytt veganlegg, mørk blå linje: Kompaktmodell eksisterende situasjon.

Jernbanen vil dermed være utsatt for vannstrømning ved 200-årsflom i dagens situasjon, og det nye veganlegget gir ingen signifikant forverring.

Det er ellers ikke lagt opp til anleggsarbeider som medfører større påvirkning på Lågen enn ferdig situasjon, men dette er uansett opp til totalentreprenør.

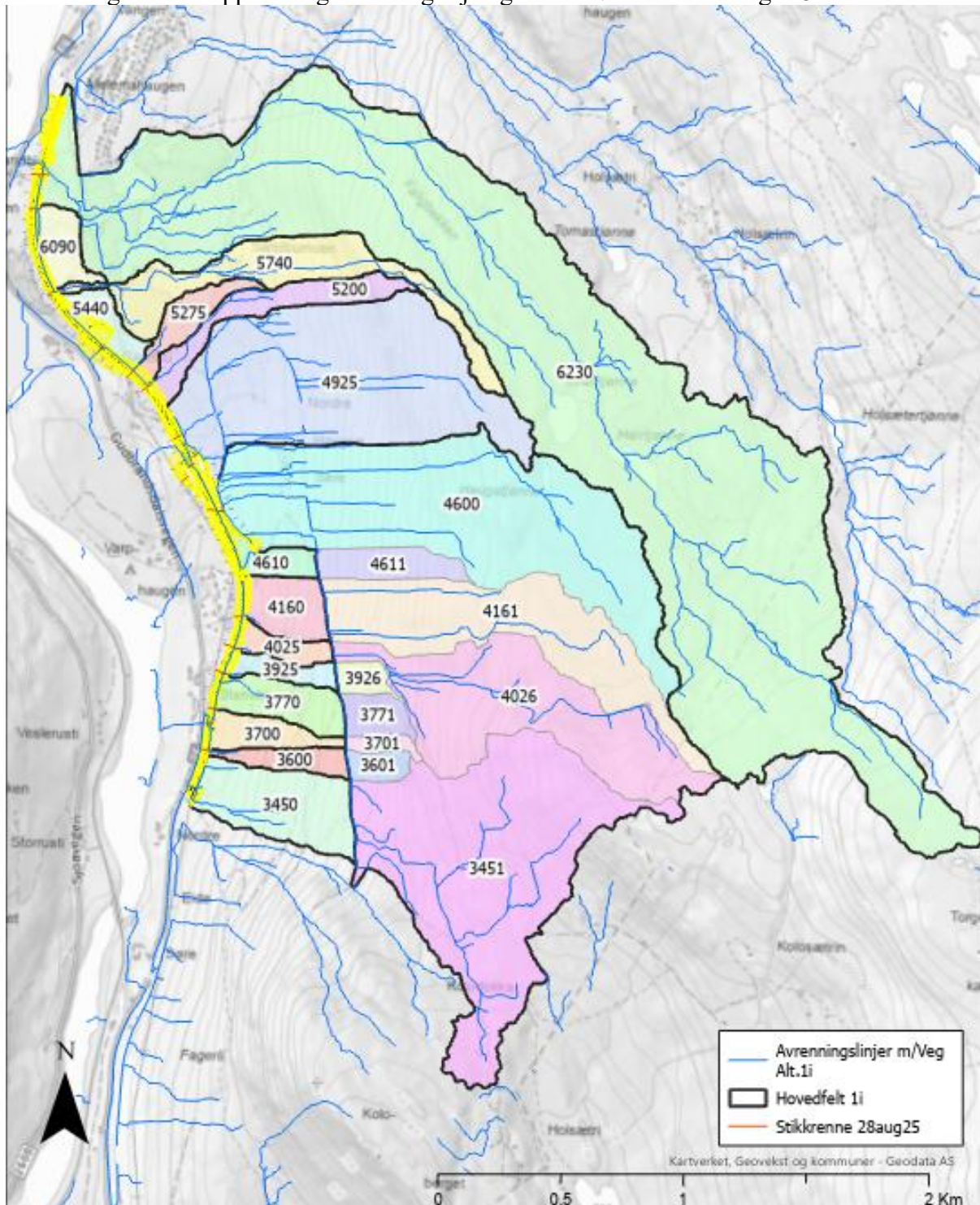
7 Erosjonssikring for kryssninger

Dimensjonering av erosjonssikring gjøres når løsningene (kryssningene) foreligger på et mer detaljert stadium. For småvassdragene tas det utgangspunkt i sikring med rauset stein i bunn + sideskråninger. Skråningene kan da ikke være brattere enn 1:1,5. For de større kryssningene vil det være naturlig å også vurdere plastring og/eller mur, avhengig av hvilke utfordringer man har på det aktuelle stedet. Mur kan f.eks. være i form av tørrmur, eller støpt betong. Eventuelle murer må prosjekteres av RIB i samråd med geoteknikk.

8 Traséalternativ 1i

8.1 Flomberegning

Det skal utredes et nytt traséalternativ 1i, som ligger lengre øst forbi Varphaugen sammenlignet med opprinnelige 1C. Veglinje og delnedbørfelt vises i Figur 8-1.



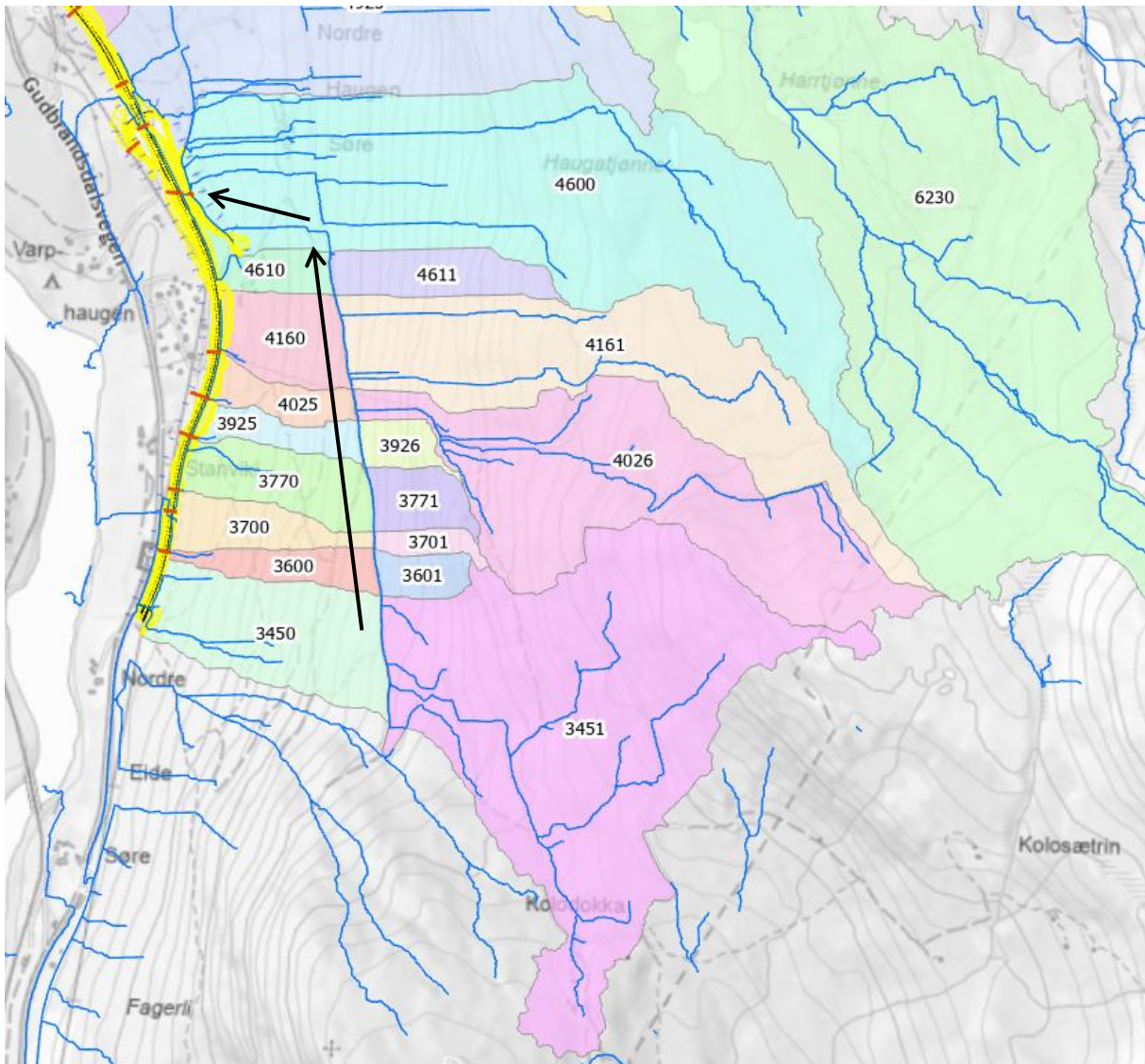
Figur 8-1. Trasé og delnedbørfelt med avrenningslinjer for alternativ 1i mellom Nordre Eide og Sandbumoen.

Profilering på vegen er endret sammenlignet med 1C, og stikkrenne-/nedbørfeltnummerering gjenspeiler dette. Justert stikkrenneplassing gir også endring i nedbørfeltene sammenlignet med 1C (Figur 3-1). Nøkkeltall for «nye» nedbørfelt/krysninger er vist i Tabell 8-1. Det er gjort en endring i metode sammenlignet med 1C, ved at felt 3450 til 4600 beregnes for både «forventet» og maksimal teoretisk feltstørrelse. Ut fra avrenningslinjene avskjæres disse feltene av den nordgående Holsetervegen, slik at vannet føres nordover til felt 4600/4610 (Figur 8-2). Dette forutsetter riktignok tette stikkrenner gjennom Holsetervegen, hvilket er sannsynlig under ekstremhendelser. Ved åpne stikkrenner (og i normalsituasjon) vil vannet derimot ikke avskjæres. Stikkrennetilstand og dimensjon gjennom Holsetervegen er ukjent, så for sikkerhets skyld beregnes det vannmengde og stikkrennedimensjon for begge situasjoner. Dette er strengt tatt tilfelle for tilsvarende krysninger på 1C også, men det er foreløpig kun beregnet for situasjon med full avskjæring der.

Maksimalnedbørfelt for hver krysning er angitt som «originalprofilnummer + 1». Profilnr 3451 representerer f.eks. maksimalnedbørfeltet til profil/stikkrenne 3450. I Figur 8-1 utgjør delfelt 3450 og 3451 til sammen maksimalfeltet, som så får betegnelsen 3451 i tabellen.

Tabell 8-1. Nøkkeltall for krysninger på alternativ 1i

Vegprofilnr	Navn/krysningssted	A (km ²)	A (ha)	Eff sjø (%)	Q _{N 61-90} (l/s·km ²)
6230	Sandbuvangbekken	2.72	272.31	0.2	8.3
6090	-	0.06	6.35	0.0	10.0
5740	-	0.23	23.49	0.0	10.0
5440	-	0.06	5.89	0.0	10.0
5275	-	0.06	5.99	0.0	10.0
5200	-	0.11	11.43	0.0	10.0
4925	Myrvang/Nordre Haugen	0.69	68.78	0.0	7.0
4611	-	0.12	11.60	0.0	10.0
4610	Varphaugen/Standvik (krysning E6)	0.04	4.42	0.0	10.0
4601	Varphaugen/Standvik (krysning lokalveg)	2.70	270.00	0.0	8.2
4600	-	0.84	84.01	0.0	8.2
4161	-	0.48	48.06	0.0	10.0
4160	-	0.08	7.97	0.0	10.0
4026	-	0.50	50.06	0.0	10.0
4025	-	0.04	4.01	0.0	10.0
3926	-	0.07	6.83	0.0	10.0
3925	-	0.04	4.04	0.0	10.0
3771	-	0.13	13.39	0.0	10.0
3770	-	0.09	8.94	0.0	10.0
3701	-	0.08	7.97	0.0	10.0
3700	-	0.06	5.97	0.0	10.0
3601	-	0.08	7.55	0.0	10.0
3600	-	0.05	4.61	0.0	10.0
3451	-	0.99	98.50	0.0	7.0
3450	-	0.18	17.86	0.0	7.0



Figur 8-2. I en situasjon med uvirksomme stikkrenner vil Holsetervegen avskjære felt 3451 - 4611 og føre vannet nordover til 4600/4610.

Det benyttes ellers samme flomberegningmetoder og grunnforutsetninger som for krysninger i alternativ 1C, ref. kapittel 3 og 4. C-verdier, nedbørintensitet/konsentrasjonstid o.l. er oppdatert for hvert felt. Samlede resultater for krysninger er vist i Tabell 8-2.

Tabell 8-2. Resultater fra flomberegninger for kryssninger/delnedbørfelt. Enkelte delfelt utgår i praksis, da noen kryssninger får bidrag fra flere delfelt.

Veg-profilnr	Navn/info	A (km ²)	Q ₂₀₀ (uten påslag) (m ³ /s)				Valgt Q ₂₀₀		Q _{200 dim} (m ³ /s)
			Rasjonelle	NIFS median	FFA	NIFS maks	(m ³ /s)	(l/s·km ²)	
6230	Sandbuvang-bekken (uendret fra 1C)	2.72	5.53	1.96	3.27	3.92	3.20	1175	6.27
6090	-	0.06	0.20	0.10	0.08	0.20	0.20	3122	0.39
5740	-	0.23	0.87	0.30	0.28	0.61	0.87	3688	1.70
5440	-	0.06	0.29	0.09	0.07	0.18	0.29	4950	0.57
5275	-	0.06	0.13	0.09	0.07	0.19	0.13	2217	0.26
5200	-	0.11	0.50	0.16	0.14	0.33	0.50	4391	0.98
4925	Myrvang	0.69	2.78	0.58	0.83	1.17	2.78	4047	5.45
4611	Varphaugen (teoretisk nedb. felt)	0.12	0.54	0.11	0.14	0.22	0.54	4671	1.06
4610*	Varphaugen (kryssning E6)	0.04	0.16	0.07	0.05	0.14	3.39*	76714	6.65*
4601	Varphaugen (kryssning lokalveg)	2.70	4.55	2.15	3.24	4.30	3.23	1196	6.33
4600	Varphaugen (teoretisk minimum)	0.84	2.64	0.78	1.01	1.57	2.64	3139	5.17
4161	(Maksfelt)	0.48	1.46	0.48	0.58	0.97	1.46	3030	2.85
4160	-	0.08	0.36	0.12	0.10	0.24	0.36	4487	0.70
4026	(Maksfelt)	0.50	1.35	0.54	0.60	1.09	1.35	2700	2.65
4025	-	0.04	0.17	0.07	0.05	0.13	0.17	4237	0.33
3926	(Maksfelt)	0.07	0.34	0.05	0.08	0.10	0.34	5051	0.68
3925	-	0.04	0.18	0.07	0.05	0.13	0.18	4377	0.35
3771	(Maksfelt)	0.13	0.68	0.07	0.16	0.14	0.68	5068	1.33
3770	-	0.09	0.38	0.13	0.11	0.26	0.38	4282	0.75
3701	(Maksfelt)	0.08	0.29	0.04	0.10	0.07	0.29	3583	0.56
3700	-	0.06	0.26	0.09	0.07	0.19	0.26	4391	0.51
3601	(Maksfelt)	0.08	0.36	0.05	0.09	0.10	0.36	4730	0.70
3600	-	0.05	0.18	0.07	0.06	0.15	0.18	3873	0.35
3451	(Maksfelt)	0.99	2.16	0.67	1.18	1.34	2.16	2191	4.23
3450	-	0.18	0.74	0.18	0.21	0.36	0.74	4122	1.44

*(Tar med alt vann fra 4601 + lokalfelt 4610).

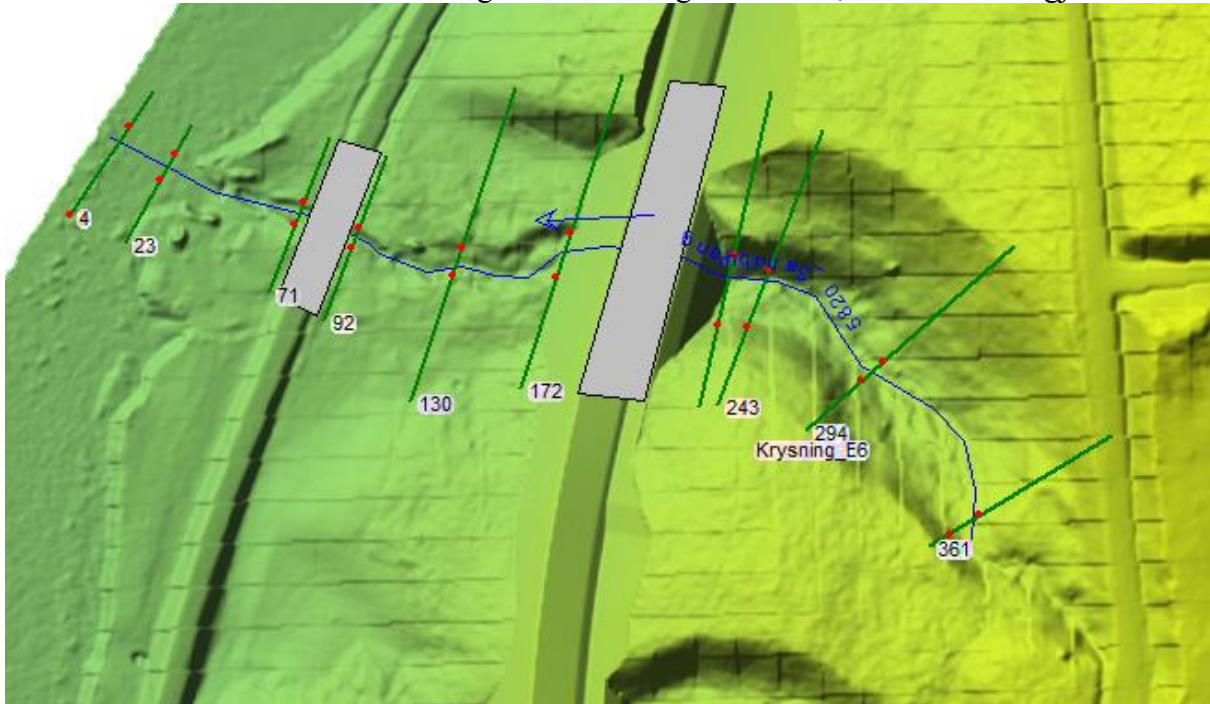
8.2 Dimensjonering av kryssninger

Det benyttes samme forutsetninger for dimensjonering på li som for 1C (kapittel 5).

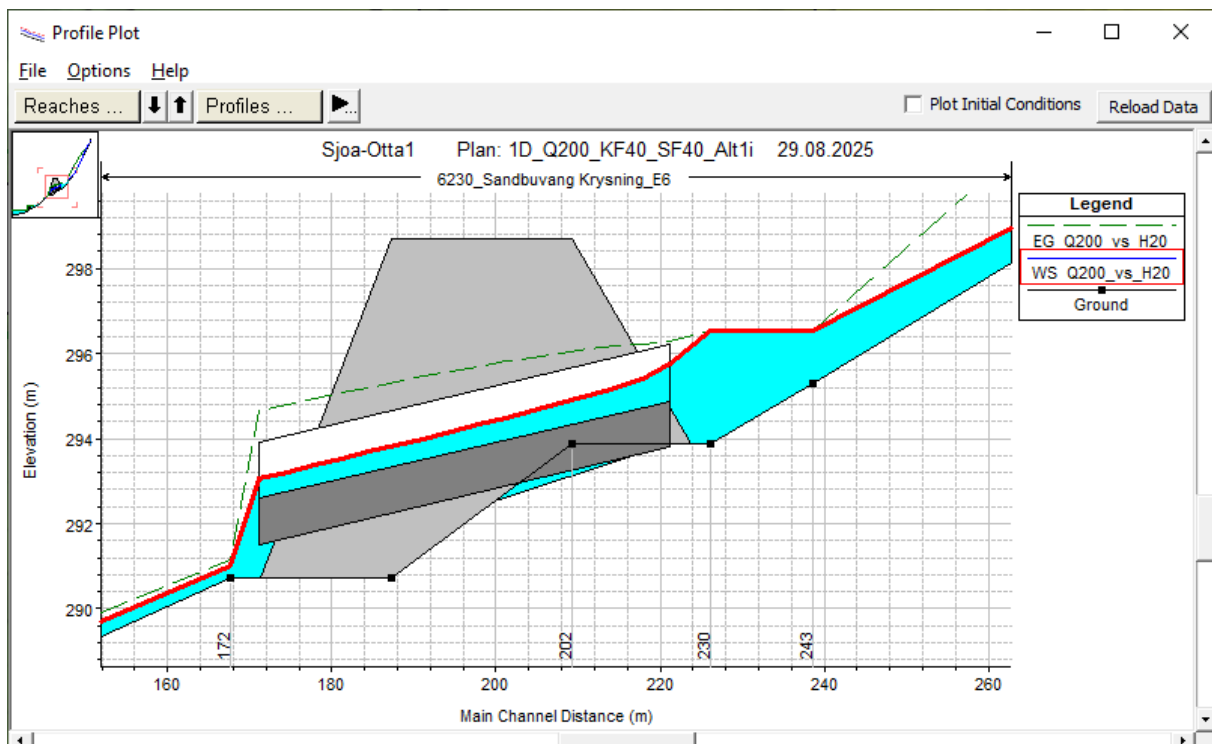
8.2.1 Sandbuvangbekken (prof. 6230)

Layout for HEC-RAS-modellen vises i Figur 8-3, med lengdeprofil i Figur 8-4. Nedbørfelt og vannmengde er i praksis uendret fra 1C, men det er i mellomtiden besluttet at kulverten også skal kunne fungere som smådyrpassasje. Det er landet på et sirkulært gjennomløp med diameter 2400 mm og nederste 40 cm permanent nedgravd i bekkebunn. Dette tverrsnittet

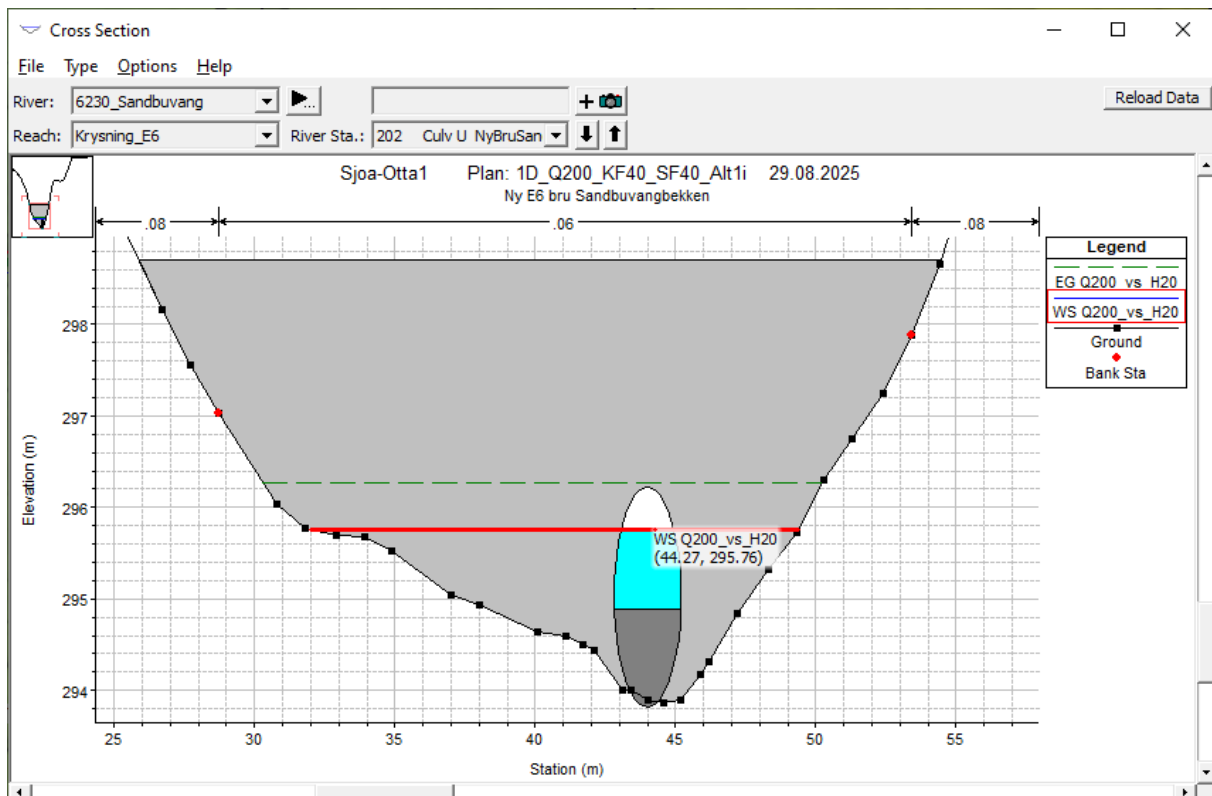
(oppstrøms side) vises i Figur 8-5. Gjentetting av nedre 1/3 er inkludert og regnes ut fra de resterende 2000 mm som ikke er nedgravd. Totalt regnes nedre 1,067 meter som gjentettet.



Figur 8-3. Layout modell Sandbuvangbekken.



Figur 8-4. Lengdeprofil for krysning Sandbuvangbekken med delvis nedgravd Ø2400-rør.



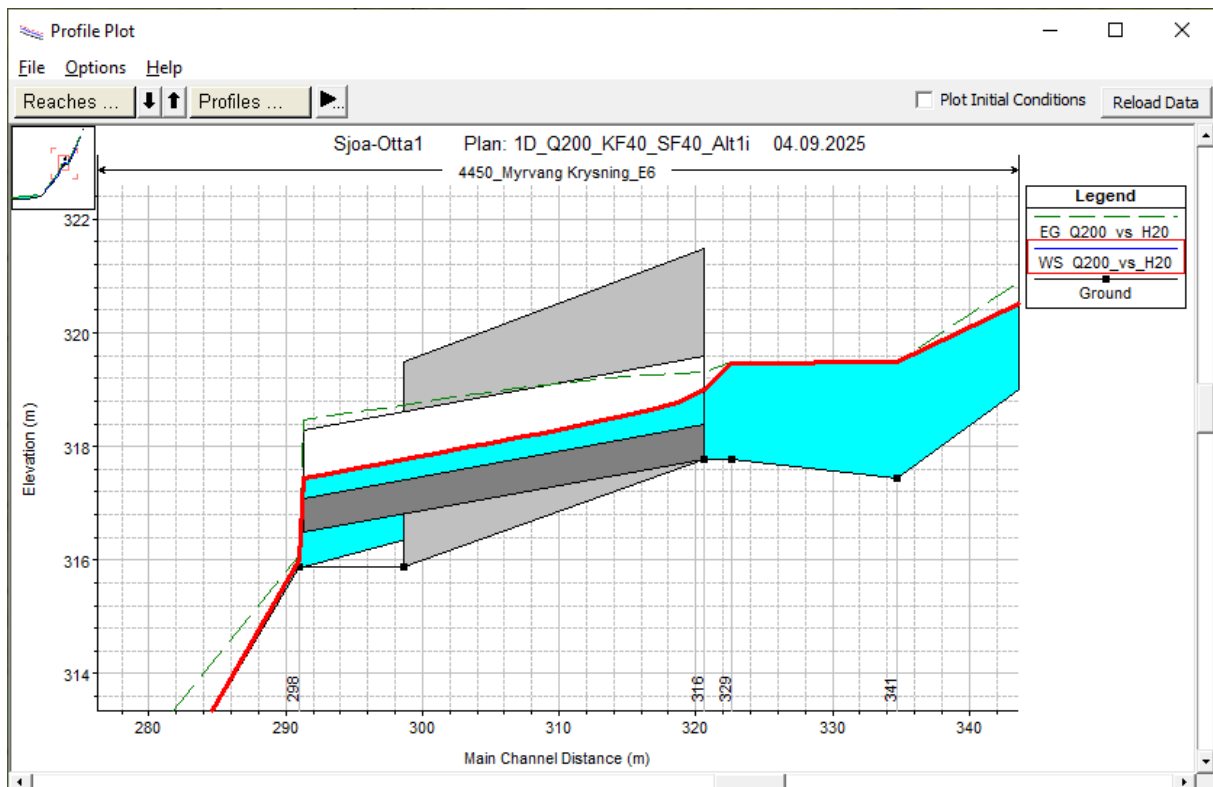
Figur 8-5. Tverrprofil for foreslått kulvertkrysning Sandbuvangbekken med delvis nedgravd Ø2400-rør.

8.2.2 Myrvang (prof. 4925)

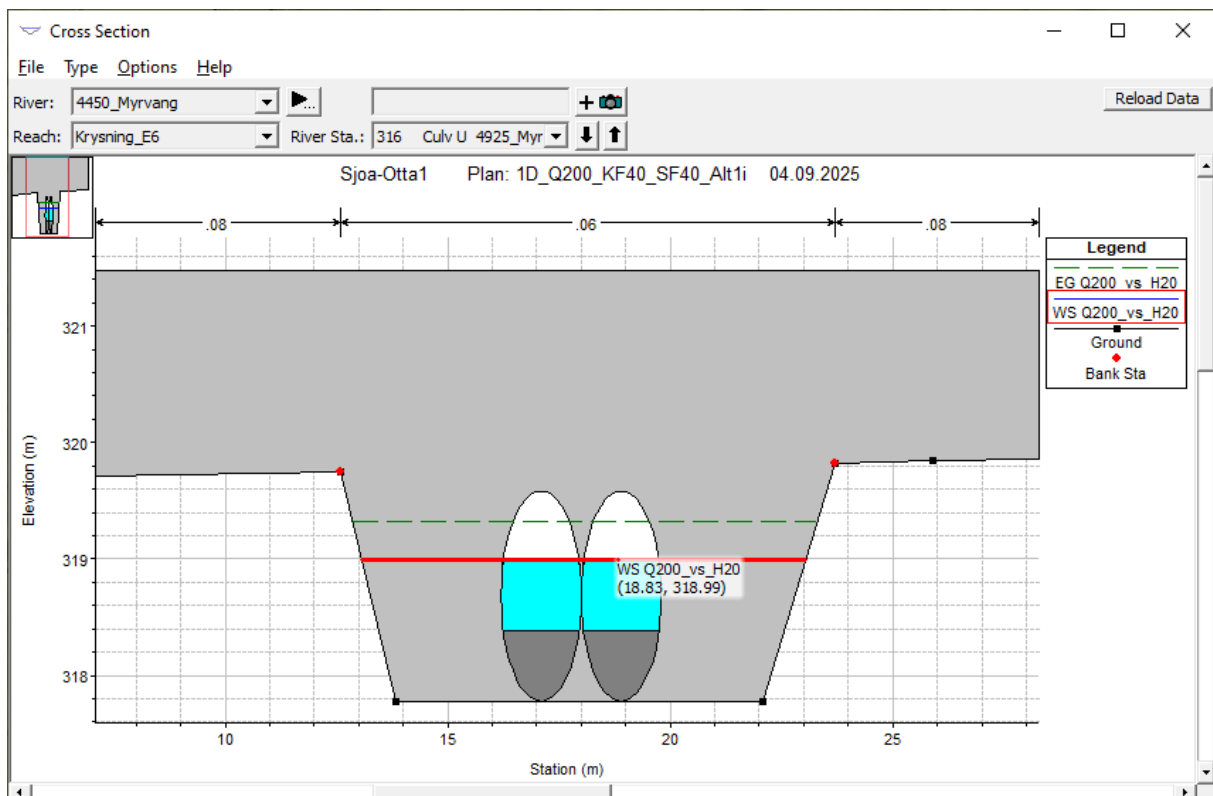
Layout for HEC-RAS-modellen vises i Figur 8-6, med lengdeprofil i Figur 8-7. Det er landet på 2 x Ø1800 mm. Tverrsnittet (oppstrøms side) vises i Figur 8-8. Gjentetting av nedre 1/3 er inkludert. For denne modellen er nedstrøms betingelse satt til normalstrømning med helning 0,01.



Figur 8-6. Layout modell for krysning Myrvang.



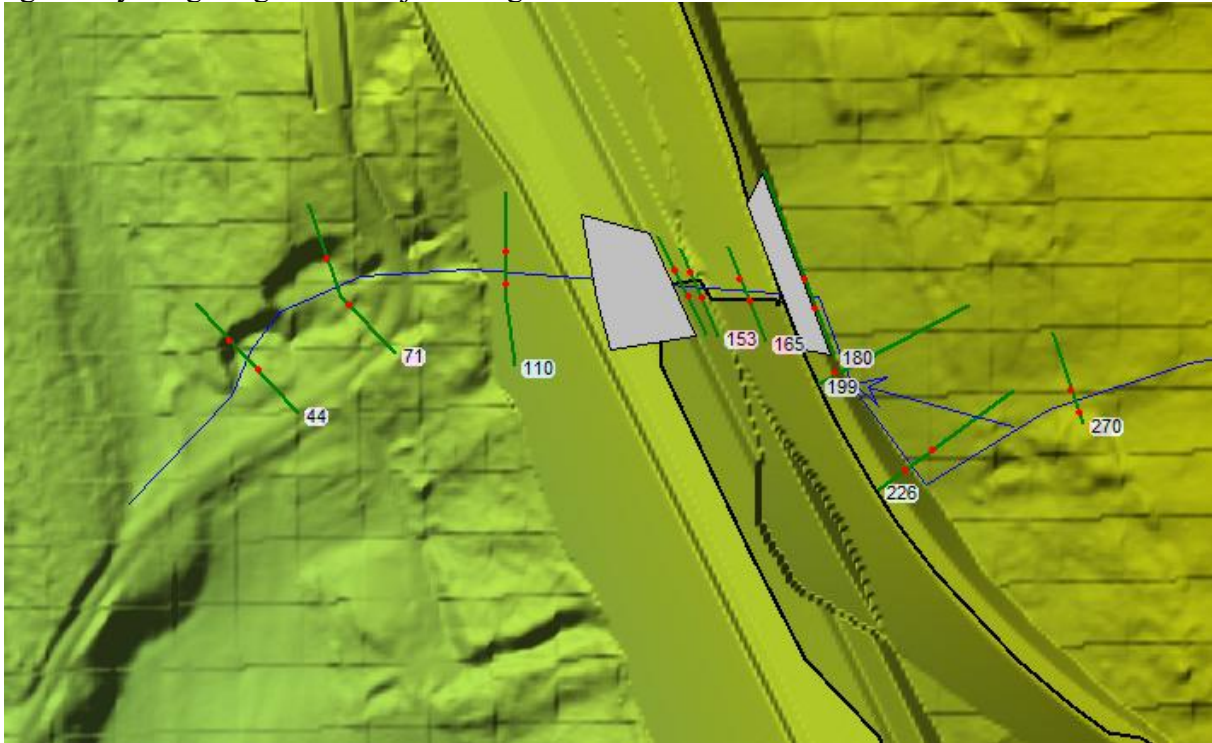
Figur 8-7. Lengdeprofil for kryssning Myrvang med 2 x 1800-rør.



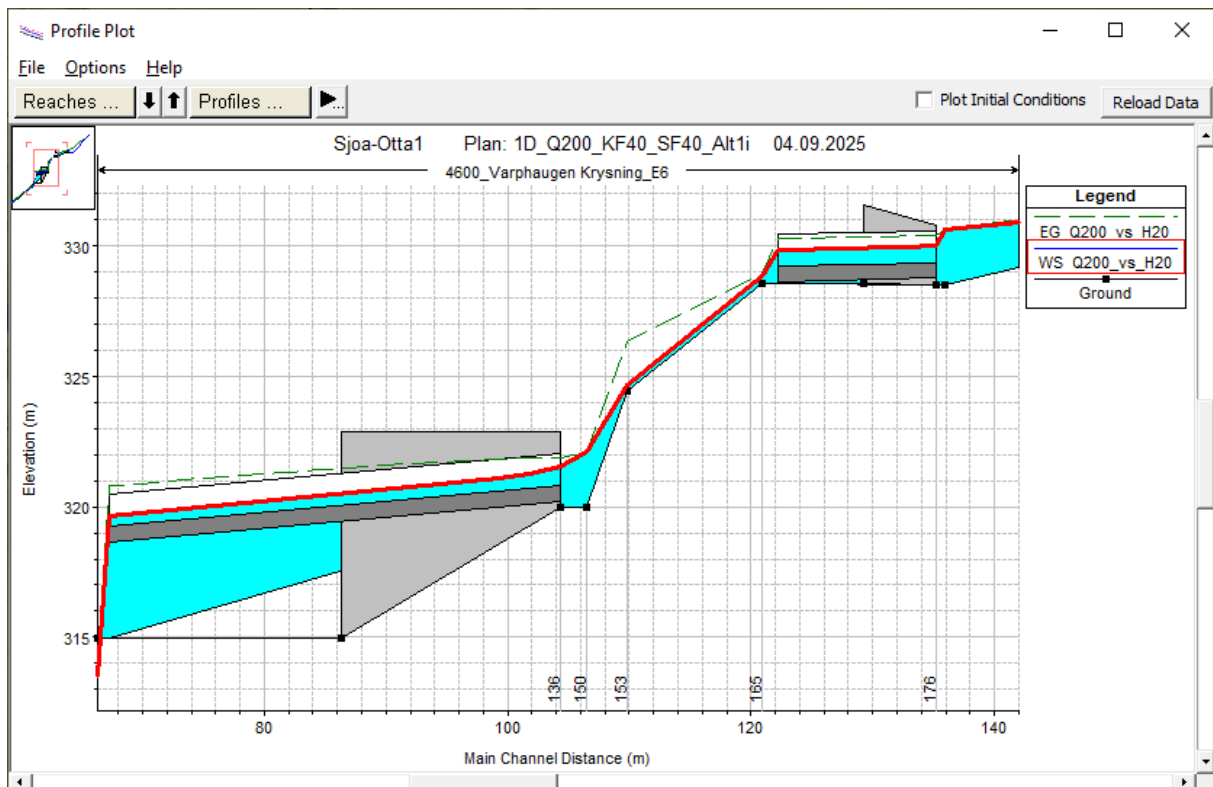
Figur 8-8. Tverrprofil for kryssning Myrvang med 2 x 1800-rør.

8.2.3 Varphaugen (prof. 4600/4601/4610)

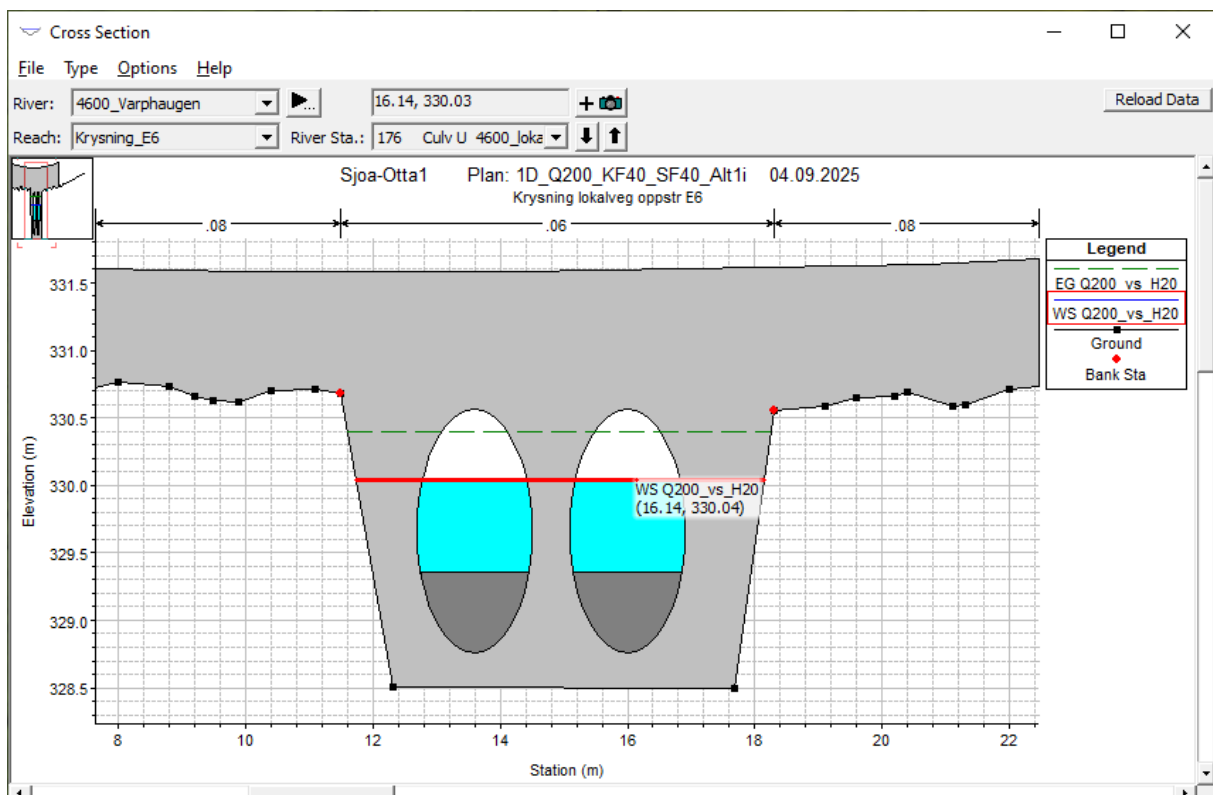
Layout for HEC-RAS-modellen vises i Figur 8-9, med lengdeprofil i Figur 8-10. Dette er i realiteten to krysninger rett etter hverandre, først under lokalveg, så E6. Det er landet på 2 x Ø1800 mm for begge. Tverrsnittet (oppstrøms side) for lokalvegkrysning vises i Figur 8-11 og E6-krysning i Figur 5-12. Gjentetting av nedre 1/3 er inkludert.



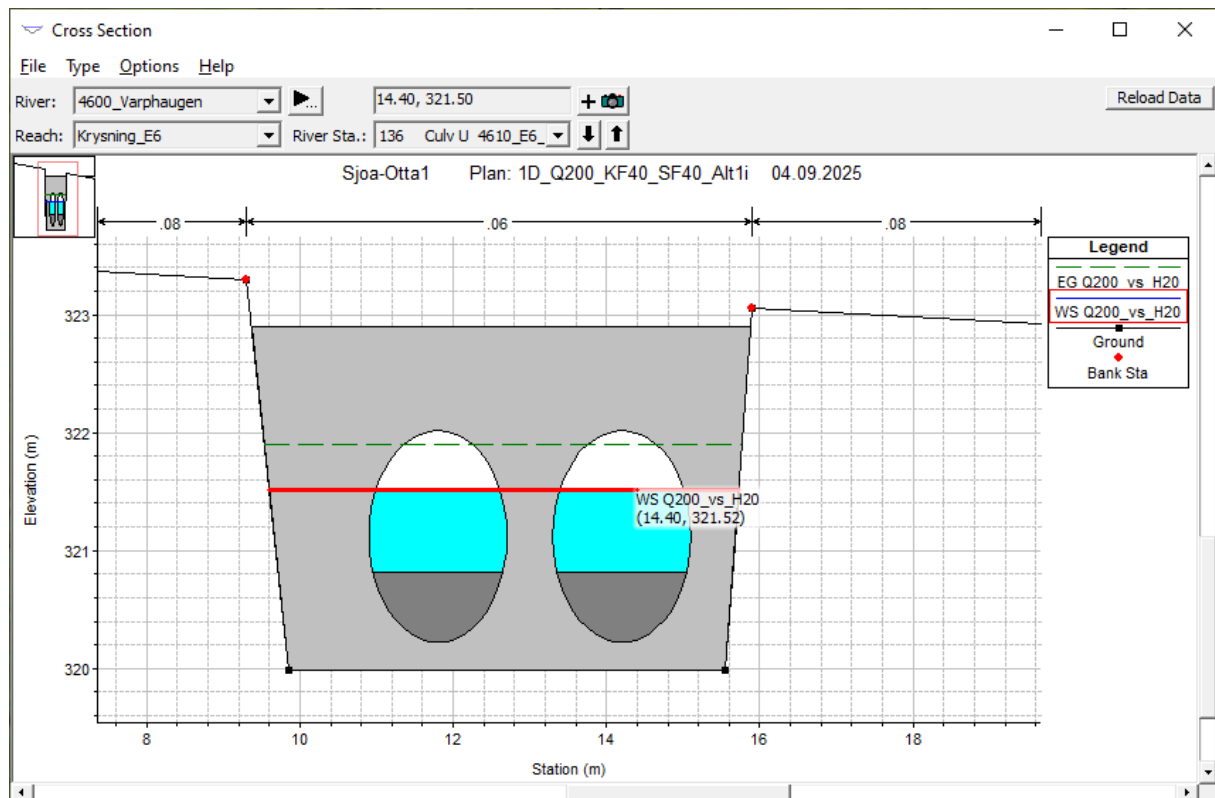
Figur 8-9. Layout modell Varphaugen.



Figur 8-10. Lengdeprofil for krysning Varphaugen (lokalveg + E6)



Figur 8-11. Tverrprofil krysning Varphaugen (lokalveg) med 2 x 1800-rør.



Figur 8-12. Tverrprofil kryssning Varphaugen (E6) med 2 x 1800-rør.

8.2.4 Øvrige kryssninger

Øvrige kryssninger dimensjoneres med HY-8. Beregnede minimumsdimensjoner for alle kryssninger på 1i (inkl. de beregnet i HEC-RAS) er listet i Tabell 8-3, sammen med dimensjonerende vannføring. Det er også generert detaljrapport fra HY-8 for resterende kryssninger i Vedlegg 2.

Tabell 8-3. Minimumsdimensjoner for kryssninger i alternativ 1i.

Vegprofilnr	Navn	Q _{200 dim} (m ³ /s)	Dim. minimum (mm)	Kommentar	Innløps-/ utløps- kontroll
6230	Sandbu-vangen	6.27	1 x 2400	I praksis uendret fra 1C, men nedre 40 cm graves ned. Qdim beholdes.	Innløp
6090		0.39	1 x 800		Utløp
5740		1.70	1 x 1600		Innløp
5440		0.57	1 x 1000		Innløp
5275		0.26	1 x 800		Innløp
5200		0.98	1 x 1200		Innløp
4925	Myrvang	5.45	2 x 1800		Utløp
4611		1.06	2 x 1800	Teoretisk minimumsfelt – ikke aktuelt	Utløp
4610	Varphaugen	6.65	2 x 1800	E6-kryssning.	Utløp
4601	Varphaugen	6.33	2 x 1800	Lokalvegkryssning. Maks feltstørrelse	Utløp
4600	Varphaugen	5.17	2 x 1800	Minimumsfelt. Ikke aktuelt	Utløp
4161		2.85	1 x 1800	Maks feltstørrelse	Innløp
4160		0.70	1 x 1000		Innløp
4026		2.65	1 x 1800	Maks feltstørrelse	Innløp
4025		0.33	1 x 800		Innløp
3926		0.68	1 x 1000	Maks feltstørrelse	Utløp
3925		0.35	1 x 800		Utløp
3771		1.33	1 x 1400	Maks feltstørrelse	Innløp
3770		0.75	1 x 1200		Innløp
3701		0.56	1 x 1000	Maks feltstørrelse	Innløp
3700		0.51	1 x 1000		Innløp
3601		0.70	1 x 1000	Maks feltstørrelse	Innløp
3600		0.35	1 x 800		Innløp
3451	Nordre Eide	4.23	2 x 1600	Maks feltstørrelse	Innløp
3450	Nordre Eide	1.44	2 x 1000		Innløp

9 Oppsummering

- Det er beregnet 200-årsvannføring, minimumsdimensjoner og vannlinje for krysninger slik de forelå 2. mai 2025 (1C) og 22. august 2025 (1i). For 1C ble det også gjort estimater for krysninger som kom til i ettertid. Beregningsmetodikk er iht. N200, med klimafaktor 1,4 og sikkerhetsfaktor 1,4. Dette basert på nedbørfelt under 10 km², antagelse om vegklasse V3 (samfunnskritisk vegstrekning uten direkte omkjøringsmulighet) og flomtall beregnet på noe usikkert grunnlag.
- De største vassdragskrysningene er dimensjonert i HEC-RAS 1D, basert på eksisterende terrenggrunnlag NDH DTM1, og gjeldende vegmodeller. (Vegmodell datert 6. mai 2025 for 1C og 21. august for 1i). Øvrige krysninger er dimensjonert med HY-8. Gjentetting er inkludert. Innmålinger av eksisterende situasjon har ikke vært tilgjengelig. Krysningene er oppsummert i Tabell 5-1 (1C) og Tabell 8-3 (1i). For 1i er det i tillegg beregnet maksimalvannmengder for teoretiske tilfeller der nedbørsfelt *ikke* avskjæres av Holsetervegen. Dette er en aktuell øvelse også for alternativ 1C, men tas ikke med i denne runden.
- Omfang av utfylling i Lågen er foreløpig uavklart. Foreløpige hydrauliske beregninger med kun vegfyllinga lagt inn, viser vannstandsending <1 cm og hastighetsøkning <0,05 m/s. Dette må riktignok verifiseres når det foreligger endelig utforming av utfyllingen. Utfyllingen må også erosjonssikres, hvilket må hensynta mange interesser, bl.a. fisk/vannmiljø.
- Det må generelt vurderes erosjonssikring ved alle nye vassdragskrysninger. Det gir riktignok mer mening å se på dette når plassering, geometri og landskapsutforming er mer låst.

10 Kilder

- Statens vegvesen - Vegnormal N200 Vegbygging (20.12.2024)
- Statens vegvesen - Vegnormal N400 Bruprosjektering (01.01.2025)
- Statens vegvesen - N-V240 Vannhåndtering (15.08.2023)
- Nevina (NVE) lastet april 2025
<http://nevina.nve.no/>
- NVE seriekart, lastet april 2025
<https://seriekart.nve.no/>
- Scalgo Live, mars 2025
[Norway · SCALGO Live](#)
- Fergus, T., Hoseth K.A., Sæterbø, E. 2010. «Vassdragshåndboka».
- NVE, Norconsult AS - [Flomsikring av Otta sentrum](#). Eksternrapport 8/2024.

11 Vedlegg

- Vedlegg 1: Generert rapport fra HY-8 for kryssninger på 1C
- Vedlegg 2: Generert rapport fra HY-8 for kryssninger på (kun) 1i

Vedlegg 1: HY-8 Culvert Analysis Report

Culvert Data: 590

Water Surface Profile Plot for Culvert: 590

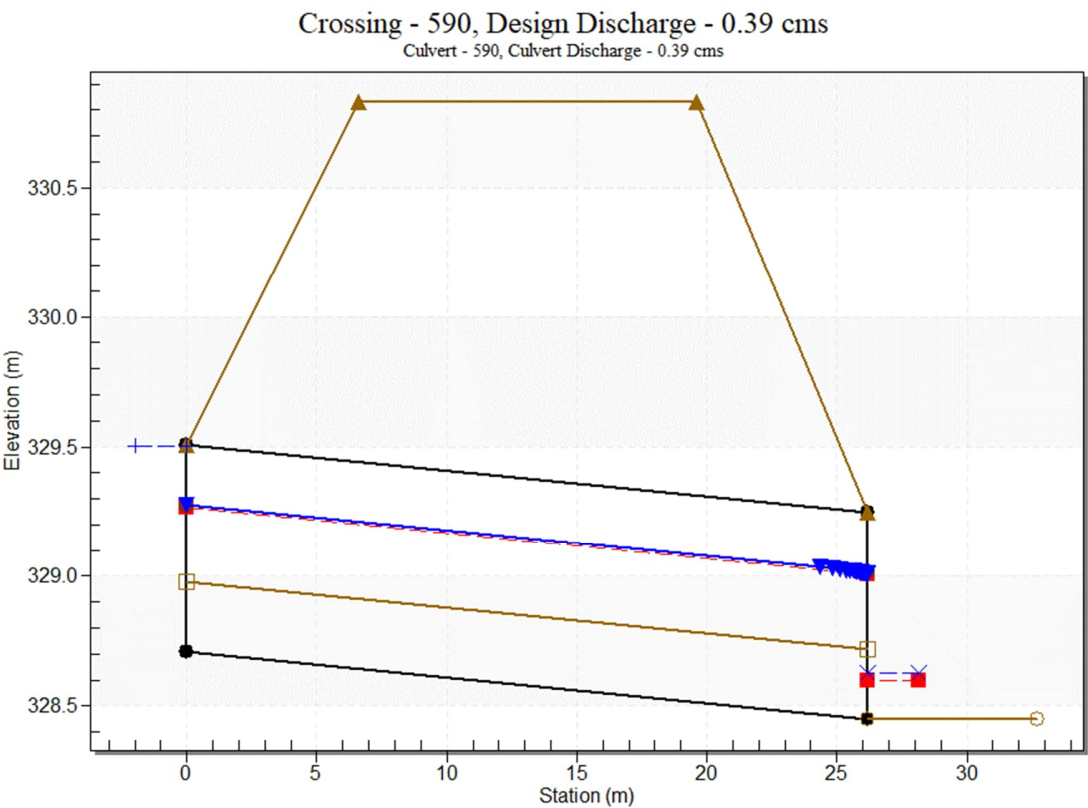


Table 2 - Culvert Summary Table: 590

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	329.19	0.21	0.209	2-M2c	0.12	0.12	0.12	0.08	1.07	0.58
0.29 cms	0.29 cms	329.41	0.42	0.426	2-M2c	0.24	0.24	0.24	0.15	1.55	0.85
0.39 cms	0.39 cms	329.50	0.52	0.522	2-M2c	0.30	0.29	0.29	0.18	1.74	0.94
0.67 cms	0.67 cms	329.88	0.90	0.790	7-M2c	0.53	0.40	0.40	0.24	2.24	1.12
0.86 cms	0.86 cms	330.22	1.24	1.233	7-M2c	0.53	0.45	0.45	0.28	2.62	1.21
1.05 cms	1.05 cms	330.71	1.69	1.726	7-M2c	0.53	0.49	0.49	0.31	3.07	1.29
1.24 cms	1.11 cms	330.87	1.86	1.890	7-M2c	0.53	0.49	0.49	0.34	3.23	1.36
1.43 cms	1.12 cms	330.90	1.89	1.921	7-M2c	0.53	0.50	0.50	0.37	3.25	1.42
1.62 cms	1.13 cms	330.93	1.92	1.946	7-M2c	0.53	0.50	0.50	0.40	3.27	1.47
1.81 cms	1.14 cms	330.95	1.94	1.968	7-M2c	0.53	0.50	0.50	0.42	3.29	1.52
2.00 cms	1.14 cms	330.97	1.96	1.988	7-M2c	0.53	0.50	0.50	0.44	3.31	1.56

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 328.98 m,

Outlet Elevation (invert): 328.72 m

Culvert Length: 26.18 m,

Culvert Slope: 0.0099

Site Data - 590

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 328.71 m

Outlet Station: 26.18 m

Outlet Elevation: 328.45 m

Number of Barrels: 1

Culvert Data Summary - 590

Barrel Shape: Circular

Barrel Diameter: 800.00 mm

Barrel Material: Concrete

Embedment: 270.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

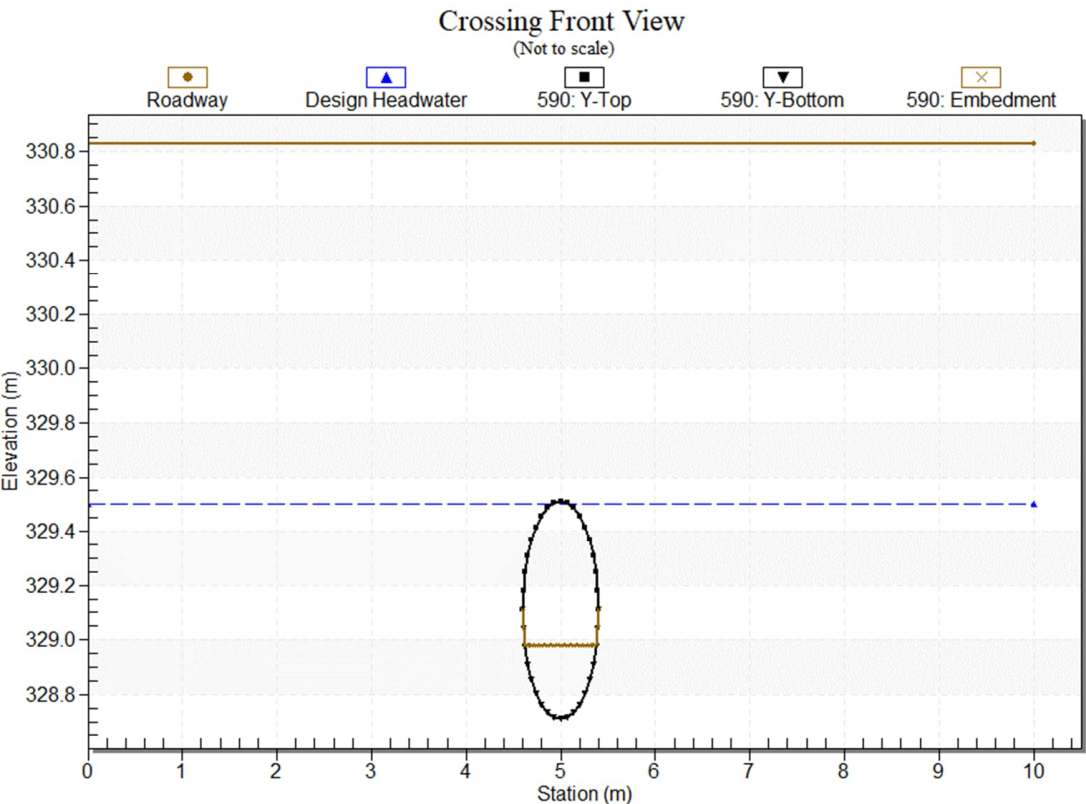
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 590



Tailwater Data for Crossing: 590

Table 2 - Downstream Channel Rating Curve (Crossing: 590)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	328.53	0.08	0.58	31.21	0.68
0.29	328.60	0.15	0.85	58.37	0.75
0.39	328.63	0.18	0.94	69.32	0.76
0.67	328.69	0.24	1.12	94.57	0.79
0.86	328.73	0.28	1.21	108.94	0.81
1.05	328.76	0.31	1.29	121.86	0.82
1.24	328.79	0.34	1.36	133.69	0.83
1.43	328.82	0.37	1.42	144.66	0.84
1.62	328.85	0.40	1.47	154.92	0.85
1.81	328.87	0.42	1.52	164.60	0.85
2.00	328.89	0.44	1.56	173.75	0.86

Tailwater Channel Data - 590

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0400

Channel Manning's n: 0.0600

Channel Invert Elevation: 328.45 m

Roadway Data for Crossing: 590

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 330.83 m

Roadway Surface: Paved

Roadway Top Width: 13.00 m

Crossing Data: 590

Crossing Notes:

Culvert Data: 940

Water Surface Profile Plot for Culvert: 940

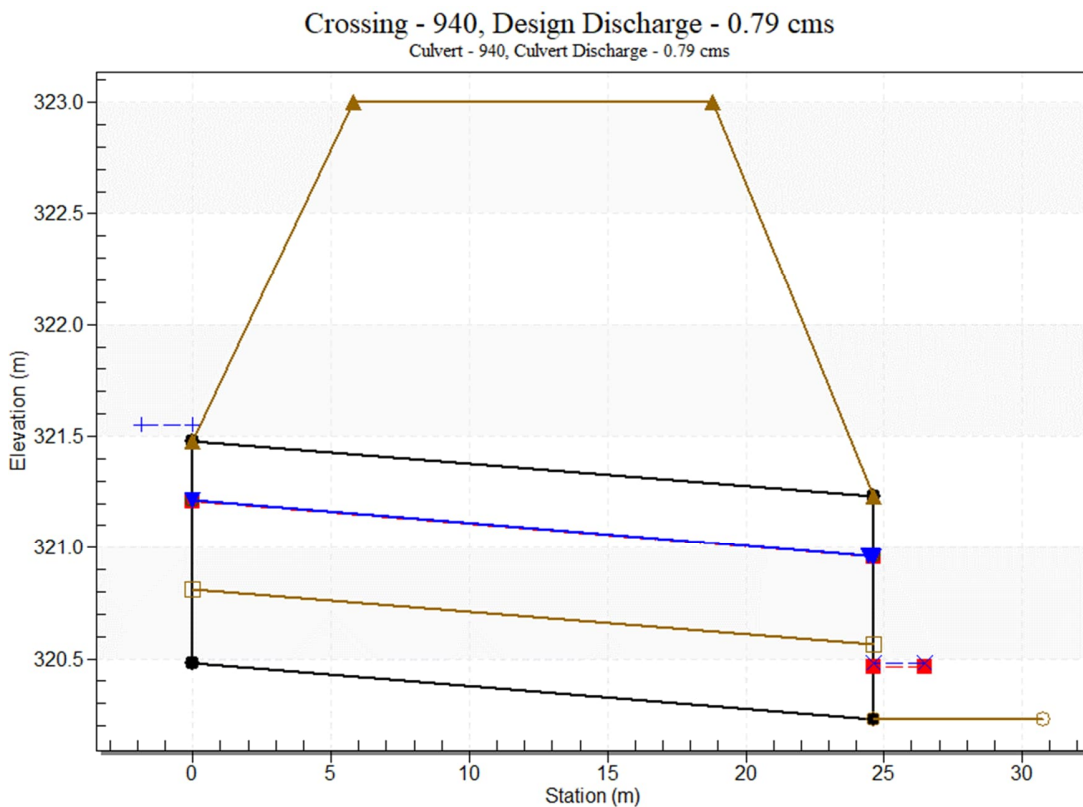


Table 3 - Culvert Summary Table: 940

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	321.00	0.18	0.182	2-M2c	0.10	0.10	0.10	0.07	1.00	0.62
0.29 cms	0.29 cms	321.17	0.36	0.003	1-S2n	0.20	0.21	0.20	0.14	1.44	0.91
0.48 cms	0.48 cms	321.31	0.50	0.156	1-S2n	0.28	0.29	0.28	0.19	1.73	1.08
0.67 cms	0.67 cms	321.45	0.64	0.330	1-S2n	0.35	0.36	0.35	0.23	1.93	1.21

0.79 cms	0.79 cms	321.55	0.74	0.729	7-M2c	0.40	0.40	0.40	0.25	2.06	1.27
1.05 cms	1.05 cms	321.79	0.98	0.895	7-M2c	0.51	0.47	0.47	0.29	2.35	1.39
1.24 cms	1.24 cms	322.01	1.19	1.031	7-M2c	0.67	0.52	0.52	0.32	2.58	1.47
1.43 cms	1.43 cms	322.25	1.44	1.284	7-M2c	0.67	0.56	0.56	0.35	2.82	1.53
1.62 cms	1.62 cms	322.53	1.72	1.574	7-M2c	0.67	0.59	0.59	0.37	3.09	1.59
1.81 cms	1.81 cms	322.85	2.04	1.876	7-M2c	0.67	0.61	0.61	0.39	3.38	1.64
2.00 cms	1.90 cms	323.03	2.22	2.025	7-M2c	0.67	0.62	0.62	0.42	3.52	1.69

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 320.81 m,

Outlet Elevation (invert): 320.56 m

Culvert Length: 24.62 m,

Culvert Slope: 0.0102

Site Data - 940

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 320.48 m

Outlet Station: 24.62 m

Outlet Elevation: 320.23 m

Number of Barrels: 1

Culvert Data Summary - 940

Barrel Shape: Circular

Barrel Diameter: 1000.00 mm

Barrel Material: Concrete

Embedment: 333.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

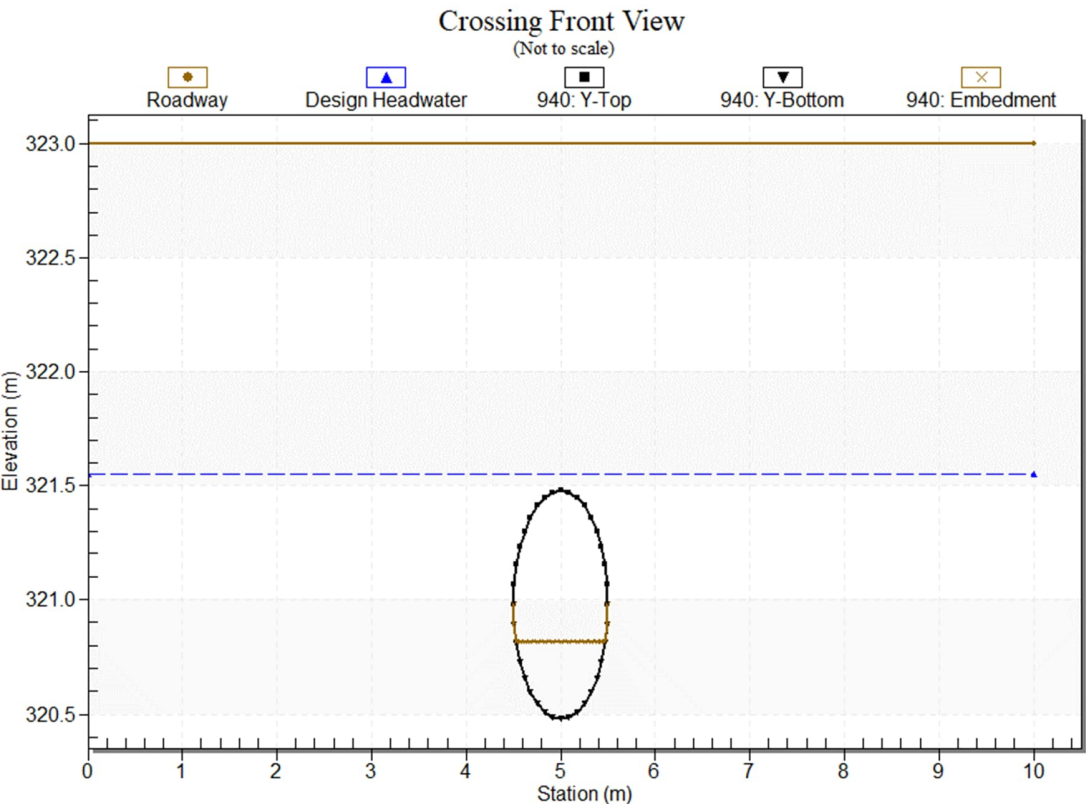
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 940



Tailwater Data for Crossing: 940

Table 3 - Downstream Channel Rating Curve (Crossing: 940)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	320.30	0.07	0.62	36.51	0.76
0.29	320.37	0.14	0.91	68.35	0.83
0.48	320.42	0.19	1.08	91.60	0.86
0.67	320.46	0.23	1.21	110.94	0.88
0.79	320.48	0.25	1.27	121.84	0.89
1.05	320.52	0.29	1.39	143.09	0.91
1.24	320.55	0.32	1.47	157.05	0.92
1.43	320.58	0.35	1.53	170.00	0.93
1.62	320.60	0.37	1.59	182.15	0.94
1.81	320.62	0.39	1.64	193.58	0.95
2.00	320.65	0.42	1.69	204.43	0.95

Tailwater Channel Data - 940

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0500

Channel Manning's n: 0.0600

Channel Invert Elevation: 320.23 m

Roadway Data for Crossing: 940

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 323.00 m

Roadway Surface: Paved

Roadway Top Width: 13.00 m

Crossing Data: 940

Crossing Notes:

Culvert Data: 1335

Water Surface Profile Plot for Culvert: 1335

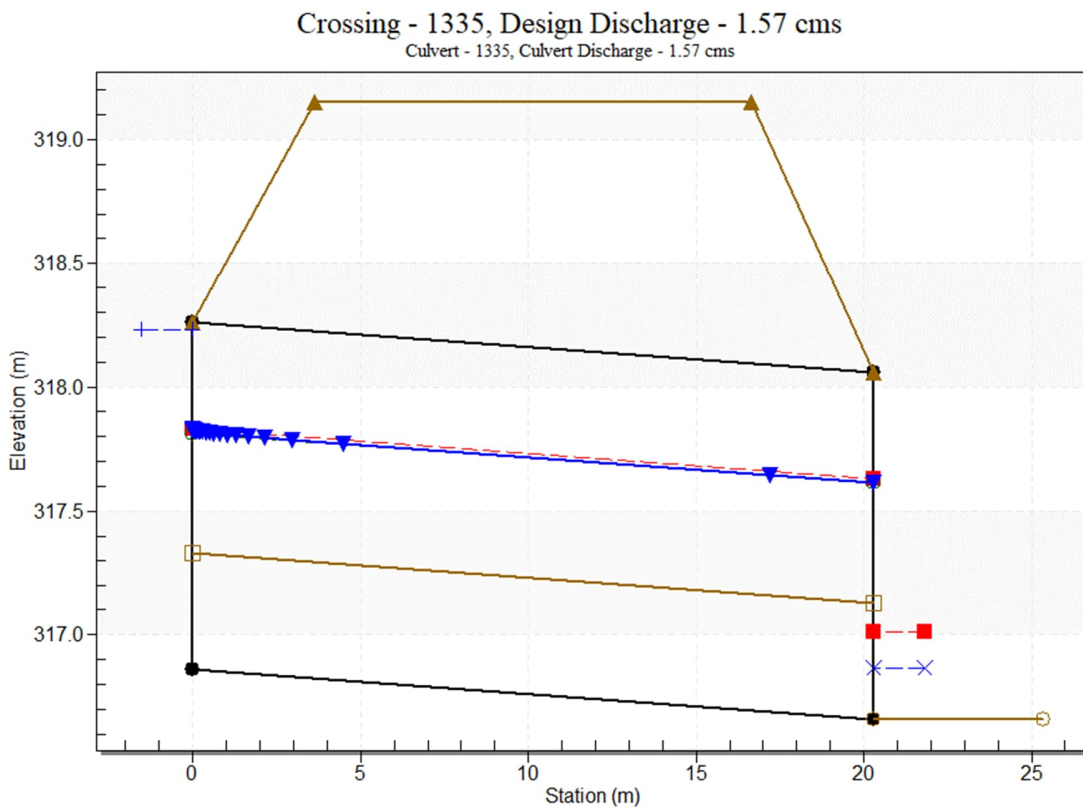


Table 4 - Culvert Summary Table: 1335

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	317.48	0.15	0.147	2-M2c	0.08	0.08	0.08	0.04	0.90	1.20
0.29 cms	0.29 cms	317.62	0.29	0.0*	1-S2n	0.16	0.17	0.16	0.08	1.31	1.78
0.48 cms	0.48 cms	317.73	0.40	0.058	1-S2n	0.23	0.23	0.23	0.10	1.55	2.14
0.67 cms	0.67 cms	317.83	0.50	0.138	1-S2n	0.28	0.29	0.28	0.12	1.75	2.41
0.86 cms	0.86 cms	317.92	0.59	0.219	1-S2n	0.33	0.34	0.33	0.14	1.92	2.62
1.05 cms	1.05 cms	318.00	0.68	0.302	1-S2n	0.37	0.39	0.37	0.16	2.06	2.81
1.24 cms	1.24 cms	318.08	0.76	0.389	1-S2n	0.41	0.43	0.41	0.18	2.18	2.97

1.43 cms	1.43 cms	318.17	0.84	0.480	1-S2n	0.46	0.47	0.46	0.19	2.29	3.11
1.57 cms	1.57 cms	318.23	0.90	0.549	1-S2n	0.49	0.50	0.49	0.20	2.36	3.21
1.81 cms	1.81 cms	318.35	1.02	0.675	5-S2n	0.54	0.55	0.54	0.22	2.47	3.36
2.00 cms	2.00 cms	318.45	1.12	0.779	5-S2n	0.58	0.59	0.58	0.23	2.55	3.47

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 317.33 m,

Outlet Elevation (invert): 317.13 m

Culvert Length: 20.29 m,

Culvert Slope: 0.0099

Site Data - 1335

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 316.86 m

Outlet Station: 20.29 m

Outlet Elevation: 316.66 m

Number of Barrels: 1

Culvert Data Summary - 1335

Barrel Shape: Circular

Barrel Diameter: 1400.00 mm

Barrel Material: Concrete

Embedment: 467.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

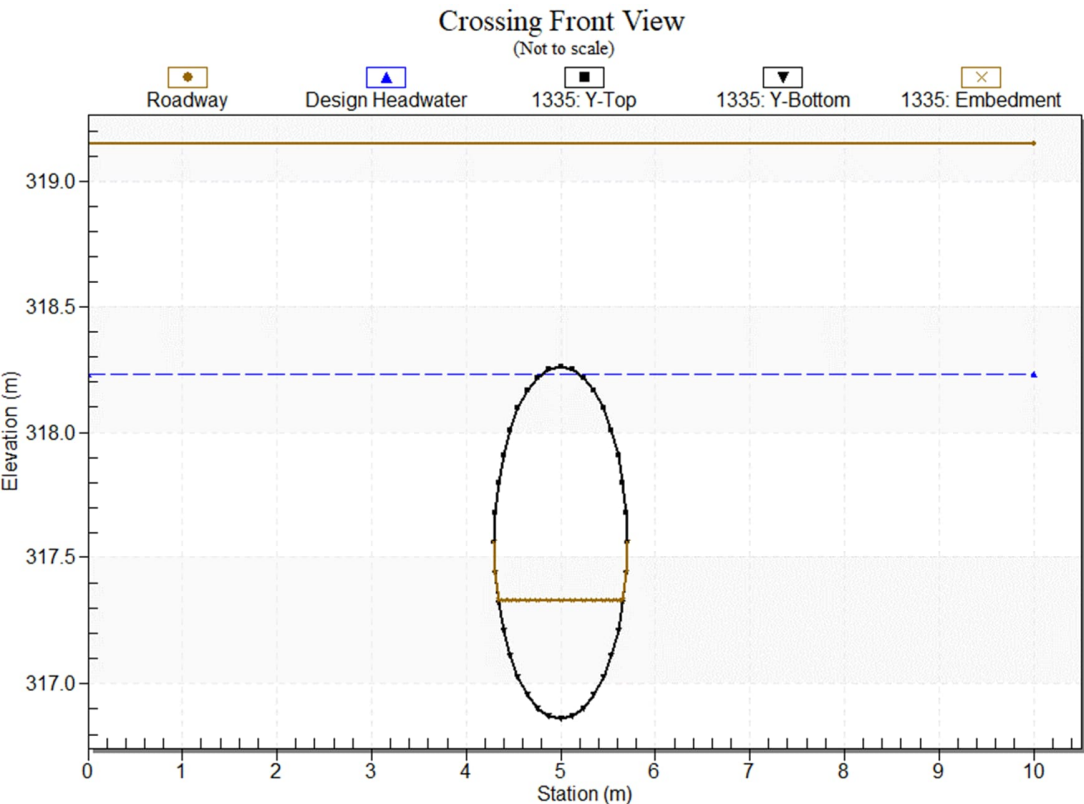
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 1335



Tailwater Data for Crossing: 1335

Table 4 - Downstream Channel Rating Curve (Crossing: 1335)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	316.70	0.04	1.20	157.25	1.95
0.29	316.74	0.08	1.78	296.40	2.14
0.48	316.76	0.10	2.14	399.36	2.24
0.67	316.78	0.12	2.41	485.78	2.30
0.86	316.80	0.14	2.62	562.10	2.35
1.05	316.82	0.16	2.81	631.43	2.38
1.24	316.84	0.18	2.97	695.37	2.41
1.43	316.85	0.19	3.11	754.94	2.44
1.57	316.86	0.20	3.21	796.74	2.46
1.81	316.88	0.22	3.36	864.47	2.48
2.00	316.89	0.23	3.47	915.16	2.50

Tailwater Channel Data - 1335

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.4000

Channel Manning's n: 0.0600

Channel Invert Elevation: 316.66 m

Roadway Data for Crossing: 1335

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 319.15 m

Roadway Surface: Paved

Roadway Top Width: 13.00 m

Crossing Data: 1335

Crossing Notes:

Culvert Data: 1780

Water Surface Profile Plot for Culvert: 1780

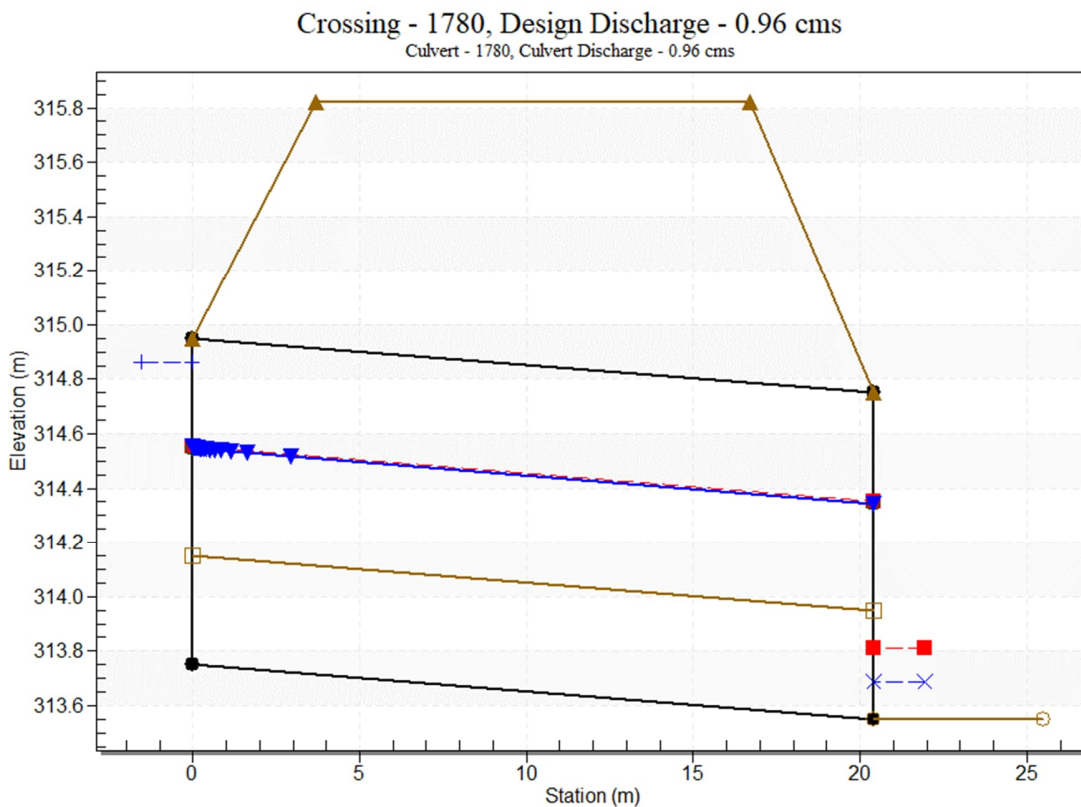


Table 5 - Culvert Summary Table: 1780

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	314.31	0.16	0.162	2-M2c	0.09	0.09	0.09	0.04	0.94	1.36
0.29 cms	0.29 cms	314.47	0.32	0.003	1-S2n	0.18	0.19	0.18	0.07	1.35	2.03
0.48 cms	0.48 cms	314.60	0.45	0.106	1-S2n	0.25	0.26	0.25	0.09	1.62	2.44
0.67 cms	0.67 cms	314.70	0.55	0.212	1-S2n	0.31	0.32	0.31	0.11	1.83	2.74
0.86 cms	0.86 cms	314.81	0.66	0.326	1-S2n	0.37	0.38	0.37	0.13	1.99	3.00
0.96 cms	0.96 cms	314.86	0.71	0.388	1-S2n	0.39	0.40	0.39	0.14	2.07	3.11
1.24 cms	1.24 cms	315.03	0.88	0.875	7-M2c	0.47	0.47	0.47	0.16	2.25	3.40

1.43 cms	1.43 cms	315.16	1.01	0.967	7-M2c	0.53	0.52	0.52	0.17	2.40	3.56
1.62 cms	1.62 cms	315.30	1.15	1.058	7-M2c	0.59	0.56	0.56	0.18	2.55	3.72
1.81 cms	1.81 cms	315.45	1.30	1.153	7-M2c	0.66	0.59	0.59	0.20	2.70	3.85
2.00 cms	2.00 cms	315.62	1.47	1.260	7-M2c	0.80	0.63	0.63	0.21	2.86	3.98

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 314.15 m,

Outlet Elevation (invert): 313.95 m

Culvert Length: 20.40 m,

Culvert Slope: 0.0098

Site Data - 1780

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 313.75 m

Outlet Station: 20.40 m

Outlet Elevation: 313.55 m

Number of Barrels: 1

Culvert Data Summary - 1780

Barrel Shape: Circular

Barrel Diameter: 1200.00 mm

Barrel Material: Concrete

Embedment: 400.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

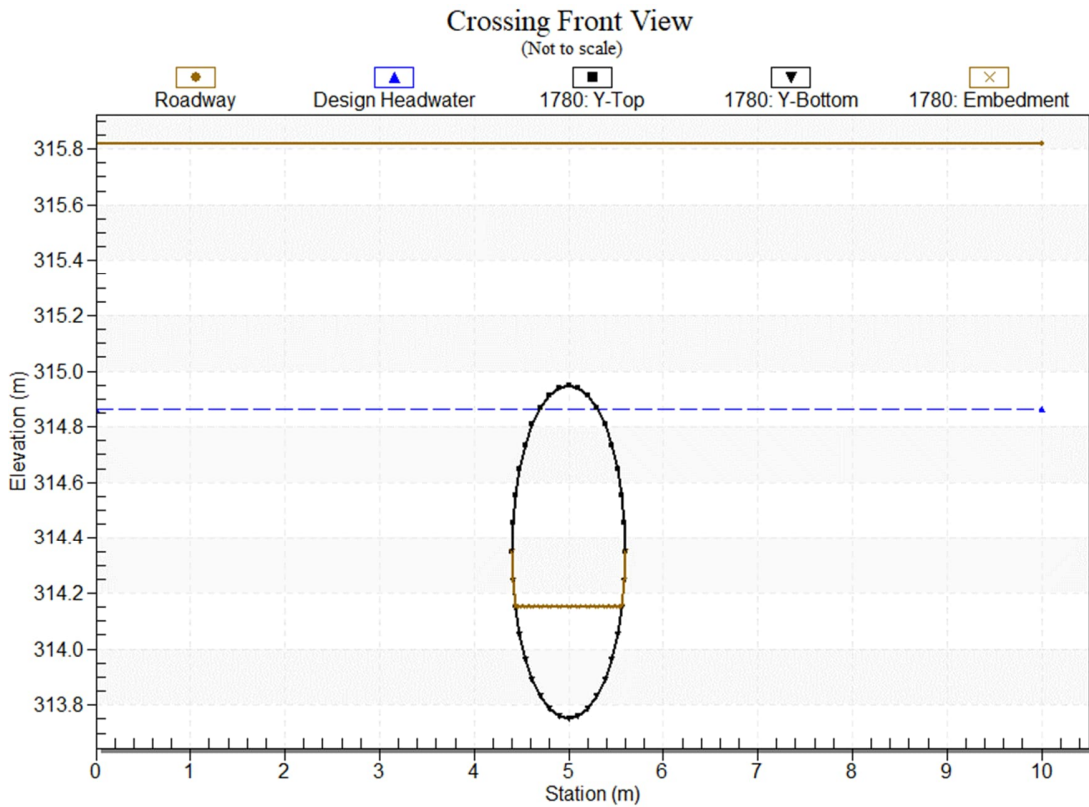
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 1780



Tailwater Data for Crossing: 1780

Table 5 - Downstream Channel Rating Curve (Crossing: 1780)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	313.59	0.04	1.36	209.07	2.34
0.29	313.62	0.07	2.03	394.24	2.58
0.48	313.64	0.09	2.44	531.50	2.69
0.67	313.66	0.11	2.74	646.83	2.77
0.86	313.68	0.13	3.00	748.98	2.83
0.96	313.69	0.14	3.11	798.80	2.85
1.24	313.71	0.16	3.40	927.26	2.91
1.43	313.72	0.17	3.56	1007.23	2.94
1.62	313.73	0.18	3.72	1082.60	2.97
1.81	313.75	0.20	3.85	1154.26	3.00
2.00	313.76	0.21	3.98	1222.43	3.02

Tailwater Channel Data - 1780

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (2:1)

Channel Slope: 0.6000

Channel Manning's n: 0.0600

Channel Invert Elevation: 313.55 m

Roadway Data for Crossing: 1780

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 315.82 m

Roadway Surface: Paved

Roadway Top Width: 13.00 m

Crossing Data: 1780

Crossing Notes:

Culvert Data: 2020

Water Surface Profile Plot for Culvert: 2020

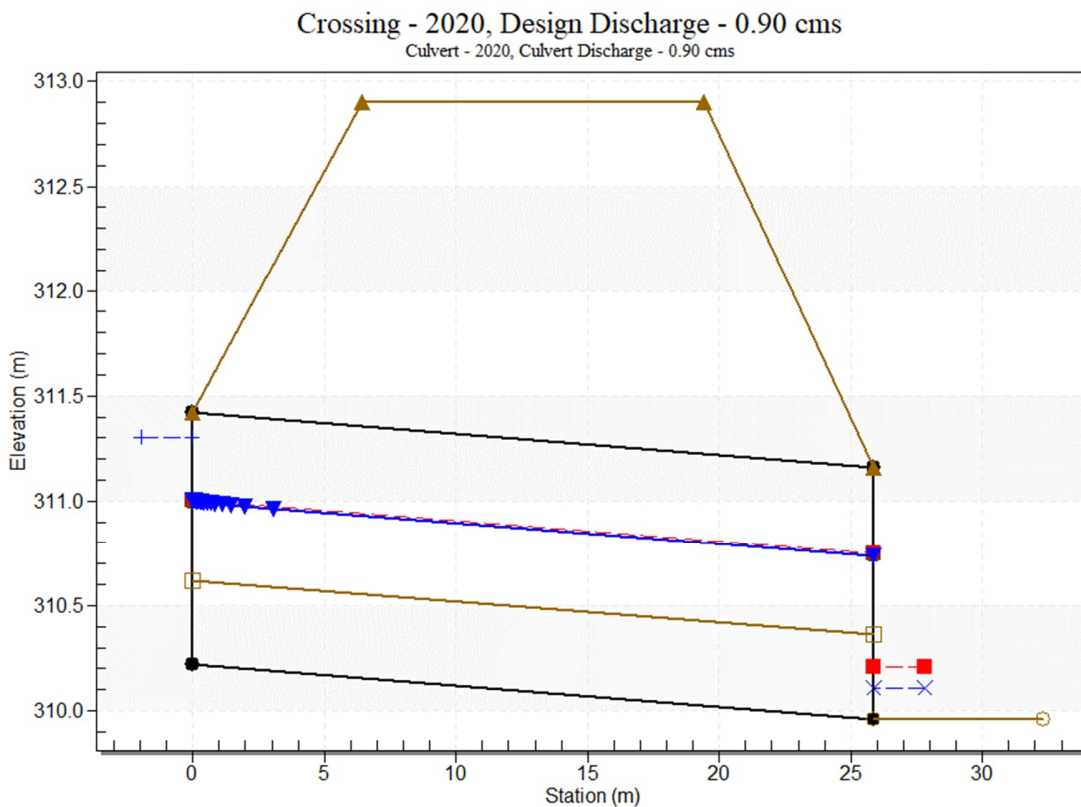


Table 6 - Culvert Summary Table: 2020

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	310.78	0.16	0.0*	1-S2n	0.09	0.09	0.09	0.04	0.94	1.20
0.29 cms	0.29 cms	310.94	0.32	0.0*	1-S2n	0.18	0.19	0.18	0.08	1.37	1.78
0.48 cms	0.48 cms	311.07	0.45	0.051	1-S2n	0.25	0.26	0.25	0.10	1.64	2.14
0.67 cms	0.67 cms	311.17	0.55	0.162	1-S2n	0.31	0.32	0.31	0.12	1.84	2.41
0.90 cms	0.90 cms	311.30	0.68	0.307	1-S2n	0.37	0.39	0.37	0.15	2.04	2.66
1.05 cms	1.05 cms	311.38	0.76	0.409	1-S2n	0.42	0.43	0.42	0.16	2.15	2.81
1.24 cms	1.24 cms	311.50	0.88	0.547	5-S2n	0.47	0.47	0.47	0.18	2.27	2.97

1.43 cms	1.43 cms	311.63	1.01	0.969	7-M2c	0.52	0.52	0.52	0.19	2.40	3.11
1.62 cms	1.62 cms	311.77	1.15	1.060	7-M2c	0.58	0.56	0.56	0.21	2.55	3.24
1.81 cms	1.81 cms	311.92	1.30	1.154	7-M2c	0.65	0.59	0.59	0.22	2.70	3.36
2.00 cms	2.00 cms	312.09	1.47	1.260	7-M2c	0.80	0.63	0.63	0.23	2.86	3.47

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 310.62 m,

Outlet Elevation (invert): 310.36 m

Culvert Length: 25.86 m,

Culvert Slope: 0.0101

Site Data - 2020

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 310.22 m

Outlet Station: 25.86 m

Outlet Elevation: 309.96 m

Number of Barrels: 1

Culvert Data Summary - 2020

Barrel Shape: Circular

Barrel Diameter: 1200.00 mm

Barrel Material: Concrete

Embedment: 400.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

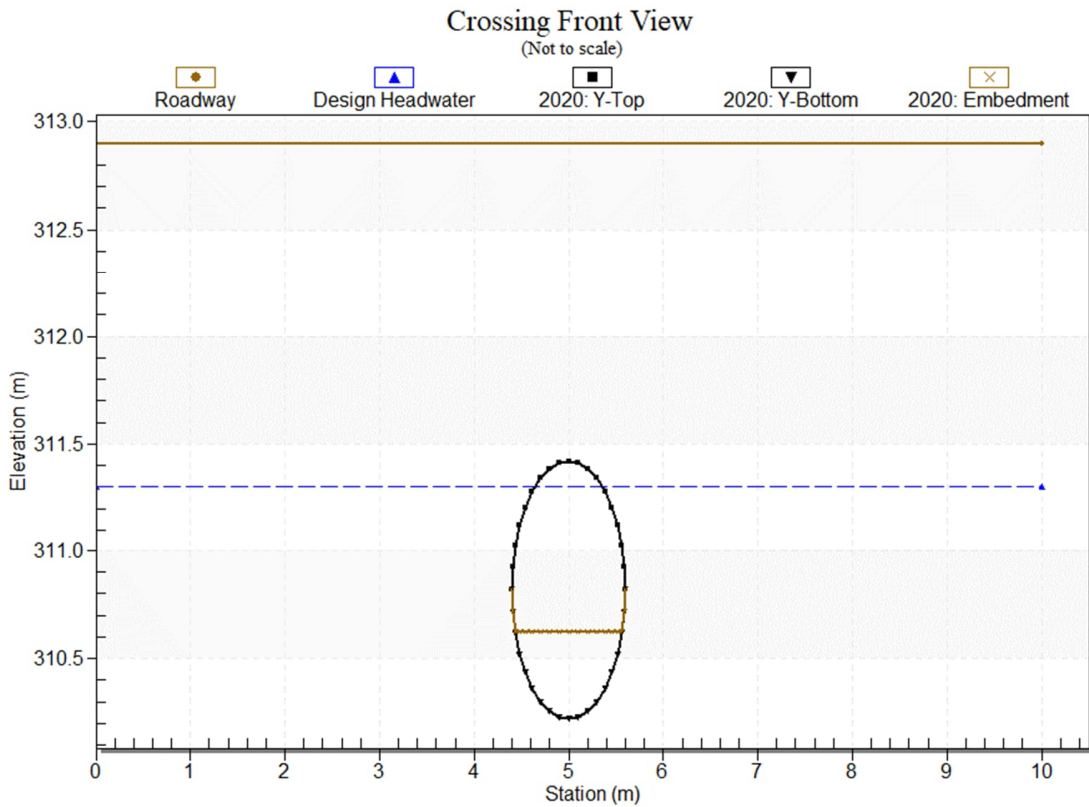
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 2020



Tailwater Data for Crossing: 2020

Table 6 - Downstream Channel Rating Curve (Crossing: 2020)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	310.00	0.04	1.20	157.25	1.95
0.29	310.04	0.08	1.78	296.40	2.14
0.48	310.06	0.10	2.14	399.36	2.24
0.67	310.08	0.12	2.41	485.78	2.30
0.90	310.11	0.15	2.66	577.25	2.35
1.05	310.12	0.16	2.81	631.43	2.38
1.24	310.14	0.18	2.97	695.37	2.41
1.43	310.15	0.19	3.11	754.94	2.44
1.62	310.17	0.21	3.24	811.16	2.46
1.81	310.18	0.22	3.36	864.47	2.48
2.00	310.19	0.23	3.47	915.16	2.50

Tailwater Channel Data - 2020

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (2:1)

Channel Slope: 0.4000

Channel Manning's n: 0.0600

Channel Invert Elevation: 309.96 m

Roadway Data for Crossing: 2020

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 312.90 m

Roadway Surface: Paved

Roadway Top Width: 13.00 m

Crossing Data: 2020

Crossing Notes:

Culvert Data: 2200

Water Surface Profile Plot for Culvert: 2200

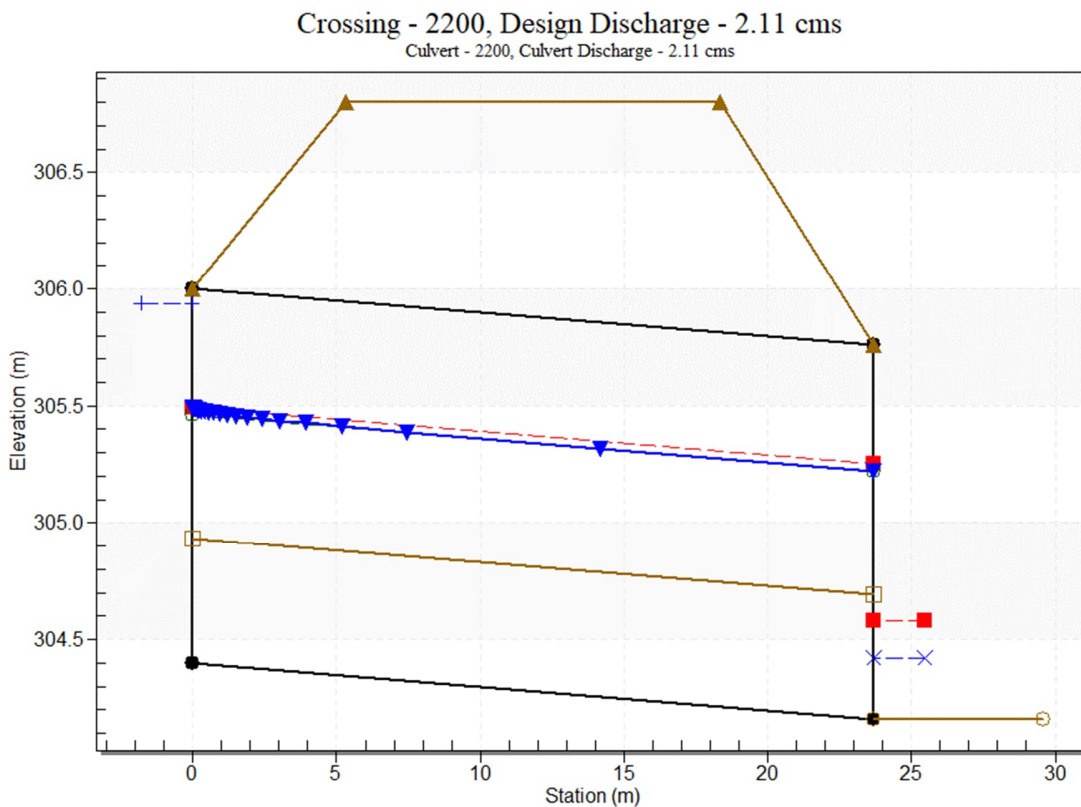


Table 7 - Culvert Summary Table: 2200

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	305.08	0.15	0.0*	1-S2n	0.08	0.08	0.08	0.04	0.86	1.10
0.49 cms	0.49 cms	305.31	0.37	0.0*	1-S2n	0.21	0.22	0.21	0.11	1.53	1.96
0.88 cms	0.88 cms	305.48	0.55	0.127	1-S2n	0.30	0.32	0.30	0.16	1.87	2.40
1.27 cms	1.27 cms	305.63	0.70	0.262	1-S2n	0.38	0.41	0.38	0.20	2.14	2.72
1.66 cms	1.66 cms	305.77	0.84	0.404	1-S2n	0.45	0.48	0.45	0.23	2.35	2.97
2.11 cms	2.11 cms	305.94	1.00	0.581	1-S2n	0.53	0.56	0.53	0.26	2.55	3.20
2.44 cms	2.44 cms	306.06	1.13	0.719	5-S2n	0.58	0.61	0.58	0.28	2.68	3.35

2.83 cms	2.83 cms	306.23	1.29	0.894	5-S2n	0.65	0.67	0.65	0.31	2.81	3.51
3.22 cms	3.22 cms	306.41	1.48	1.076	5-S2n	0.72	0.73	0.72	0.33	2.92	3.65
3.61 cms	3.61 cms	306.61	1.68	1.516	7-M2c	0.80	0.78	0.78	0.35	3.07	3.78
4.00 cms	3.97 cms	306.82	1.88	1.630	7-M2c	0.88	0.82	0.82	0.37	3.24	3.90

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 304.93 m,

Outlet Elevation (invert): 304.69 m

Culvert Length: 23.68 m,

Culvert Slope: 0.0101

Site Data - 2200

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 304.40 m

Outlet Station: 23.68 m

Outlet Elevation: 304.16 m

Number of Barrels: 1

Culvert Data Summary - 2200

Barrel Shape: Circular

Barrel Diameter: 1600.00 mm

Barrel Material: Concrete

Embedment: 533.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

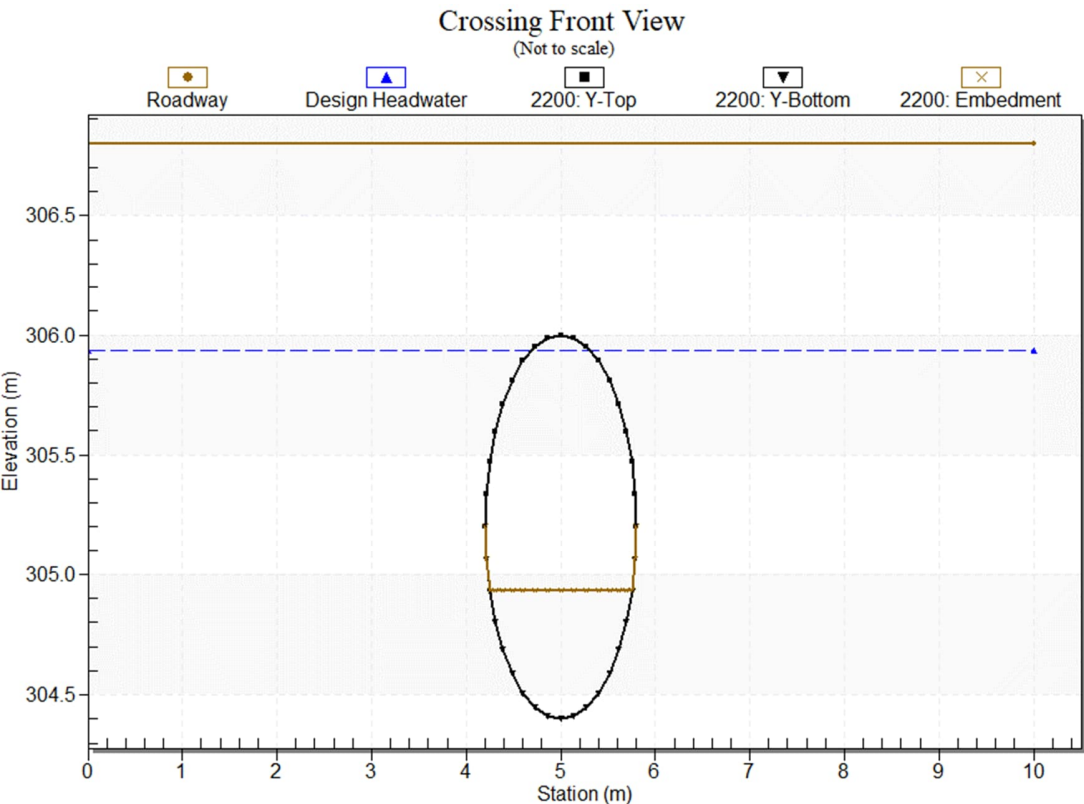
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 2200



Tailwater Data for Crossing: 2200

Table 7 - Downstream Channel Rating Curve (Crossing: 2200)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	304.20	0.04	1.10	128.52	1.71
0.49	304.27	0.11	1.96	329.93	1.96
0.88	304.32	0.16	2.40	464.61	2.06
1.27	304.36	0.20	2.72	574.51	2.12
1.66	304.39	0.23	2.97	669.88	2.16
2.11	304.42	0.26	3.20	767.86	2.20
2.44	304.44	0.28	3.35	833.45	2.22
2.83	304.47	0.31	3.51	905.79	2.25
3.22	304.49	0.33	3.65	973.51	2.27
3.61	304.51	0.35	3.78	1037.24	2.28
4.00	304.53	0.37	3.90	1097.63	2.30

Tailwater Channel Data - 2200

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.3000

Channel Manning's n: 0.0600

Channel Invert Elevation: 304.16 m

Roadway Data for Crossing: 2200

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 306.80 m

Roadway Surface: Paved

Roadway Top Width: 13.00 m

Crossing Data: 2200

Crossing Notes:

Culvert Data: 2325

Water Surface Profile Plot for Culvert: 2325

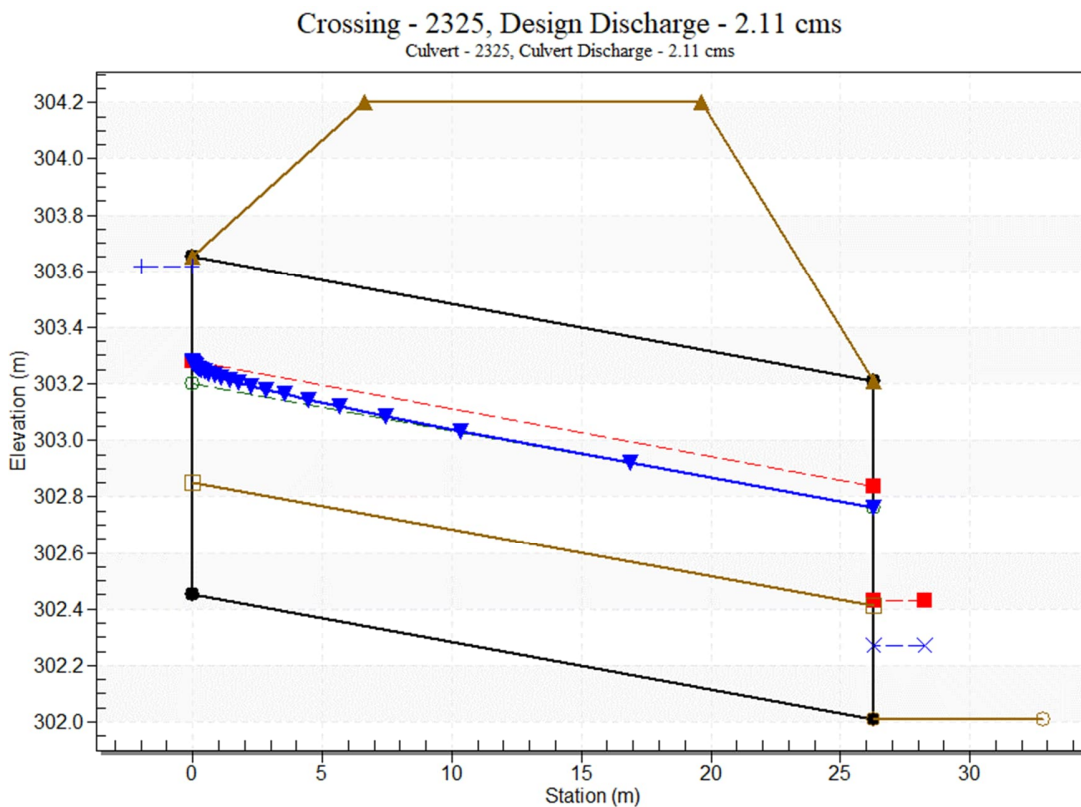


Table 8 - Culvert Summary Table: 2325

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	302.96	0.11	0.0*	1-S2n	0.05	0.06	0.05	0.04	0.86	1.10
0.49 cms	0.49 cms	303.13	0.28	0.0*	1-S2n	0.14	0.17	0.14	0.11	1.53	1.96
0.88 cms	0.88 cms	303.27	0.42	0.0*	1-S2n	0.20	0.24	0.20	0.16	1.86	2.40
1.27 cms	1.27 cms	303.38	0.53	0.0*	1-S2n	0.25	0.31	0.25	0.20	2.13	2.72
1.66 cms	1.66 cms	303.49	0.64	0.086	1-S2n	0.30	0.37	0.30	0.23	2.34	2.97
2.11 cms	2.11 cms	303.61	0.76	0.239	1-S2n	0.35	0.43	0.35	0.26	2.55	3.20
2.44 cms	2.44 cms	303.71	0.86	0.362	5-S2n	0.39	0.47	0.39	0.28	2.68	3.35

2.83 cms	2.83 cms	303.84	0.99	0.517	5-S2n	0.43	0.51	0.43	0.31	2.82	3.51
3.22 cms	3.22 cms	303.99	1.14	0.682	5-S2n	0.47	0.56	0.47	0.33	2.94	3.65
3.61 cms	3.61 cms	304.15	1.30	0.854	5-S2n	0.51	0.59	0.51	0.35	3.04	3.78
4.00 cms	3.84 cms	304.25	1.40	1.053	5-S2n	0.54	0.61	0.54	0.37	3.10	3.90

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 302.85 m,

Outlet Elevation (invert): 302.41 m

Culvert Length: 26.28 m,

Culvert Slope: 0.0167

Site Data - 2325

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 302.45 m

Outlet Station: 26.28 m

Outlet Elevation: 302.01 m

Number of Barrels: 2

Culvert Data Summary - 2325

Barrel Shape: Circular

Barrel Diameter: 1200.00 mm

Barrel Material: Concrete

Embedment: 400.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

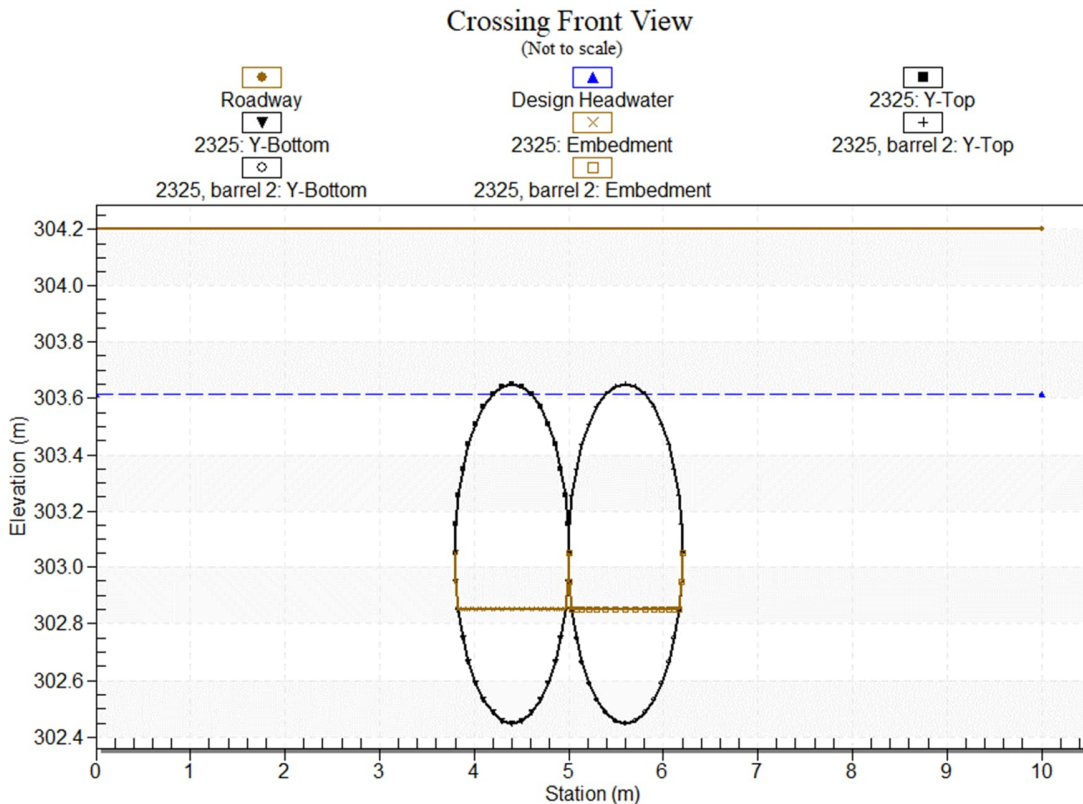
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 2325



Tailwater Data for Crossing: 2325

Table 8 - Downstream Channel Rating Curve (Crossing: 2325)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	302.05	0.04	1.10	128.52	1.71
0.49	302.12	0.11	1.96	329.93	1.96
0.88	302.17	0.16	2.40	464.61	2.06
1.27	302.21	0.20	2.72	574.51	2.12
1.66	302.24	0.23	2.97	669.88	2.16
2.11	302.27	0.26	3.20	767.86	2.20
2.44	302.29	0.28	3.35	833.45	2.22
2.83	302.32	0.31	3.51	905.79	2.25
3.22	302.34	0.33	3.65	973.51	2.27
3.61	302.36	0.35	3.78	1037.24	2.28
4.00	302.38	0.37	3.90	1097.63	2.30

Tailwater Channel Data - 2325

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.3000

Channel Manning's n: 0.0600

Channel Invert Elevation: 302.01 m

Roadway Data for Crossing: 2325

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 304.20 m

Roadway Surface: Paved

Roadway Top Width: 13.00 m

Crossing Data: 2325

Crossing Notes:

Culvert Data: 2525

Water Surface Profile Plot for Culvert: 2525

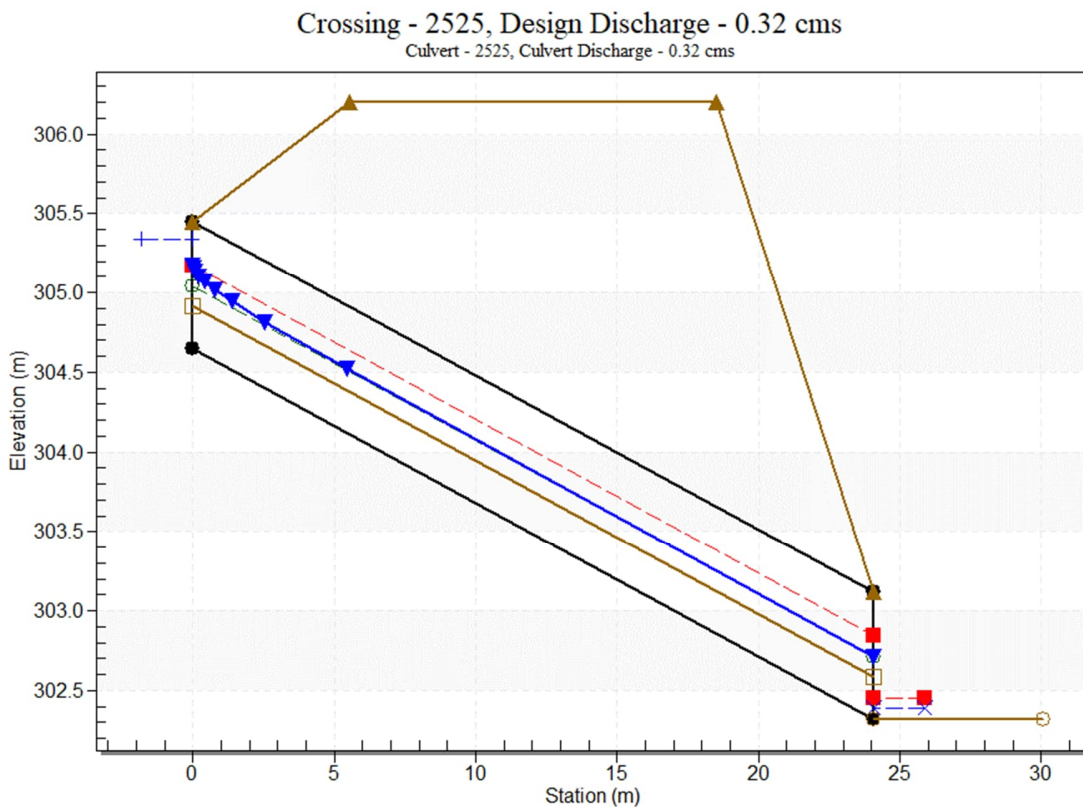


Table 9 - Culvert Summary Table: 2525

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	305.10	0.18	0.0*	1-S2n	0.06	0.12	0.06	0.03	2.19	1.48
0.19 cms	0.19 cms	305.21	0.29	0.0*	1-S2n	0.09	0.18	0.09	0.05	2.75	1.89
0.32 cms	0.32 cms	305.34	0.42	0.0*	1-S2n	0.12	0.25	0.12	0.07	3.29	2.30
0.37 cms	0.37 cms	305.39	0.48	0.0*	1-S2n	0.14	0.28	0.14	0.07	3.45	2.43
0.46 cms	0.46 cms	305.49	0.58	0.0*	5-S2n	0.16	0.32	0.16	0.08	3.73	2.63
0.55 cms	0.55 cms	305.61	0.69	0.0*	5-S2n	0.18	0.36	0.18	0.09	3.99	2.81
0.64 cms	0.64 cms	305.74	0.82	0.0*	5-S2n	0.19	0.39	0.19	0.10	4.22	2.96

0.73 cms	0.73 cms	305.88	0.97	0.0*	5-S2n	0.21	0.42	0.22	0.11	4.31	3.10
0.82 cms	0.82 cms	306.05	1.13	0.0*	5-S2n	0.23	0.44	0.23	0.11	4.60	3.23
0.91 cms	0.90 cms	306.21	1.29	0.0*	5-S2n	0.24	0.46	0.24	0.12	4.75	3.35
1.00 cms	0.91 cms	306.23	1.31	0.0*	5-S2n	0.24	0.46	0.24	0.13	4.77	3.47

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 304.92 m,

Outlet Elevation (invert): 302.59 m

Culvert Length: 24.18 m,

Culvert Slope: 0.0968

Site Data - 2525

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 304.65 m

Outlet Station: 24.07 m

Outlet Elevation: 302.32 m

Number of Barrels: 1

Culvert Data Summary - 2525

Barrel Shape: Circular

Barrel Diameter: 800.00 mm

Barrel Material: Concrete

Embedment: 267.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

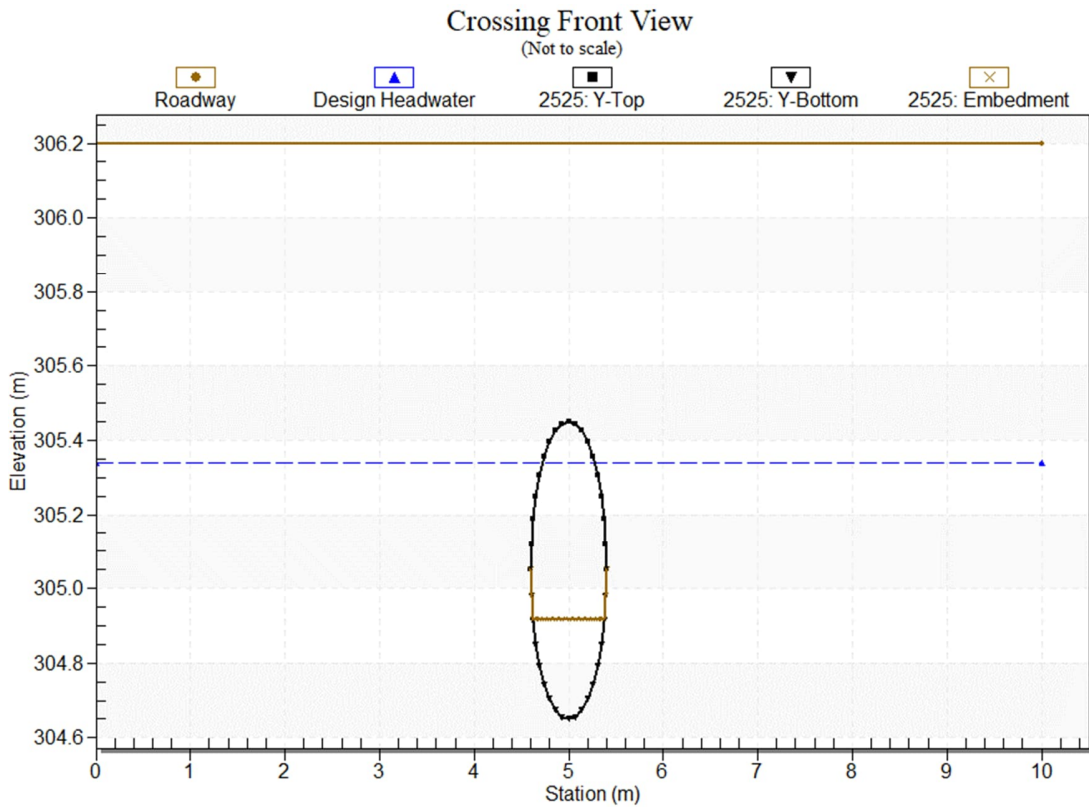
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 2525



Tailwater Data for Crossing: 2525

Table 9 - Downstream Channel Rating Curve (Crossing: 2525)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	302.35	0.03	1.48	255.82	2.66
0.19	302.37	0.05	1.89	375.38	2.83
0.32	302.39	0.07	2.30	511.70	2.96
0.37	302.39	0.07	2.43	557.78	3.00
0.46	302.40	0.08	2.63	634.67	3.06
0.55	302.41	0.09	2.81	705.24	3.11
0.64	302.42	0.10	2.96	771.33	3.15
0.73	302.43	0.11	3.10	833.47	3.18
0.82	302.43	0.11	3.23	892.45	3.21
0.91	302.44	0.12	3.35	948.83	3.24
1.00	302.45	0.13	3.47	1002.72	3.27

Tailwater Channel Data - 2525

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.8000

Channel Manning's n: 0.0600

Channel Invert Elevation: 302.32 m

Roadway Data for Crossing: 2525

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 306.20 m

Roadway Surface: Paved

Roadway Top Width: 13.00 m

Crossing Data: 2525

Crossing Notes:

Culvert Data: 2660+2790

Water Surface Profile Plot for Culvert: 2660+2790

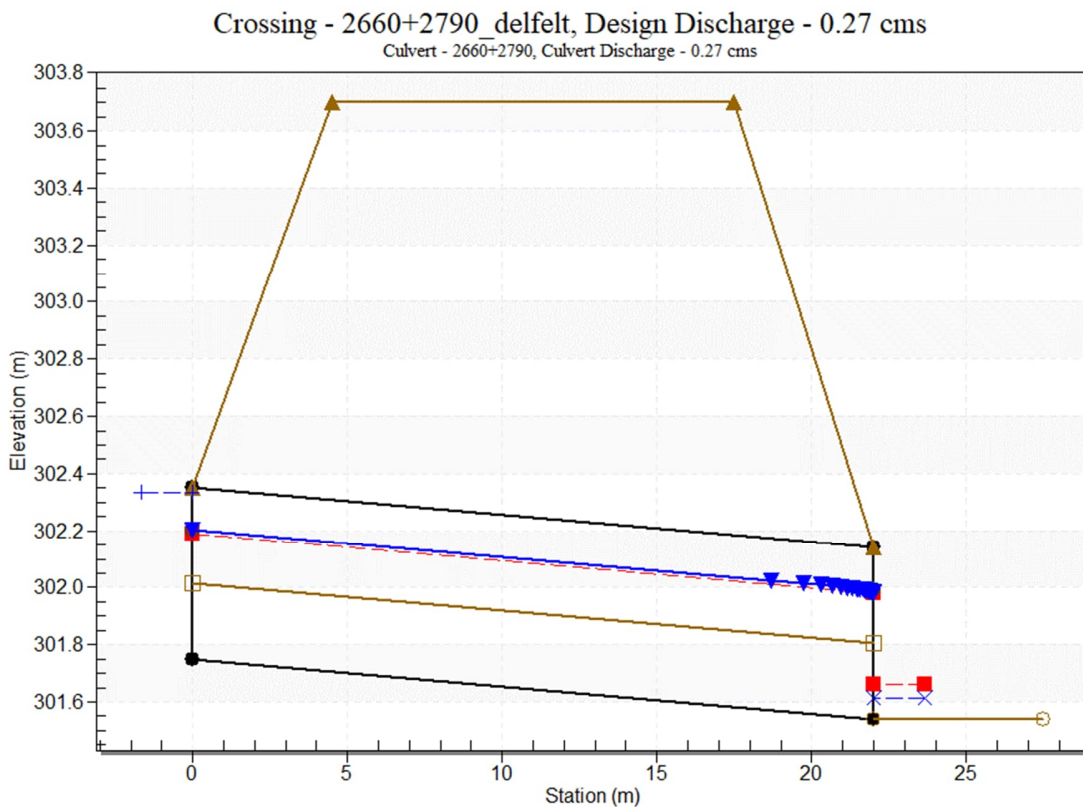


Table 10 - Culvert Summary Table: 2660+2790

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	302.17	0.15	0.157	2-M2c	0.09	0.09	0.09	0.04	0.94	1.20
0.19 cms	0.19 cms	302.26	0.24	0.244	2-M2c	0.14	0.14	0.14	0.06	1.18	1.53
0.27 cms	0.27 cms	302.33	0.31	0.316	2-M2c	0.19	0.17	0.17	0.07	1.37	1.75
0.37 cms	0.37 cms	302.43	0.41	0.393	7-M2c	0.24	0.21	0.21	0.09	1.56	1.95
0.46 cms	0.46 cms	302.53	0.52	0.478	7-M2c	0.33	0.24	0.24	0.10	1.73	2.11
0.55 cms	0.55 cms	302.71	0.65	0.696	7-M2c	0.33	0.27	0.27	0.11	1.92	2.24
0.64 cms	0.64 cms	302.94	0.80	0.921	7-M2c	0.33	0.28	0.28	0.12	2.13	2.37

0.73 cms	0.73 cms	303.18	0.97	1.161	7-M2c	0.33	0.30	0.30	0.13	2.37	2.48
0.82 cms	0.82 cms	303.45	1.18	1.429	7-M2c	0.33	0.31	0.31	0.14	2.61	2.58
0.91 cms	0.90 cms	303.71	1.40	1.692	7-M2c	0.33	0.31	0.31	0.15	2.84	2.67
1.00 cms	0.90 cms	303.73	1.42	1.716	7-M2c	0.33	0.31	0.31	0.16	2.86	2.76

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 302.02 m,

Outlet Elevation (invert): 301.81 m

Culvert Length: 22.00 m,

Culvert Slope: 0.0095

Site Data - 2660+2790

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 301.75 m

Outlet Station: 22.00 m

Outlet Elevation: 301.54 m

Number of Barrels: 2

Culvert Data Summary - 2660+2790

Barrel Shape: Circular

Barrel Diameter: 600.00 mm

Barrel Material: Concrete

Embedment: 267.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

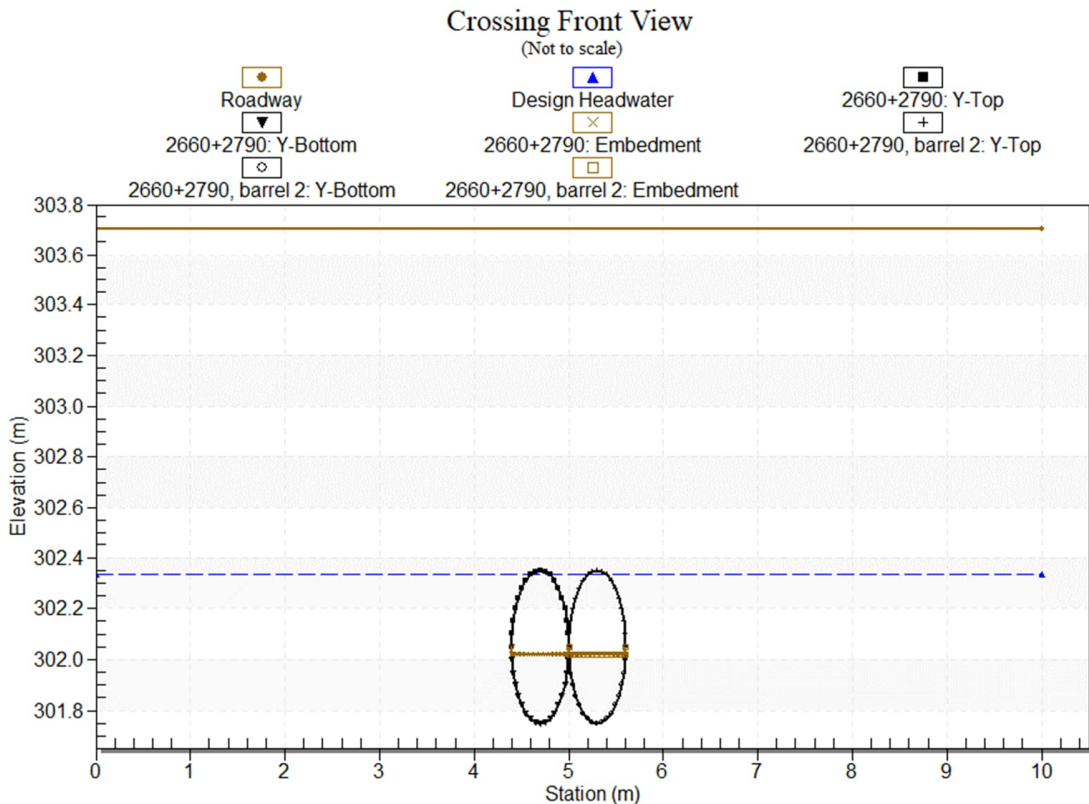
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 2660+2790_delfelt



Tailwater Data for Crossing: 2660+2790_delfelt

Table 10 - Downstream Channel Rating Curve (Crossing: 2660+2790_delfelt)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	301.58	0.04	1.20	157.25	1.95
0.19	301.60	0.06	1.53	230.57	2.06
0.27	301.61	0.07	1.75	287.32	2.13
0.37	301.63	0.09	1.95	342.48	2.19
0.46	301.64	0.10	2.11	389.35	2.23
0.55	301.65	0.11	2.24	432.67	2.26
0.64	301.66	0.12	2.37	472.96	2.29
0.73	301.67	0.13	2.48	510.83	2.31
0.82	301.68	0.14	2.58	546.66	2.34
0.91	301.69	0.15	2.67	581.03	2.36
1.00	301.70	0.16	2.76	613.81	2.37

Tailwater Channel Data - 2660+2790 delfelt

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (2:1)

Channel Slope: 0.4000

Channel Manning's n: 0.0600

Channel Invert Elevation: 301.54 m

Roadway Data for Crossing: 2660+2790_delfelt

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 303.70 m

Roadway Surface: Paved

Roadway Top Width: 13.00 m

Crossing Data: 2660+2790_delfelt

Crossing Notes:

Culvert Data: 3075

Water Surface Profile Plot for Culvert: 3075

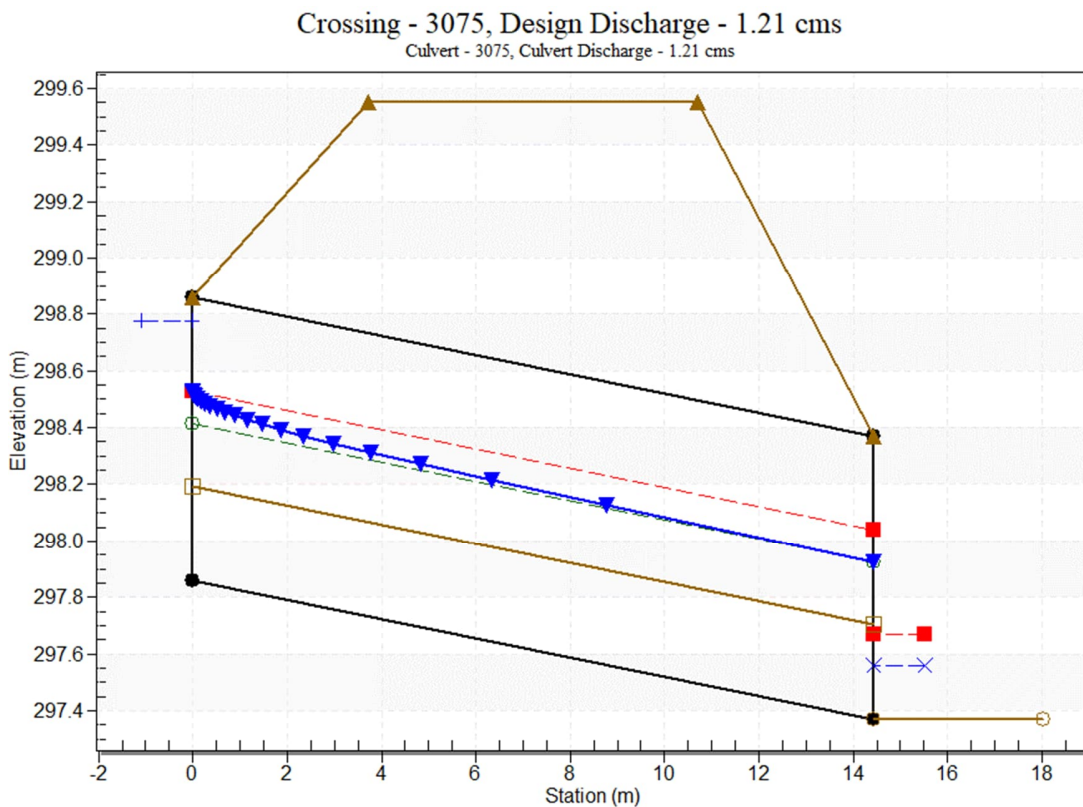


Table 11 - Culvert Summary Table: 3075

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	298.30	0.11	0.0*	1-S2n	0.05	0.07	0.05	0.04	1.14	1.10
0.29 cms	0.29 cms	298.41	0.22	0.0*	1-S2n	0.09	0.13	0.09	0.08	1.67	1.63
0.48 cms	0.48 cms	298.50	0.31	0.0*	1-S2n	0.12	0.18	0.12	0.11	2.00	1.95
0.67 cms	0.67 cms	298.58	0.39	0.0*	1-S2n	0.15	0.23	0.15	0.13	2.24	2.19
0.86 cms	0.86 cms	298.65	0.46	0.0*	1-S2n	0.18	0.27	0.18	0.16	2.41	2.39
1.05 cms	1.05 cms	298.72	0.53	0.0*	1-S2n	0.20	0.31	0.21	0.18	2.59	2.55
1.21 cms	1.21 cms	298.78	0.58	0.0*	1-S2n	0.22	0.33	0.22	0.19	2.77	2.68

1.43 cms	1.43 cms	298.86	0.67	0.092	5-S2n	0.25	0.37	0.25	0.21	2.88	2.83
1.62 cms	1.62 cms	298.94	0.75	0.180	5-S2n	0.27	0.40	0.28	0.22	2.97	2.94
1.81 cms	1.81 cms	299.02	0.83	0.274	5-S2n	0.29	0.43	0.30	0.24	3.11	3.05
2.00 cms	2.00 cms	299.11	0.92	0.369	5-S2n	0.31	0.46	0.32	0.25	3.20	3.15

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 298.19 m,

Outlet Elevation (invert): 297.70 m

Culvert Length: 14.44 m,

Culvert Slope: 0.0340

Site Data - 3075

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 297.86 m

Outlet Station: 14.43 m

Outlet Elevation: 297.37 m

Number of Barrels: 2

Culvert Data Summary - 3075

Barrel Shape: Circular

Barrel Diameter: 1000.00 mm

Barrel Material: Concrete

Embedment: 333.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

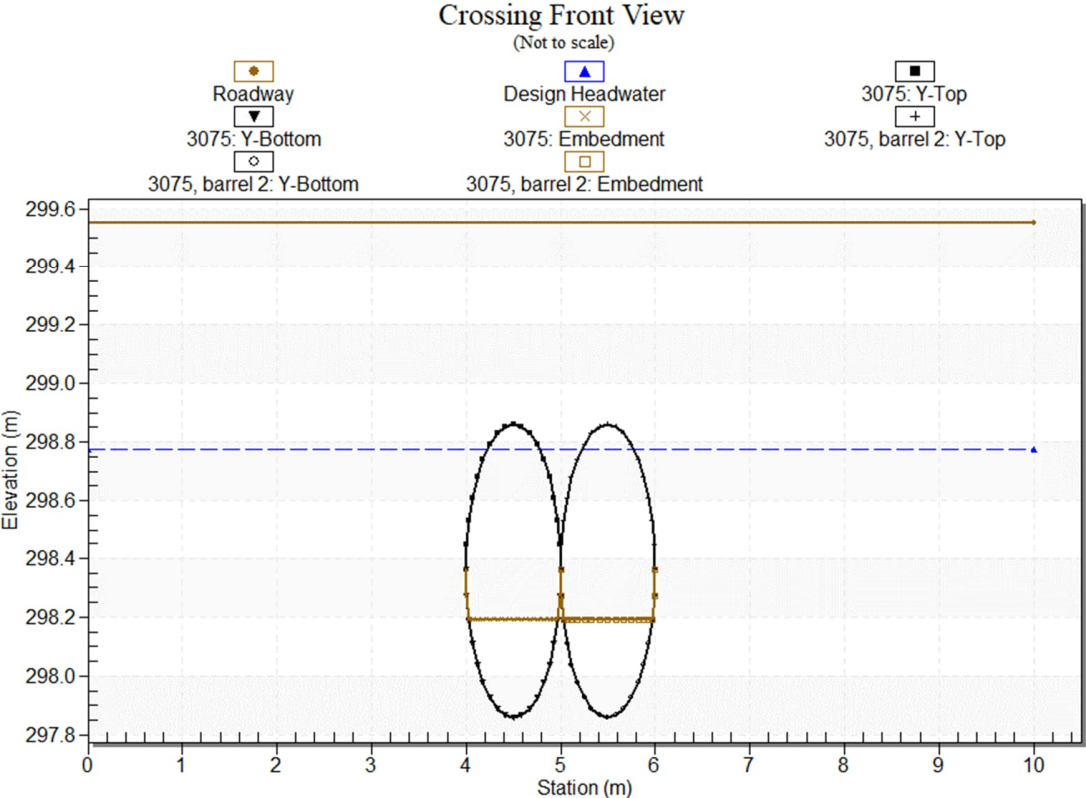
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 3075



Tailwater Data for Crossing: 3075

Table 11 - Downstream Channel Rating Curve (Crossing: 3075)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	297.41	0.04	1.10	128.52	1.71
0.29	297.45	0.08	1.63	242.15	1.88
0.48	297.48	0.11	1.95	325.88	1.96
0.67	297.50	0.13	2.19	396.34	2.01
0.86	297.53	0.16	2.39	458.50	2.05
1.05	297.55	0.18	2.55	514.76	2.09
1.21	297.56	0.19	2.68	558.78	2.11
1.43	297.58	0.21	2.83	615.04	2.14
1.62	297.59	0.22	2.94	660.70	2.16
1.81	297.61	0.24	3.05	703.85	2.17
2.00	297.62	0.25	3.15	744.92	2.19

Tailwater Channel Data - 3075

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.3000

Channel Manning's n: 0.0600

Channel Invert Elevation: 297.37 m

Roadway Profile Shape: Constant Roadway Elevation

Crest Elevation: 299.55 m

Roadway Top Width: 7.00 m

Crossing Notes:

Water Surface Profile Plot for Culvert: 3250



Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	307.10	0.18	0.0*	1-S2n	0.06	0.12	0.06	0.05	2.23	0.88
0.19 cms	0.19 cms	307.21	0.29	0.0*	1-S2n	0.09	0.18	0.09	0.08	2.80	1.12
0.28 cms	0.28 cms	307.30	0.38	0.0*	1-S2n	0.11	0.23	0.11	0.10	3.20	1.29
0.34 cms	0.34 cms	307.36	0.44	0.0*	1-S2n	0.13	0.26	0.13	0.11	3.42	1.38
0.46 cms	0.46 cms	307.49	0.57	0.0*	5-S2n	0.15	0.32	0.15	0.13	3.81	1.53
0.55 cms	0.55 cms	307.61	0.69	0.0*	5-S2n	0.17	0.36	0.17	0.15	4.07	1.63
0.64 cms	0.62 cms	307.71	0.79	0.0*	5-S2n	0.19	0.38	0.19	0.16	4.25	1.72

0.73 cms	0.64 cms	307.73	0.81	0.0*	5-S2n	0.19	0.39	0.19	0.17	4.29	1.79
0.82 cms	0.65 cms	307.75	0.83	0.0*	5-S2n	0.19	0.39	0.19	0.19	4.31	1.87
0.91 cms	0.66 cms	307.76	0.85	0.0*	5-S2n	0.19	0.40	0.19	0.20	4.33	1.93
1.00 cms	0.66 cms	307.77	0.86	0.0*	5-S2n	0.19	0.40	0.19	0.21	4.35	1.99

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 306.92 m,

Outlet Elevation (invert): 304.21 m

Culvert Length: 26.62 m,

Culvert Slope: 0.1023

Site Data - 3250

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 306.65 m

Outlet Station: 26.48 m

Outlet Elevation: 303.94 m

Number of Barrels: 1

Culvert Data Summary - 3250

Barrel Shape: Circular

Barrel Diameter: 800.00 mm

Barrel Material: Concrete

Embedment: 267.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

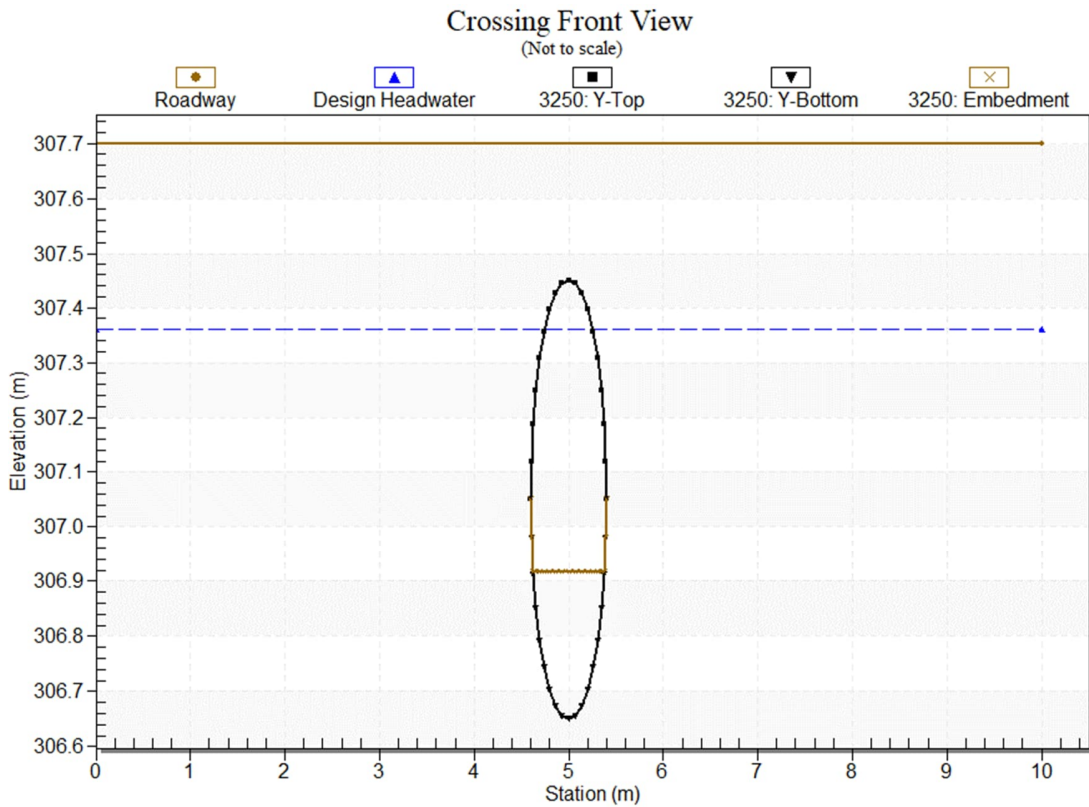
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 3250



Tailwater Data for Crossing: 3250

Table 12 - Downstream Channel Rating Curve (Crossing: 3250)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	303.99	0.05	0.88	79.06	1.25
0.19	304.02	0.08	1.12	115.69	1.32
0.28	304.04	0.10	1.29	145.51	1.36
0.34	304.05	0.11	1.38	163.14	1.39
0.46	304.07	0.13	1.53	194.78	1.42
0.55	304.09	0.15	1.63	216.19	1.44
0.64	304.10	0.16	1.72	236.13	1.46
0.73	304.11	0.17	1.79	254.87	1.47
0.82	304.13	0.19	1.87	272.62	1.49
0.91	304.14	0.20	1.93	289.44	1.50
1.00	304.15	0.21	1.99	305.61	1.51

Tailwater Channel Data - 3250

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.1500

Channel Manning's n: 0.0600

Channel Invert Elevation: 303.94 m

Roadway Data for Crossing: 3250

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 307.70 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 3250

Crossing Notes:

Culvert Data: 3380

Water Surface Profile Plot for Culvert: 3380

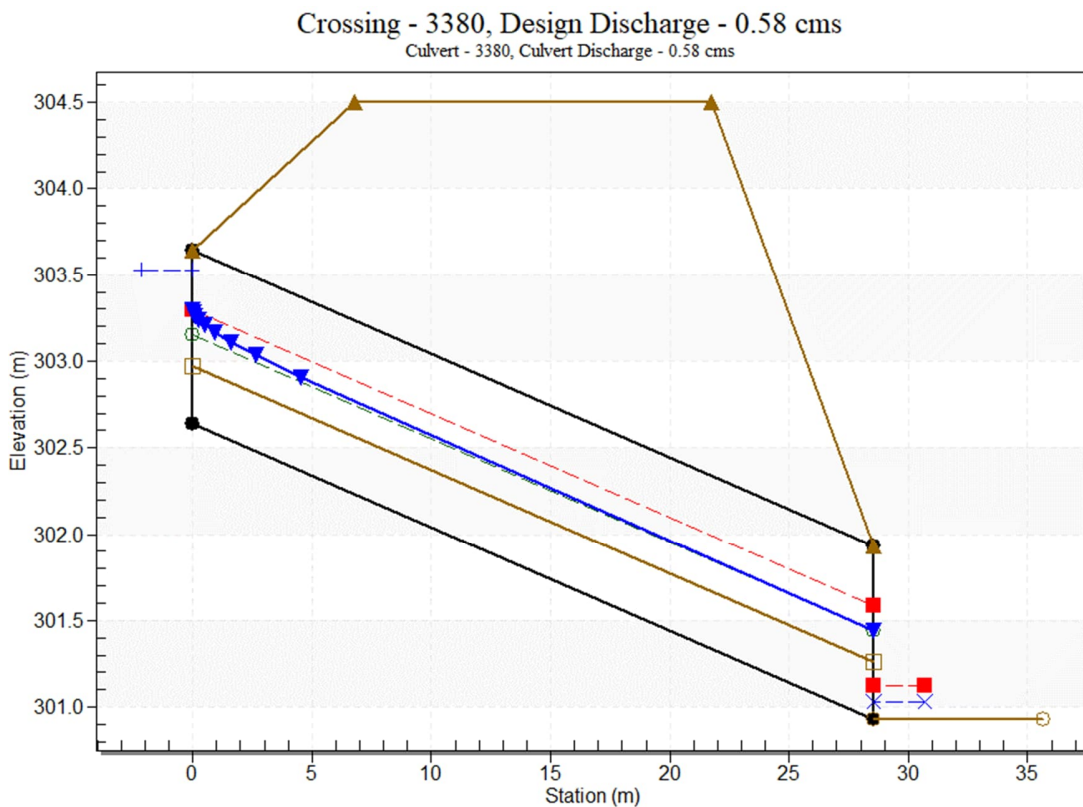


Table 13 - Culvert Summary Table: 3380

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	303.13	0.16	0.0*	1-S2n	0.06	0.10	0.06	0.04	1.76	1.36
0.19 cms	0.19 cms	303.23	0.26	0.0*	1-S2n	0.09	0.16	0.09	0.05	2.21	1.73
0.28 cms	0.28 cms	303.31	0.34	0.0*	1-S2n	0.11	0.20	0.11	0.07	2.54	2.00
0.37 cms	0.37 cms	303.38	0.41	0.0*	1-S2n	0.14	0.24	0.14	0.08	2.79	2.22
0.46 cms	0.46 cms	303.44	0.47	0.0*	1-S2n	0.16	0.28	0.16	0.09	3.01	2.40
0.58 cms	0.58 cms	303.53	0.56	0.0*	1-S2n	0.18	0.33	0.18	0.10	3.27	2.61
0.64 cms	0.64 cms	303.57	0.60	0.0*	1-S2n	0.19	0.35	0.19	0.11	3.39	2.70

0.73 cms	0.73 cms	303.64	0.67	0.0*	5-S2n	0.21	0.38	0.21	0.12	3.55	2.83
0.82 cms	0.82 cms	303.72	0.75	0.0*	5-S2n	0.23	0.41	0.23	0.12	3.69	2.95
0.91 cms	0.91 cms	303.80	0.83	0.0*	5-S2n	0.24	0.43	0.24	0.13	3.84	3.05
1.00 cms	1.00 cms	303.89	0.91	0.0*	5-S2n	0.26	0.46	0.26	0.14	3.97	3.16

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 302.97 m,

Outlet Elevation (invert): 301.26 m

Culvert Length: 28.59 m,

Culvert Slope: 0.0599

Site Data - 3380

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 302.64 m

Outlet Station: 28.54 m

Outlet Elevation: 300.93 m

Number of Barrels: 1

Culvert Data Summary - 3380

Barrel Shape: Circular

Barrel Diameter: 1000.00 mm

Barrel Material: Concrete

Embedment: 333.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

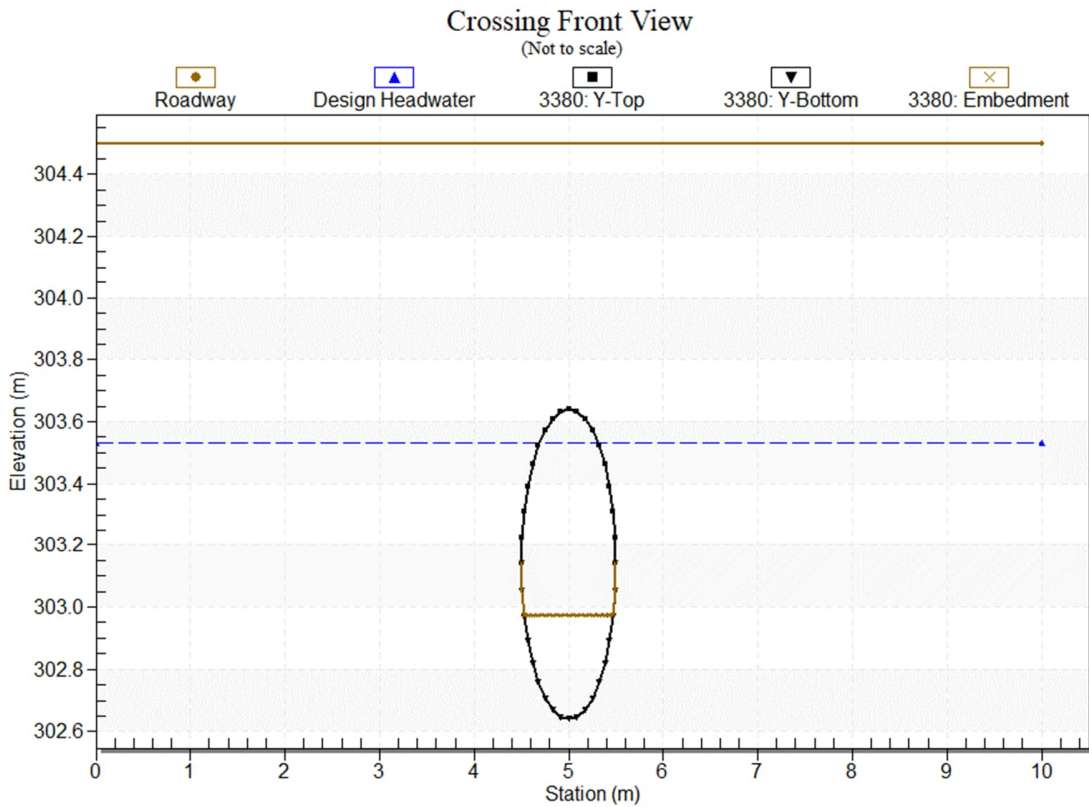
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 3380



Tailwater Data for Crossing: 3380

Table 13 - Downstream Channel Rating Curve (Crossing: 3380)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	300.97	0.04	1.36	209.07	2.34
0.19	300.98	0.05	1.73	306.56	2.48
0.28	301.00	0.07	2.00	386.15	2.57
0.37	301.01	0.08	2.22	455.66	2.63
0.46	301.02	0.09	2.40	518.26	2.68
0.58	301.03	0.10	2.61	594.10	2.74
0.64	301.04	0.11	2.70	629.65	2.76
0.73	301.05	0.12	2.83	680.40	2.79
0.82	301.05	0.12	2.95	728.45	2.81
0.91	301.06	0.13	3.05	774.11	2.84
1.00	301.07	0.14	3.16	818.02	2.86

Tailwater Channel Data - 3380

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.6000

Channel Manning's n: 0.0600

Channel Invert Elevation: 300.93 m

Roadway Data for Crossing: 3380

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 304.50 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 3380

Crossing Notes:

Culvert Data: 3460

Water Surface Profile Plot for Culvert: 3460

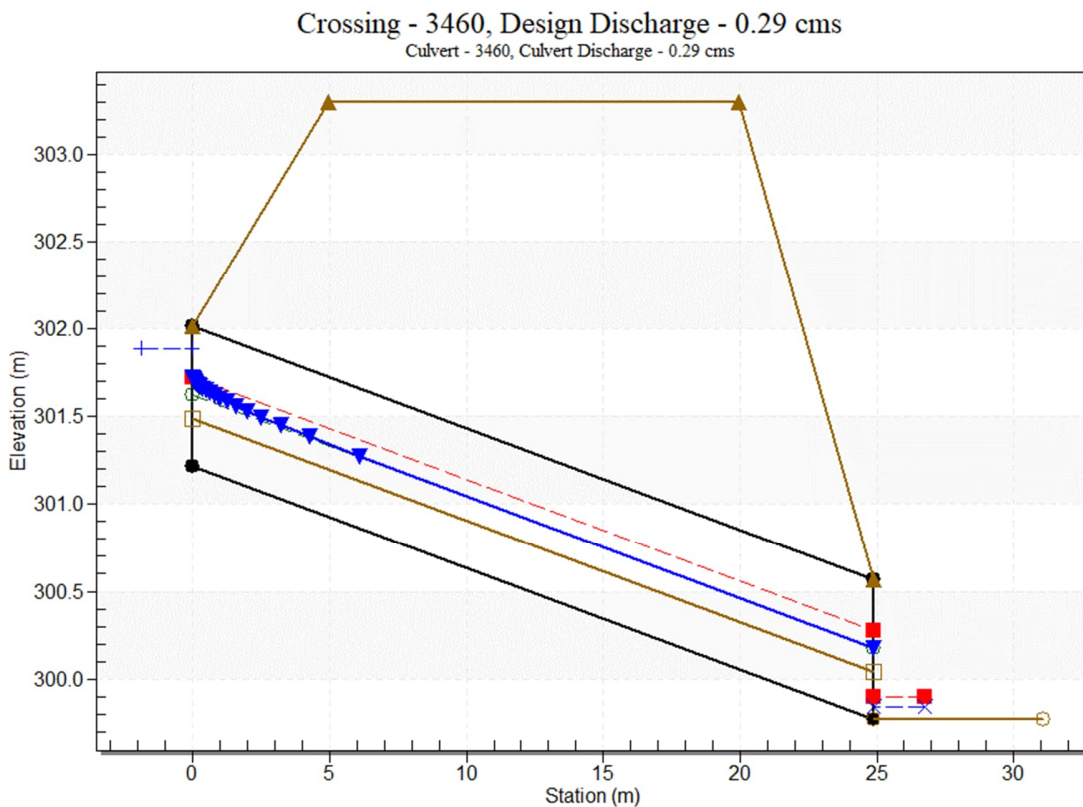


Table 14 - Culvert Summary Table: 3460

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	301.68	0.19	0.0*	1-S2n	0.07	0.12	0.07	0.04	1.86	1.36
0.19 cms	0.19 cms	301.79	0.30	0.0*	1-S2n	0.10	0.18	0.10	0.05	2.33	1.73
0.29 cms	0.29 cms	301.89	0.40	0.0*	1-S2n	0.14	0.24	0.14	0.07	2.69	2.03
0.37 cms	0.37 cms	301.97	0.49	0.0*	1-S2n	0.16	0.28	0.16	0.08	2.94	2.22
0.46 cms	0.46 cms	302.07	0.59	0.0*	5-S2n	0.18	0.32	0.18	0.09	3.18	2.40
0.55 cms	0.55 cms	302.19	0.70	0.0*	5-S2n	0.21	0.36	0.21	0.10	3.39	2.56
0.64 cms	0.64 cms	302.32	0.83	0.0*	5-S2n	0.23	0.39	0.23	0.11	3.50	2.70

0.73 cms	0.73 cms	302.47	0.98	0.0*	5-S2n	0.25	0.42	0.25	0.12	3.74	2.83
0.82 cms	0.82 cms	302.63	1.14	0.009	5-S2n	0.27	0.44	0.27	0.12	3.89	2.95
0.91 cms	0.91 cms	302.81	1.33	0.224	5-S2n	0.29	0.46	0.29	0.13	4.03	3.05
1.00 cms	1.00 cms	303.02	1.53	0.466	5-S2n	0.31	0.48	0.31	0.14	4.16	3.16

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 301.49 m,

Outlet Elevation (invert): 300.04 m

Culvert Length: 24.92 m,

Culvert Slope: 0.0583

Site Data - 3460

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 301.22 m

Outlet Station: 24.88 m

Outlet Elevation: 299.77 m

Number of Barrels: 1

Culvert Data Summary - 3460

Barrel Shape: Circular

Barrel Diameter: 800.00 mm

Barrel Material: Concrete

Embedment: 267.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

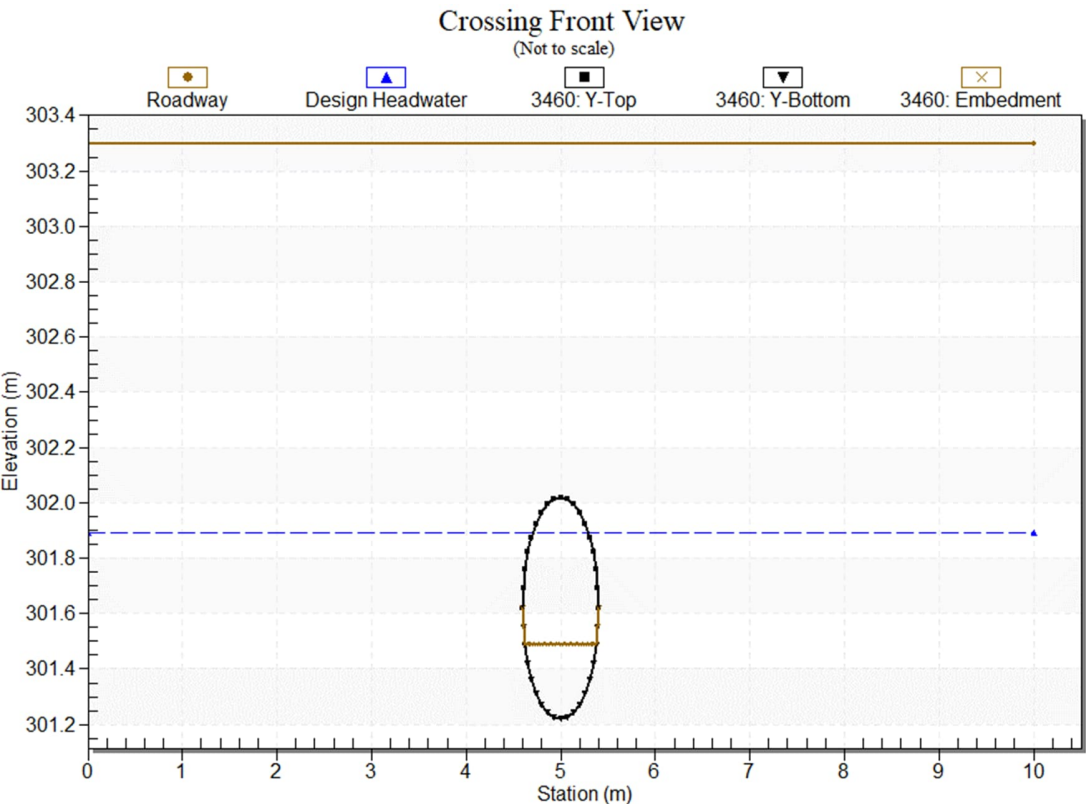
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 3460



Tailwater Data for Crossing: 3460

Table 14 - Downstream Channel Rating Curve (Crossing: 3460)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	299.81	0.04	1.36	209.07	2.34
0.19	299.82	0.05	1.73	306.56	2.48
0.29	299.84	0.07	2.03	394.24	2.58
0.37	299.85	0.08	2.22	455.66	2.63
0.46	299.86	0.09	2.40	518.26	2.68
0.55	299.87	0.10	2.56	575.93	2.72
0.64	299.88	0.11	2.70	629.65	2.76
0.73	299.89	0.12	2.83	680.40	2.79
0.82	299.89	0.12	2.95	728.45	2.81
0.91	299.90	0.13	3.05	774.11	2.84
1.00	299.91	0.14	3.16	818.02	2.86

Tailwater Channel Data - 3460

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (2:1)

Channel Slope: 0.6000

Channel Manning's n: 0.0600

Channel Invert Elevation: 299.77 m

Roadway Data for Crossing: 3460

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 303.30 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 3460

Crossing Notes:

Culvert Data: 3640

Water Surface Profile Plot for Culvert: 3640

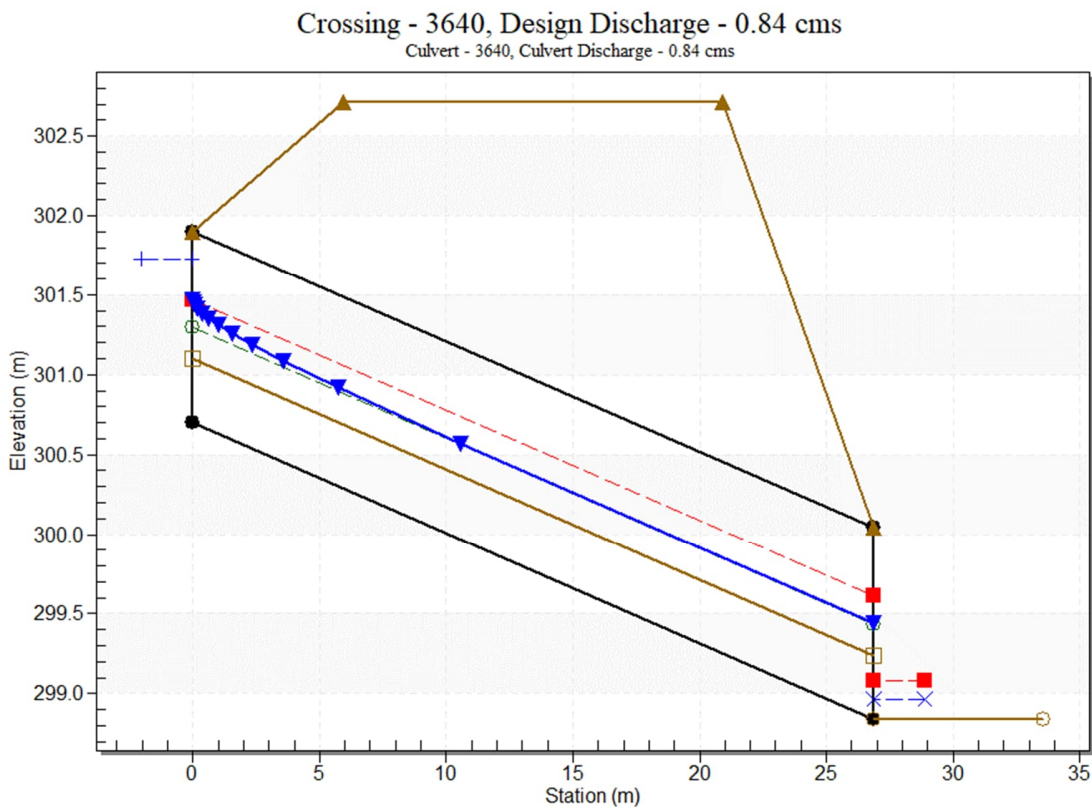


Table 15 - Culvert Summary Table: 3640

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	301.24	0.14	0.0*	1-S2n	0.05	0.09	0.05	0.04	1.74	1.36
0.29 cms	0.29 cms	301.40	0.30	0.0*	1-S2n	0.10	0.19	0.10	0.07	2.56	2.03
0.48 cms	0.48 cms	301.52	0.42	0.0*	1-S2n	0.13	0.26	0.13	0.09	3.06	2.44
0.67 cms	0.67 cms	301.63	0.53	0.0*	1-S2n	0.17	0.32	0.17	0.11	3.43	2.74
0.84 cms	0.84 cms	301.72	0.62	0.0*	1-S2n	0.19	0.37	0.20	0.13	3.56	2.97
1.05 cms	1.05 cms	301.84	0.74	0.0*	1-S2n	0.22	0.43	0.22	0.14	4.02	3.21
1.24 cms	1.24 cms	301.96	0.86	0.0*	5-S2n	0.25	0.47	0.25	0.16	4.20	3.40

1.43 cms	1.43 cms	302.08	0.98	0.0*	5-S2n	0.27	0.52	0.27	0.17	4.49	3.56
1.62 cms	1.62 cms	302.22	1.12	0.0*	5-S2n	0.29	0.56	0.29	0.18	4.70	3.72
1.81 cms	1.81 cms	302.38	1.28	0.0*	5-S2n	0.31	0.59	0.31	0.20	4.89	3.85
2.00 cms	2.00 cms	302.55	1.45	0.0*	5-S2n	0.34	0.63	0.35	0.21	4.91	3.98

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 301.10 m,

Outlet Elevation (invert): 299.24 m

Culvert Length: 26.92 m,

Culvert Slope: 0.0692

Site Data - 3640

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 300.70 m

Outlet Station: 26.86 m

Outlet Elevation: 298.84 m

Number of Barrels: 1

Culvert Data Summary - 3640

Barrel Shape: Circular

Barrel Diameter: 1200.00 mm

Barrel Material: Concrete

Embedment: 400.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

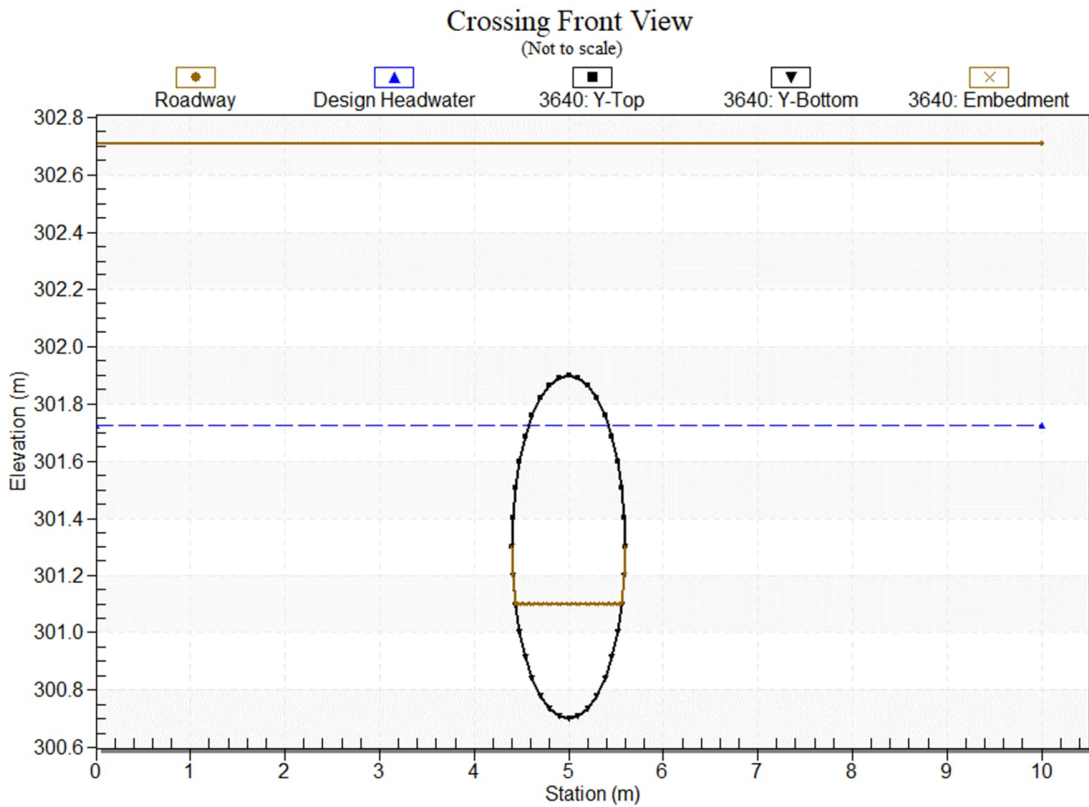
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 3640



Tailwater Data for Crossing: 3640

Table 15 - Downstream Channel Rating Curve (Crossing: 3640)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	298.88	0.04	1.36	209.07	2.34
0.29	298.91	0.07	2.03	394.24	2.58
0.48	298.93	0.09	2.44	531.50	2.69
0.67	298.95	0.11	2.74	646.83	2.77
0.84	298.97	0.13	2.97	738.72	2.82
1.05	298.98	0.14	3.21	841.62	2.87
1.24	299.00	0.16	3.40	927.26	2.91
1.43	299.01	0.17	3.56	1007.23	2.94
1.62	299.02	0.18	3.72	1082.60	2.97
1.81	299.04	0.20	3.85	1154.26	3.00
2.00	299.05	0.21	3.98	1222.43	3.02

Tailwater Channel Data - 3640

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.6000

Channel Manning's n: 0.0600

Channel Invert Elevation: 298.84 m

Roadway Data for Crossing: 3640

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 302.71 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 3640

Crossing Notes:

Culvert Data: 3700

Water Surface Profile Plot for Culvert: 3700

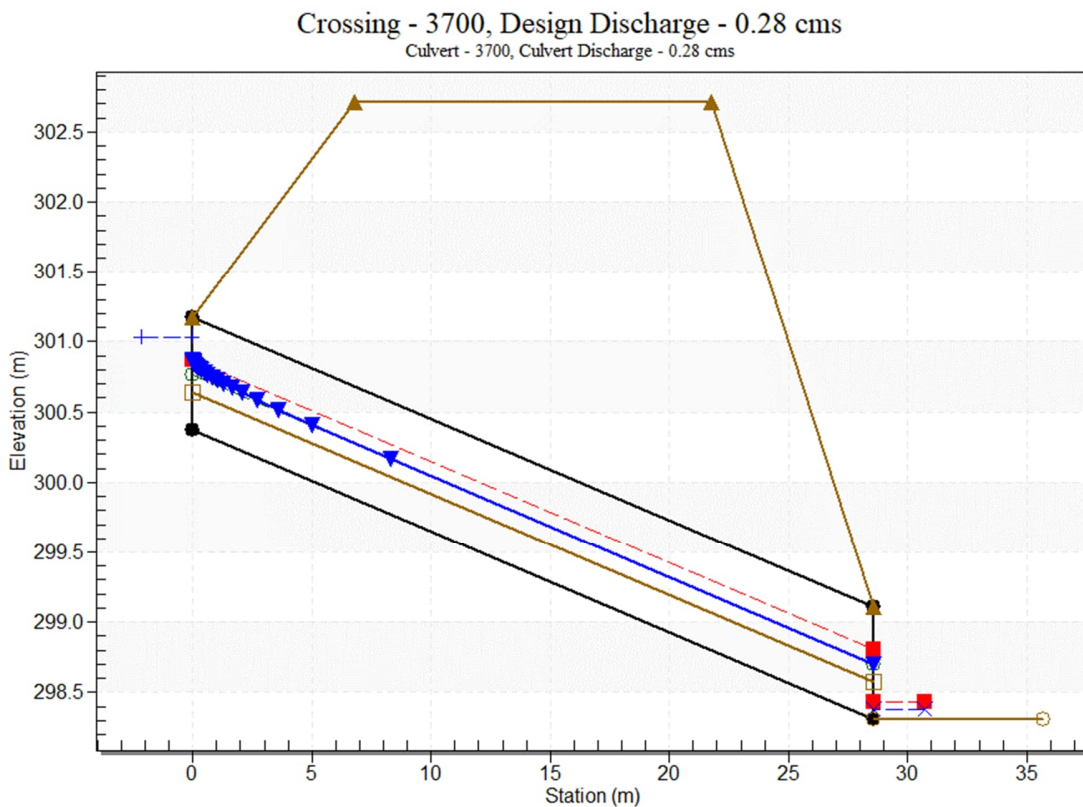


Table 16 - Culvert Summary Table: 3700

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	300.83	0.19	0.0*	1-S2n	0.07	0.12	0.07	0.04	1.99	1.36
0.28 cms	0.28 cms	301.03	0.39	0.0*	1-S2n	0.13	0.23	0.13	0.07	2.85	2.00
0.48 cms	0.48 cms	301.24	0.61	0.0*	5-S2n	0.18	0.33	0.18	0.09	3.46	2.44
0.67 cms	0.67 cms	301.51	0.87	0.0*	5-S2n	0.22	0.40	0.22	0.11	3.90	2.74
0.86 cms	0.86 cms	301.85	1.22	0.0*	5-S2n	0.26	0.45	0.26	0.13	4.20	3.00
1.05 cms	1.05 cms	302.29	1.66	0.146	5-S2n	0.30	0.49	0.30	0.14	4.54	3.21
1.24 cms	1.19 cms	302.73	2.09	0.612	5-S2n	0.33	0.50	0.33	0.16	4.62	3.40

1.43 cms	1.20 cms	302.77	2.13	0.633	5-S2n	0.33	0.51	0.34	0.17	4.63	3.56
1.62 cms	1.21 cms	302.80	2.16	0.661	5-S2n	0.33	0.51	0.33	0.18	4.75	3.72
1.81 cms	1.22 cms	302.82	2.18	0.684	5-S2n	0.33	0.51	0.33	0.20	4.76	3.85
2.00 cms	1.22 cms	302.84	2.20	0.705	5-S2n	0.33	0.51	0.33	0.21	4.76	3.98

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 300.64 m,

Outlet Elevation (invert): 298.58 m

Culvert Length: 28.64 m,

Culvert Slope: 0.0721

Site Data - 3700

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 300.37 m

Outlet Station: 28.57 m

Outlet Elevation: 298.31 m

Number of Barrels: 1

Culvert Data Summary - 3700

Barrel Shape: Circular

Barrel Diameter: 800.00 mm

Barrel Material: Concrete

Embedment: 267.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

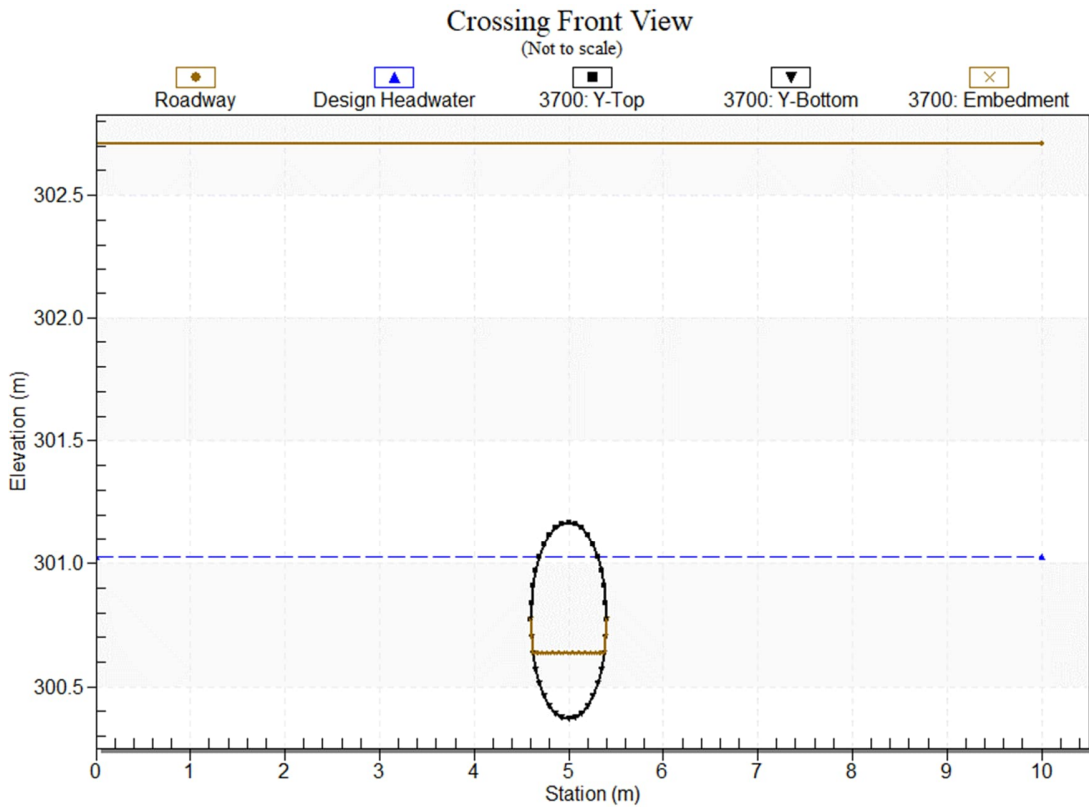
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 3700



Tailwater Data for Crossing: 3700

Table 16 - Downstream Channel Rating Curve (Crossing: 3700)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	298.35	0.04	1.36	209.07	2.34
0.28	298.38	0.07	2.00	386.15	2.57
0.48	298.40	0.09	2.44	531.50	2.69
0.67	298.42	0.11	2.74	646.83	2.77
0.86	298.44	0.13	3.00	748.98	2.83
1.05	298.45	0.14	3.21	841.62	2.87
1.24	298.47	0.16	3.40	927.26	2.91
1.43	298.48	0.17	3.56	1007.23	2.94
1.62	298.49	0.18	3.72	1082.60	2.97
1.81	298.51	0.20	3.85	1154.26	3.00
2.00	298.52	0.21	3.98	1222.43	3.02

Tailwater Channel Data - 3700

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.6000

Channel Manning's n: 0.0600

Channel Invert Elevation: 298.31 m

Roadway Data for Crossing: 3700

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 302.71 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 3700

Crossing Notes:

Culvert Data: 3760

Water Surface Profile Plot for Culvert: 3760

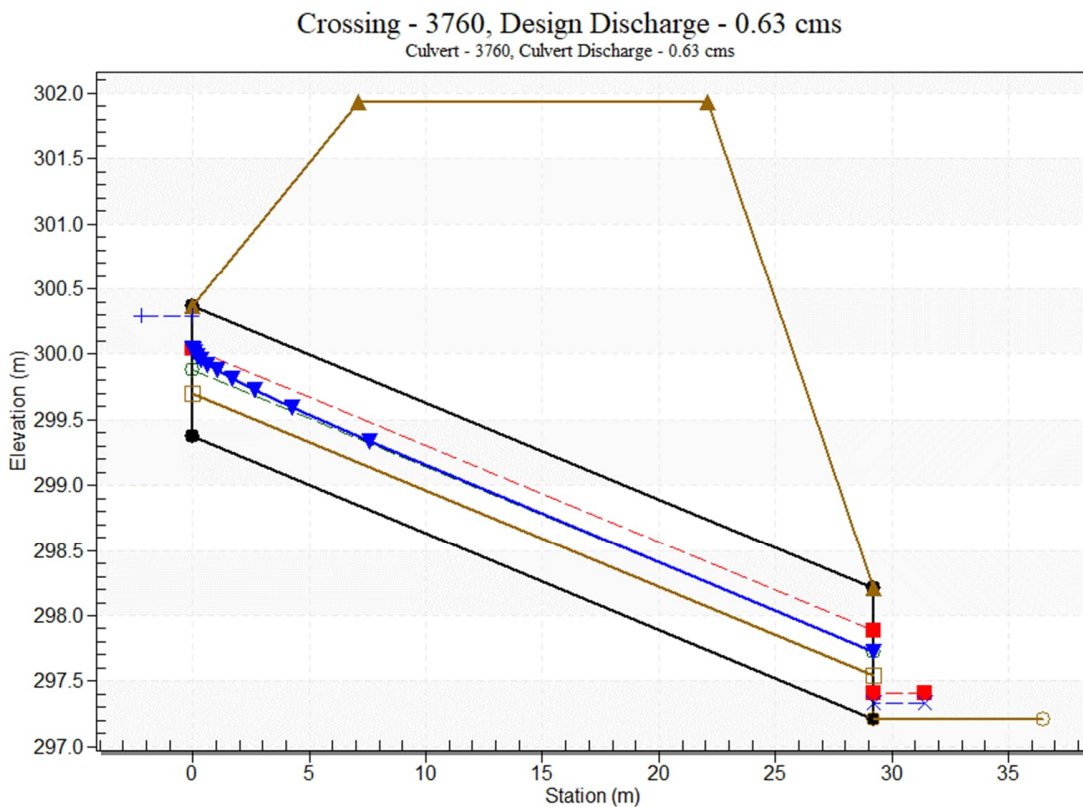


Table 17 - Culvert Summary Table: 3760

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	299.86	0.16	0.0*	1-S2n	0.06	0.10	0.06	0.04	1.88	1.20
0.19 cms	0.19 cms	299.95	0.25	0.0*	1-S2n	0.08	0.16	0.08	0.06	2.37	1.53
0.28 cms	0.28 cms	300.03	0.33	0.0*	1-S2n	0.11	0.20	0.11	0.07	2.72	1.76
0.37 cms	0.37 cms	300.10	0.40	0.0*	1-S2n	0.13	0.24	0.13	0.09	2.97	1.95
0.46 cms	0.46 cms	300.17	0.47	0.0*	1-S2n	0.15	0.28	0.15	0.10	3.23	2.11
0.55 cms	0.55 cms	300.23	0.53	0.0*	1-S2n	0.16	0.31	0.16	0.11	3.43	2.24
0.63 cms	0.63 cms	300.29	0.59	0.0*	1-S2n	0.18	0.34	0.18	0.12	3.60	2.35

0.73 cms	0.73 cms	300.37	0.67	0.0*	1-S2n	0.20	0.38	0.20	0.13	3.80	2.48
0.82 cms	0.82 cms	300.44	0.74	0.0*	5-S2n	0.21	0.41	0.21	0.14	3.93	2.58
0.91 cms	0.91 cms	300.52	0.82	0.0*	5-S2n	0.23	0.43	0.23	0.15	3.97	2.67
1.00 cms	1.00 cms	300.61	0.91	0.0*	5-S2n	0.24	0.46	0.24	0.16	4.25	2.76

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 299.70 m,

Outlet Elevation (invert): 297.54 m

Culvert Length: 29.29 m,

Culvert Slope: 0.0739

Site Data - 3760

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 299.37 m

Outlet Station: 29.21 m

Outlet Elevation: 297.21 m

Number of Barrels: 1

Culvert Data Summary - 3760

Barrel Shape: Circular

Barrel Diameter: 1000.00 mm

Barrel Material: Concrete

Embedment: 333.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

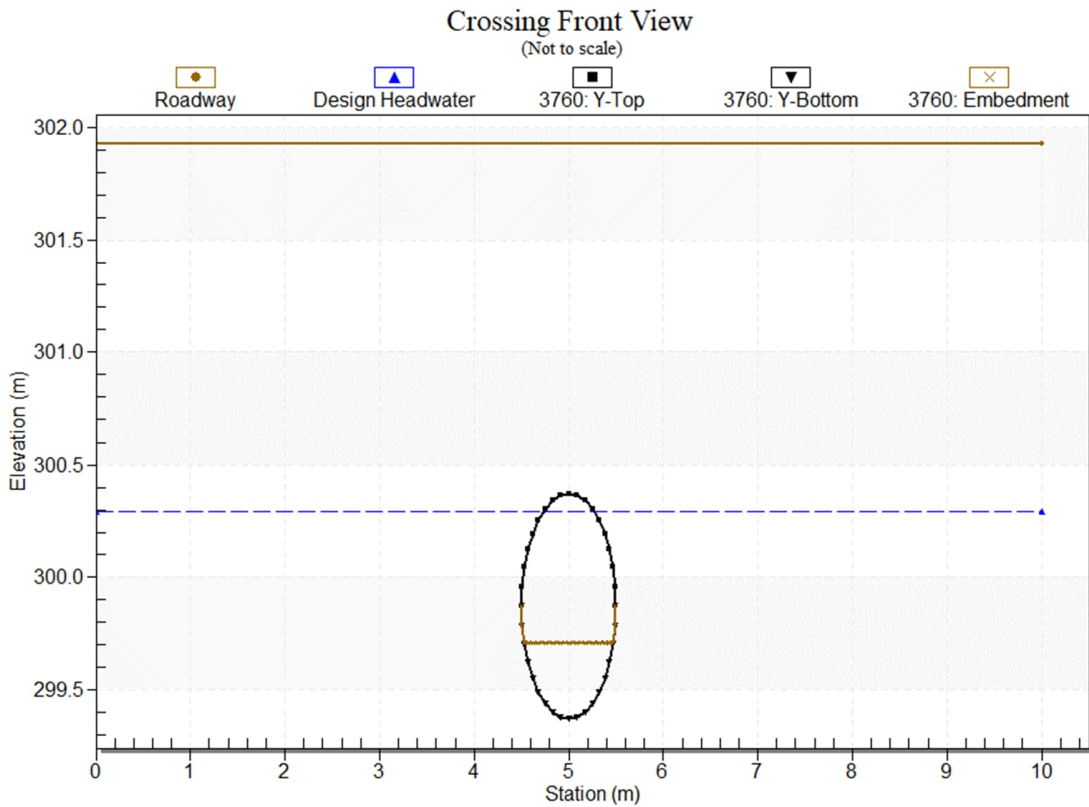
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 3760



Tailwater Data for Crossing: 3760

Table 17 - Downstream Channel Rating Curve (Crossing: 3760)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	297.25	0.04	1.20	157.25	1.95
0.19	297.27	0.06	1.53	230.57	2.06
0.28	297.28	0.07	1.76	290.35	2.13
0.37	297.30	0.09	1.95	342.48	2.19
0.46	297.31	0.10	2.11	389.35	2.23
0.55	297.32	0.11	2.24	432.67	2.26
0.63	297.33	0.12	2.35	468.59	2.29
0.73	297.34	0.13	2.48	510.83	2.31
0.82	297.35	0.14	2.58	546.66	2.34
0.91	297.36	0.15	2.67	581.03	2.36
1.00	297.37	0.16	2.76	613.81	2.37

Tailwater Channel Data - 3760

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (2:1)

Channel Slope: 0.4000

Channel Manning's n: 0.0600

Channel Invert Elevation: 297.21 m

Roadway Data for Crossing: 3760

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 301.93 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 3760

Crossing Notes:

Culvert Data: 3960_E6_naturligFelt

Water Surface Profile Plot for Culvert: 3960_E6_naturligFelt

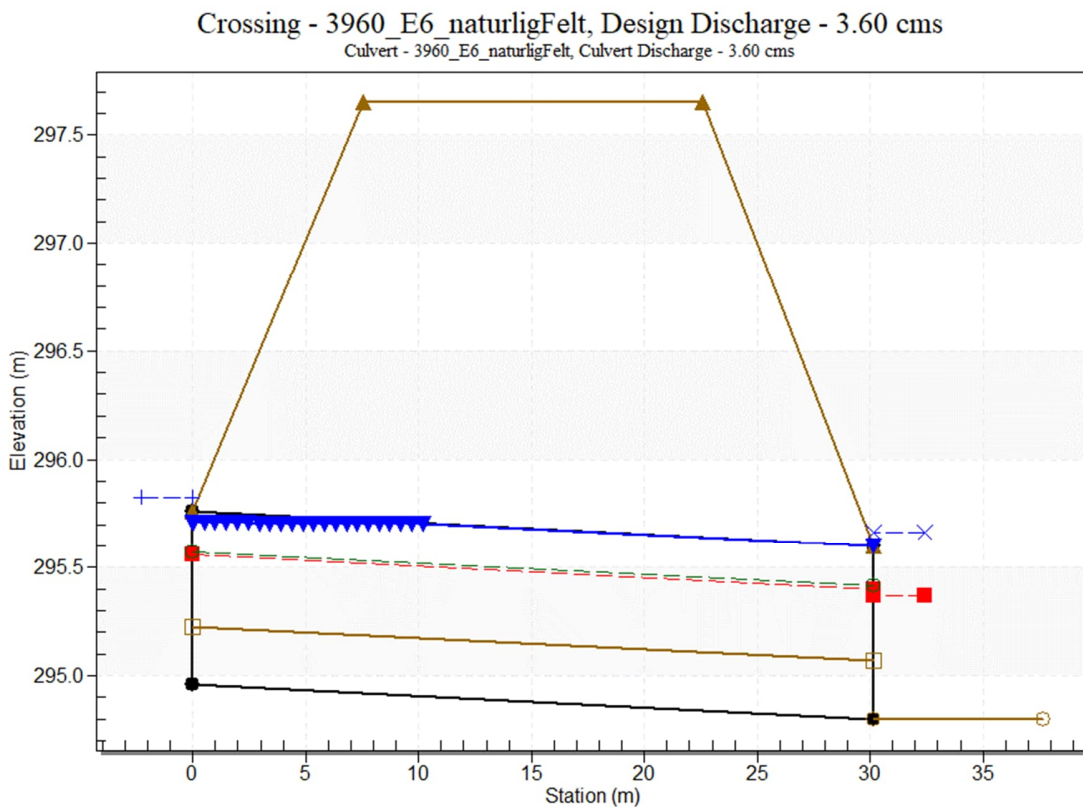


Table 18 - Culvert Summary Table: 3960_E6_naturligFelt

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	295.28	0.05	0.053	2-M2c	0.04	0.03	0.03	0.12	0.55	0.37
0.59 cms	0.59 cms	295.40	0.17	0.171	2-M2c	0.12	0.10	0.10	0.33	0.99	0.67
1.08 cms	1.08 cms	295.48	0.25	0.256	3-M1t	0.17	0.15	0.20	0.46	0.92	0.80
1.57 cms	1.57 cms	295.56	0.32	0.329	3-M1t	0.21	0.19	0.30	0.56	0.88	0.89
2.06 cms	2.06 cms	295.62	0.39	0.394	3-M1t	0.25	0.23	0.38	0.65	0.90	0.96
2.55 cms	2.55 cms	295.68	0.45	0.454	3-M1t	0.28	0.26	0.46	0.73	0.93	1.02
3.04 cms	3.04 cms	295.74	0.50	0.514	3-M1t	0.31	0.30	0.53	0.79	0.96	1.07

3.60 cms	3.60 cms	295.83	0.56	0.599	3-M1f	0.35	0.33	0.53	0.86	1.13	1.12
4.02 cms	4.02 cms	295.95	0.61	0.721	4-FFf	0.37	0.36	0.53	0.91	1.26	1.15
4.51 cms	4.51 cms	296.06	0.67	0.834	4-FFf	0.40	0.39	0.53	0.97	1.41	1.19
5.00 cms	5.00 cms	296.18	0.74	0.951	4-FFf	0.42	0.41	0.53	1.02	1.56	1.22

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 295.23 m,

Outlet Elevation (invert): 295.07 m

Culvert Length: 30.15 m,

Culvert Slope: 0.0053

Site Data - 3960_E6_naturligFelt

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 294.96 m

Outlet Station: 30.15 m

Outlet Elevation: 294.80 m

Number of Barrels: 1

Culvert Data Summary - 3960_E6_naturligFelt

Barrel Shape: Concrete Box

Barrel Span: 6000.00 mm

Barrel Rise: 800.00 mm

Barrel Material: Concrete

Embedment: 267.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

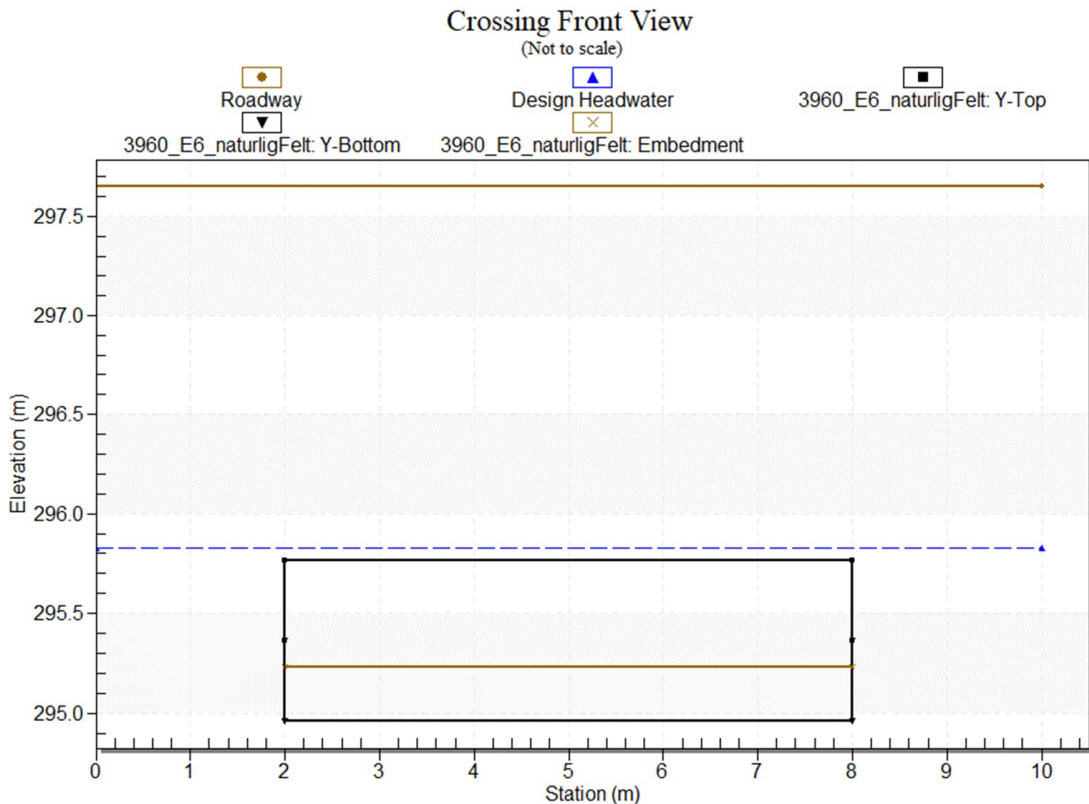
Culvert Type: Straight

Inlet Configuration: Square Edge (90°) Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 3960_E6_naturligFelt



Tailwater Data for Crossing: 3960_E6_naturligFelt

Table 18 - Downstream Channel Rating Curve (Crossing: 3960_E6_naturligFelt)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	294.92	0.12	0.37	11.74	0.36
0.59	295.13	0.33	0.67	32.51	0.41
1.08	295.26	0.46	0.80	45.29	0.43
1.57	295.36	0.56	0.89	55.29	0.44
2.06	295.45	0.65	0.96	63.72	0.45
2.55	295.53	0.73	1.02	71.13	0.45
3.04	295.59	0.79	1.07	77.78	0.46
3.60	295.66	0.86	1.12	84.68	0.46
4.02	295.71	0.91	1.15	89.47	0.47
4.51	295.77	0.97	1.19	94.70	0.47
5.00	295.82	1.02	1.22	99.62	0.47

Tailwater Channel Data - 3960_E6_naturligFelt

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (.:1)

Channel Slope: 0.0100

Channel Manning's n: 0.0600

Channel Invert Elevation: 294.80 m

Roadway Data for Crossing: 3960_E6_naturligFelt

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 297.65 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 3960_E6_naturligFelt

Crossing Notes:

Culvert Data: 3960_E6lokalFelt

Water Surface Profile Plot for Culvert: 3960_E6lokalFelt

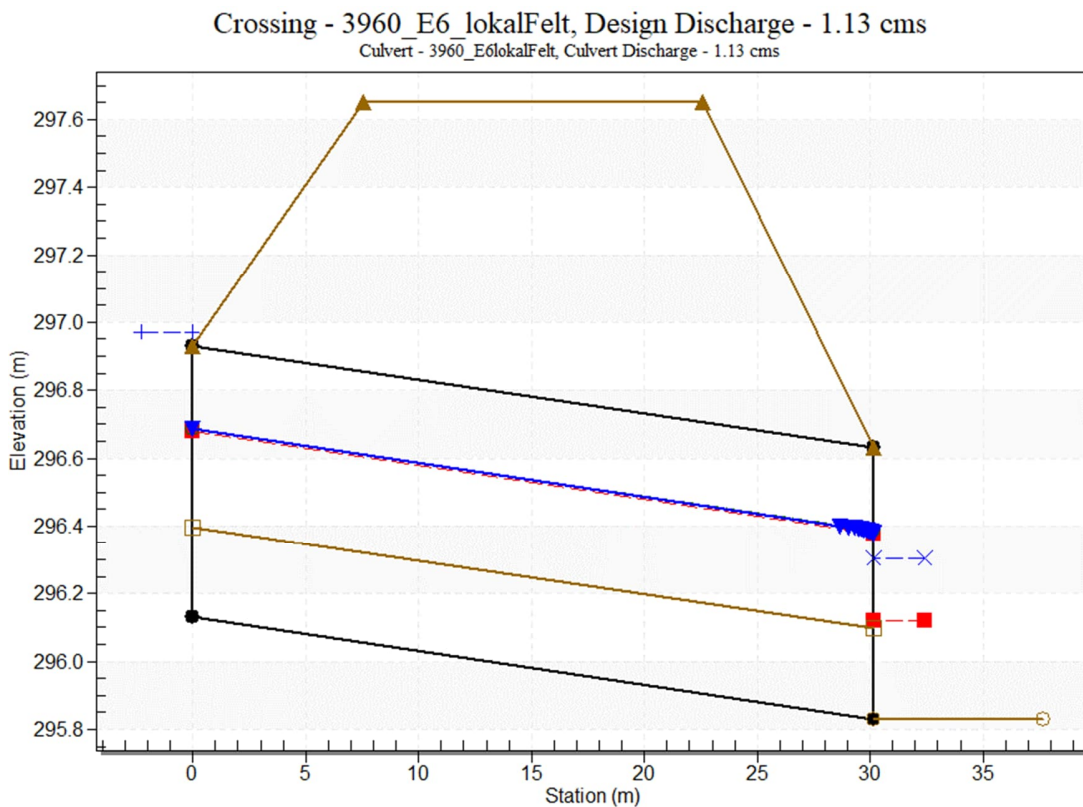


Table 19 - Culvert Summary Table: 3960_E6lokalFelt

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	296.51	0.10	0.113	2-M2c	0.06	0.06	0.06	0.12	0.75	0.37
0.59 cms	0.59 cms	296.77	0.35	0.369	2-M2c	0.19	0.19	0.19	0.33	1.35	0.67
1.13 cms	1.13 cms	296.97	0.56	0.573	7-M2c	0.29	0.28	0.28	0.47	1.71	0.81
1.57 cms	1.57 cms	297.18	0.79	0.721	7-M2c	0.37	0.35	0.35	0.56	1.97	0.89
2.06 cms	2.06 cms	297.53	1.13	0.899	7-M2c	0.53	0.41	0.41	0.65	2.26	0.96
2.55 cms	2.28 cms	297.72	1.32	1.106	7-M2t	0.53	0.43	0.46	0.73	2.29	1.02
3.04 cms	2.34 cms	297.77	1.37	1.227	7-M2t	0.53	0.43	0.53	0.79	2.20	1.07

3.53 cms	2.39 cms	297.82	1.42	1.329	4-FFf	0.53	0.44	0.53	0.86	2.25	1.11
4.02 cms	2.43 cms	297.86	1.46	1.424	4-FFf	0.53	0.44	0.53	0.91	2.29	1.15
4.51 cms	2.46 cms	297.90	1.48	1.500	4-FFf	0.53	0.44	0.53	0.97	2.31	1.19
5.00 cms	2.45 cms	297.94	1.47	1.539	4-FFf	0.53	0.44	0.53	1.02	2.30	1.22

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 296.40 m,

Outlet Elevation (invert): 296.10 m

Culvert Length: 30.15 m,

Culvert Slope: 0.0100

Site Data - 3960_E6lokalFelt

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 296.13 m

Outlet Station: 30.15 m

Outlet Elevation: 295.83 m

Number of Barrels: 3

Culvert Data Summary - 3960_E6lokalFelt

Barrel Shape: Circular

Barrel Diameter: 800.00 mm

Barrel Material: Concrete

Embedment: 267.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

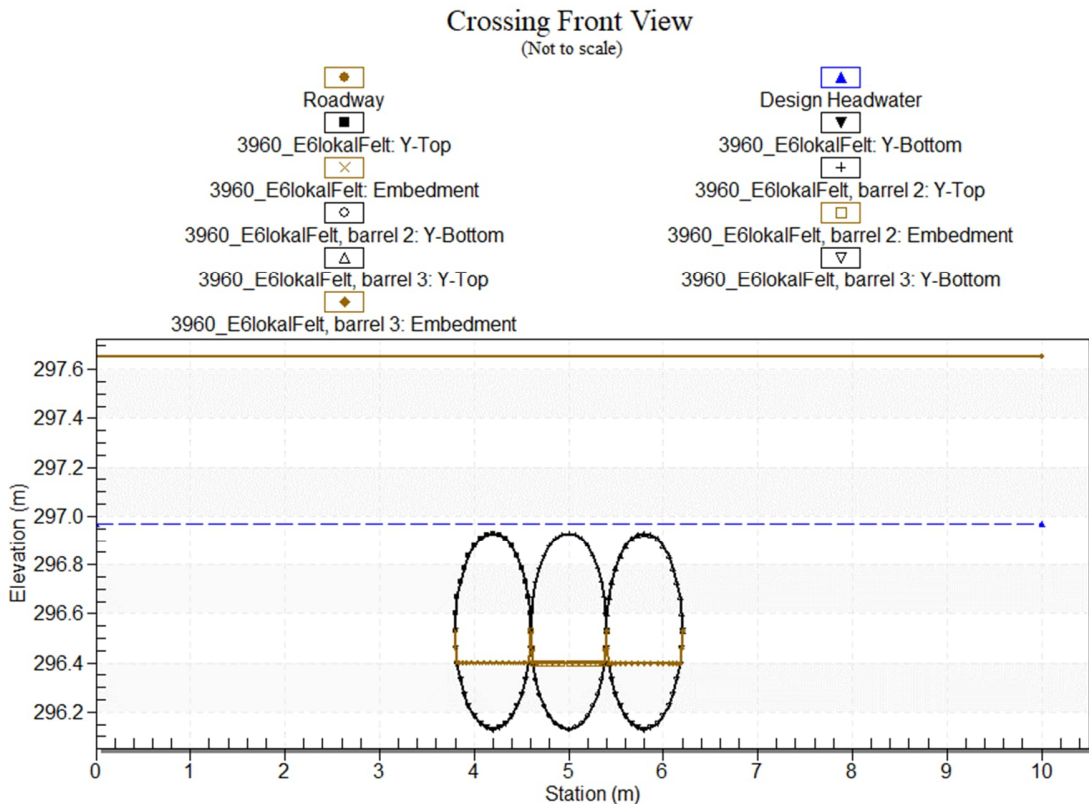
Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 3960_E6_lokalFelt



Tailwater Data for Crossing: 3960_E6_lokalFelt

Table 19 - Downstream Channel Rating Curve (Crossing: 3960_E6_lokalFelt)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	295.95	0.12	0.37	11.74	0.36
0.59	296.16	0.33	0.67	32.51	0.41
1.13	296.30	0.47	0.81	46.40	0.43
1.57	296.39	0.56	0.89	55.29	0.44
2.06	296.48	0.65	0.96	63.72	0.45
2.55	296.56	0.73	1.02	71.13	0.45
3.04	296.62	0.79	1.07	77.78	0.46
3.53	296.69	0.86	1.11	83.85	0.46
4.02	296.74	0.91	1.15	89.47	0.47
4.51	296.80	0.97	1.19	94.70	0.47
5.00	296.85	1.02	1.22	99.62	0.47

Tailwater Channel Data - 3960_E6_lokalFelt

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (:1)

Channel Slope: 0.0100

Channel Manning's n: 0.0600

Channel Invert Elevation: 295.83 m

Roadway Data for Crossing: 3960_E6_lokalFelt

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 297.65 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 3960_E6_lokalFelt

Crossing Notes:

Culvert Data: 4540

Water Surface Profile Plot for Culvert: 4540

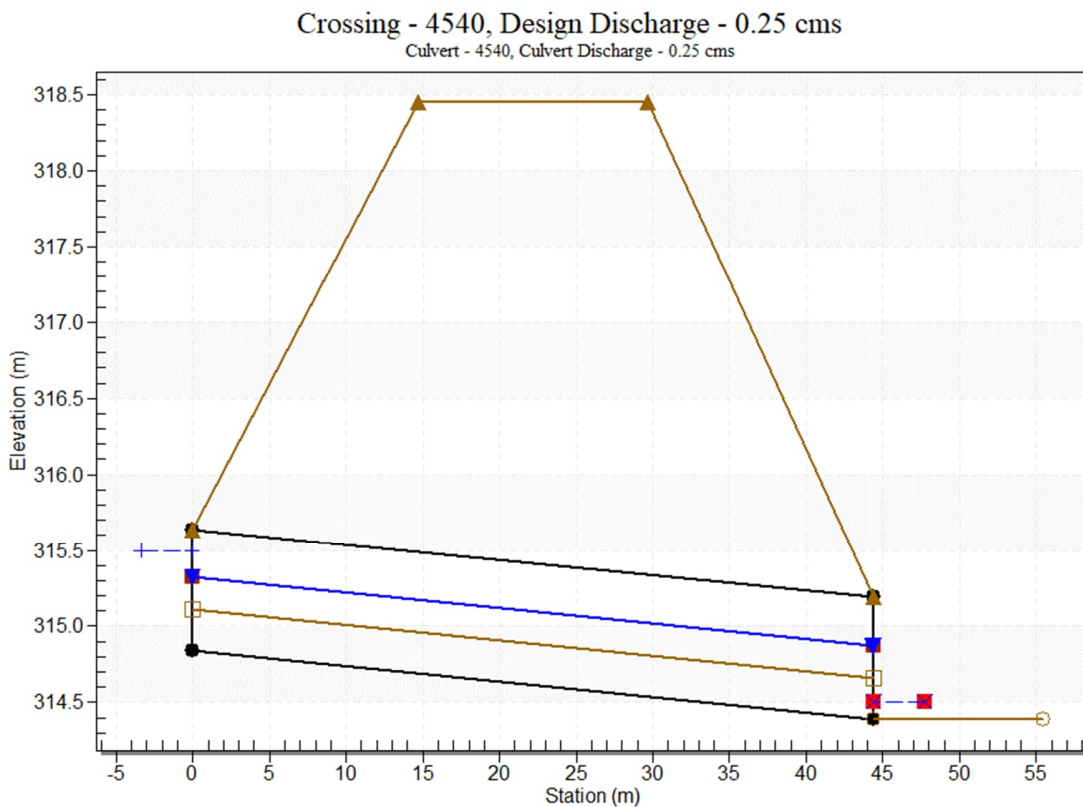


Table 20 - Culvert Summary Table: 4540

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.01 cms	0.01 cms	315.17	0.06	0.045	2-M2c	0.03	0.03	0.03	0.02	0.50	0.30
0.11 cms	0.11 cms	315.33	0.22	0.221	2-M2c	0.13	0.13	0.13	0.07	1.10	0.75
0.25 cms	0.25 cms	315.49	0.38	0.386	2-M2c	0.22	0.22	0.22	0.11	1.47	1.01
0.31 cms	0.31 cms	315.55	0.43	0.444	2-M2c	0.25	0.25	0.25	0.13	1.58	1.09
0.41 cms	0.41 cms	315.64	0.54	0.537	7-M2c	0.30	0.30	0.30	0.15	1.76	1.20
0.51 cms	0.51 cms	315.76	0.65	0.627	7-M2c	0.36	0.34	0.34	0.17	1.94	1.29
0.60 cms	0.60 cms	315.90	0.79	0.717	7-M2c	0.42	0.38	0.38	0.19	2.11	1.37

0.70 cms	0.70 cms	316.05	0.94	0.853	7-M2c	0.53	0.41	0.41	0.20	2.29	1.44
0.80 cms	0.80 cms	316.32	1.12	1.212	7-M2c	0.53	0.44	0.44	0.22	2.49	1.50
0.90 cms	0.90 cms	316.64	1.32	1.533	7-M2c	0.53	0.46	0.46	0.23	2.70	1.56
1.00 cms	1.00 cms	316.96	1.54	1.856	7-M2c	0.53	0.48	0.48	0.25	2.93	1.61

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 315.11 m,

Outlet Elevation (invert): 314.66 m

Culvert Length: 44.39 m,

Culvert Slope: 0.0101

Site Data - 4540

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 314.84 m

Outlet Station: 44.39 m

Outlet Elevation: 314.39 m

Number of Barrels: 1

Culvert Data Summary - 4540

Barrel Shape: Circular

Barrel Diameter: 800.00 mm

Barrel Material: Concrete

Embedment: 267.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

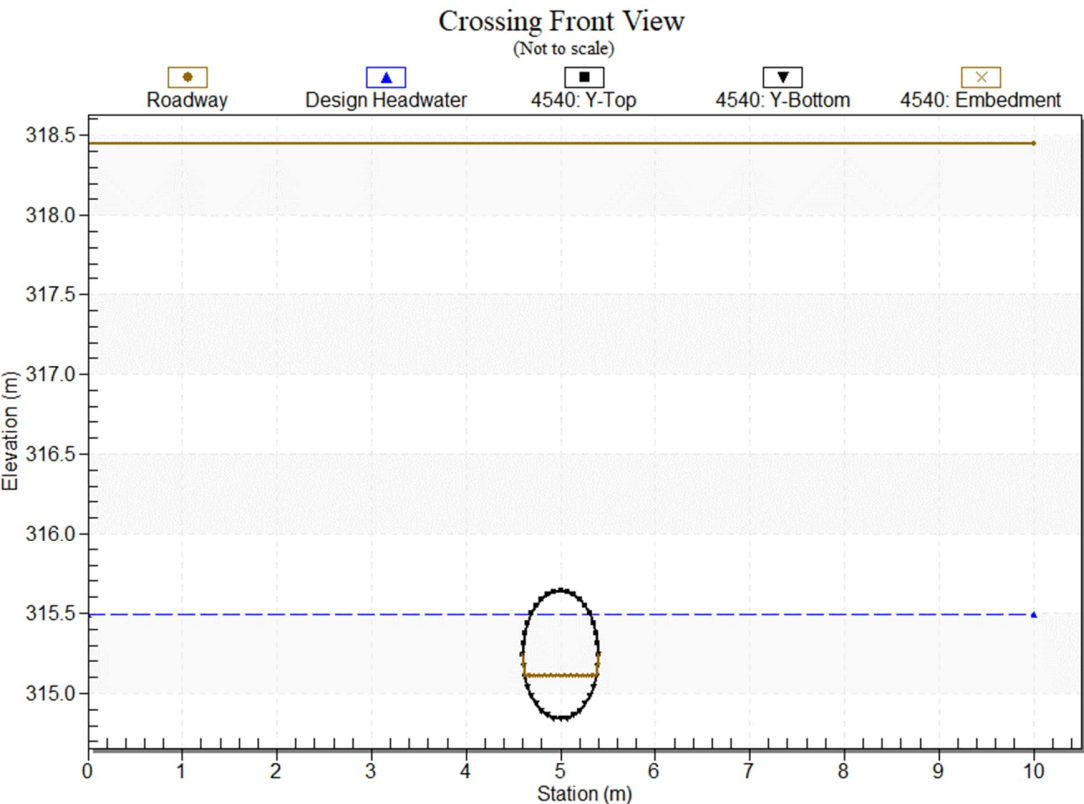
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 4540



Tailwater Data for Crossing: 4540

Table 20 - Downstream Channel Rating Curve (Crossing: 4540)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.01	314.41	0.02	0.30	12.83	0.76
0.11	314.46	0.07	0.75	53.49	0.94
0.25	314.50	0.11	1.01	87.35	1.01
0.31	314.52	0.13	1.09	98.55	1.03
0.41	314.54	0.15	1.20	116.03	1.05
0.51	314.56	0.17	1.29	131.73	1.07
0.60	314.58	0.19	1.37	146.09	1.09
0.70	314.59	0.20	1.44	159.47	1.10
0.80	314.61	0.22	1.50	171.96	1.11
0.90	314.62	0.23	1.56	183.79	1.12
1.00	314.64	0.25	1.61	195.03	1.13

Tailwater Channel Data - 4540

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0800

Channel Manning's n: 0.0600

Channel Invert Elevation: 314.39 m

Roadway Data for Crossing: 4540

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 318.45 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 4540

Crossing Notes:

Culvert Data: 4860

Water Surface Profile Plot for Culvert: 4860

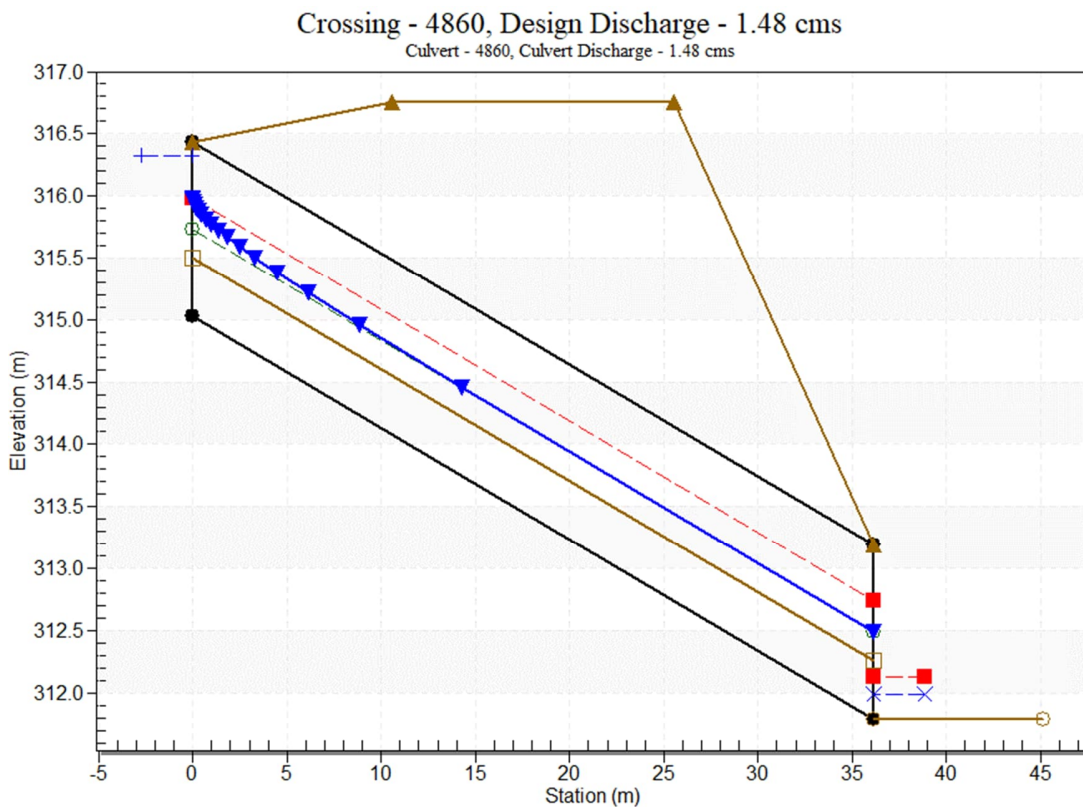


Table 21 - Culvert Summary Table: 4860

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	315.61	0.11	0.0*	1-S2n	0.04	0.08	0.04	0.04	1.80	1.20
0.59 cms	0.59 cms	315.92	0.43	0.0*	1-S2n	0.13	0.27	0.13	0.11	3.43	2.30
1.08 cms	1.08 cms	316.15	0.65	0.0*	1-S2n	0.19	0.40	0.19	0.16	4.20	2.84
1.48 cms	1.48 cms	316.32	0.83	0.0*	1-S2n	0.23	0.48	0.23	0.20	4.67	3.15
2.06 cms	2.06 cms	316.61	1.11	0.0*	5-S2n	0.28	0.60	0.29	0.24	5.17	3.51
2.55 cms	2.38 cms	316.80	1.30	0.0*	5-S2n	0.31	0.65	0.31	0.27	5.60	3.75
3.04 cms	2.47 cms	316.86	1.36	0.0*	5-S2n	0.32	0.66	0.32	0.30	5.55	3.97

3.53 cms	2.54 cms	316.90	1.40	0.0*	5-S2n	0.32	0.68	0.32	0.32	5.74	4.15
4.02 cms	2.60 cms	316.94	1.45	0.0*	5-S2n	0.33	0.69	0.33	0.35	5.79	4.32
4.51 cms	2.66 cms	316.98	1.48	0.0*	5-S2n	0.33	0.69	0.34	0.37	5.68	4.47
5.00 cms	2.71 cms	317.02	1.52	0.0*	5-S2n	0.34	0.70	0.34	0.39	5.73	4.61

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 315.50 m,

Outlet Elevation (invert): 312.26 m

Culvert Length: 36.27 m,

Culvert Slope: 0.0897

Site Data - 4860

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 315.03 m

Outlet Station: 36.13 m

Outlet Elevation: 311.79 m

Number of Barrels: 1

Culvert Data Summary - 4860

Barrel Shape: Circular

Barrel Diameter: 1400.00 mm

Barrel Material: Concrete

Embedment: 467.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

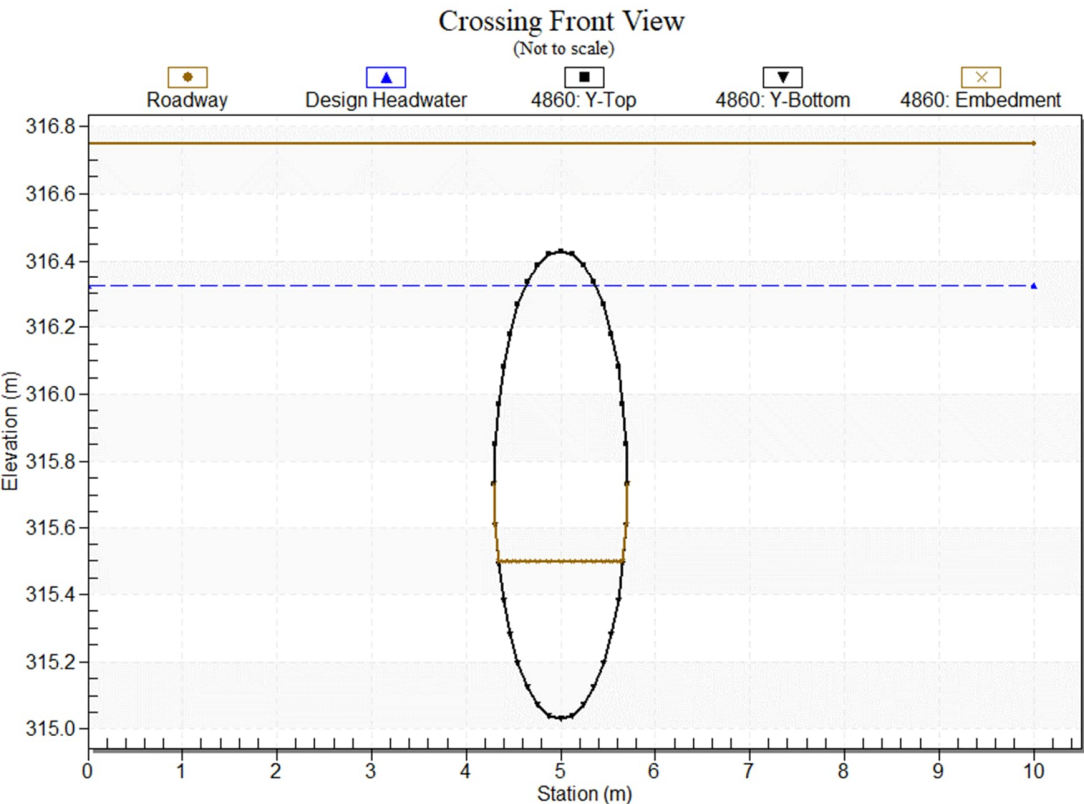
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 4860



Tailwater Data for Crossing: 4860

Table 21 - Downstream Channel Rating Curve (Crossing: 4860)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	311.83	0.04	1.20	157.25	1.95
0.59	311.90	0.11	2.30	450.84	2.27
1.08	311.95	0.16	2.84	641.77	2.39
1.48	311.99	0.20	3.15	770.09	2.45
2.06	312.03	0.24	3.51	930.75	2.51
2.55	312.06	0.27	3.75	1050.47	2.55
3.04	312.09	0.30	3.97	1159.78	2.58
3.53	312.11	0.32	4.15	1260.98	2.61
4.02	312.14	0.35	4.32	1355.43	2.63
4.51	312.16	0.37	4.47	1444.42	2.65
5.00	312.18	0.39	4.61	1528.68	2.67

Tailwater Channel Data - 4860

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.4000

Channel Manning's n: 0.0600

Channel Invert Elevation: 311.79 m

Roadway Data for Crossing: 4860

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 316.75 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 4860

Crossing Notes:

Culvert Data: 5025

Water Surface Profile Plot for Culvert: 5025

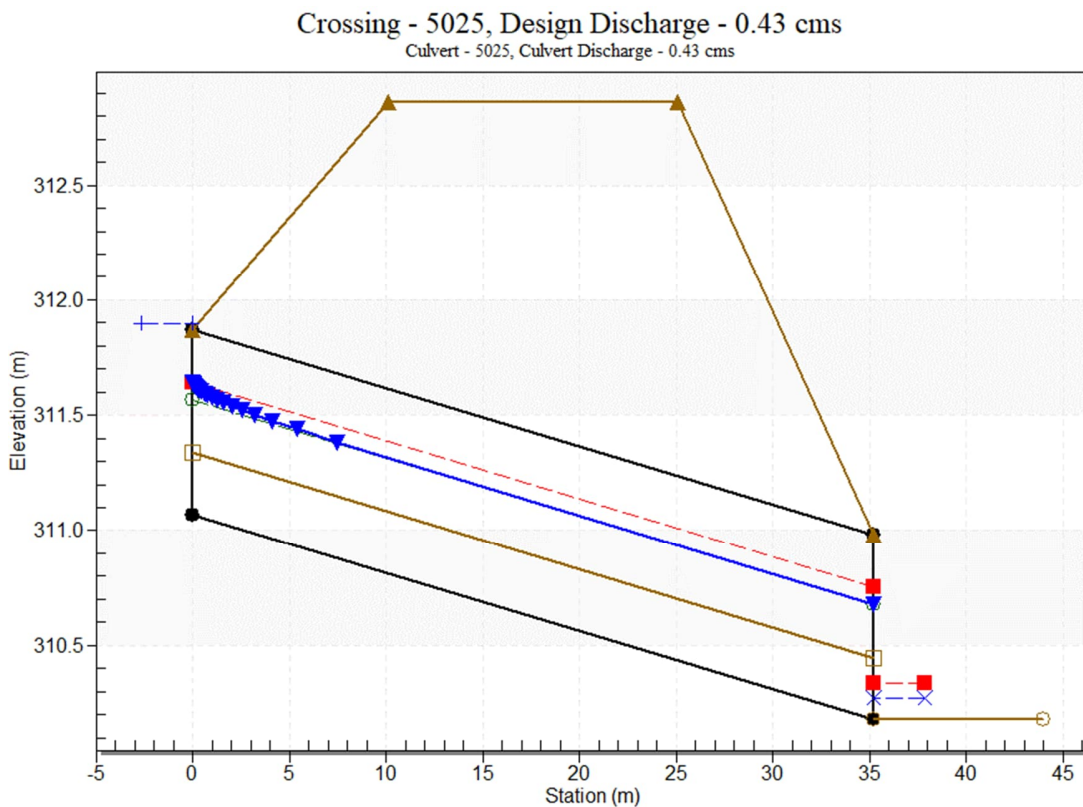


Table 22 - Culvert Summary Table: 5025

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	311.54	0.20	0.0*	1-S2n	0.09	0.12	0.09	0.04	1.42	1.28
0.29 cms	0.29 cms	311.75	0.41	0.0*	1-S2n	0.18	0.24	0.18	0.07	2.06	1.91
0.43 cms	0.43 cms	311.90	0.56	0.0*	5-S2n	0.23	0.31	0.23	0.09	2.37	2.21
0.67 cms	0.67 cms	312.22	0.89	0.353	5-S2n	0.31	0.40	0.32	0.12	2.74	2.59
0.86 cms	0.86 cms	312.57	1.23	0.822	5-S2n	0.38	0.45	0.38	0.13	2.97	2.82
1.05 cms	1.00 cms	312.88	1.54	1.217	5-S2n	0.45	0.48	0.45	0.15	3.07	3.02
1.24 cms	1.02 cms	312.92	1.58	1.251	5-S2n	0.46	0.48	0.46	0.17	3.08	3.20

1.43 cms	1.03 cms	312.94	1.61	1.287	5-S2n	0.46	0.49	0.46	0.18	3.08	3.35
1.62 cms	1.04 cms	312.97	1.63	1.303	5-S2n	0.47	0.49	0.47	0.19	3.08	3.50
1.81 cms	1.04 cms	312.99	1.65	1.329	5-S2n	0.48	0.49	0.48	0.21	3.08	3.63
2.00 cms	1.05 cms	313.01	1.67	1.340	5-S2n	0.48	0.49	0.48	0.22	3.08	3.75

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 311.34 m,

Outlet Elevation (invert): 310.45 m

Culvert Length: 35.21 m,

Culvert Slope: 0.0253

Site Data - 5025

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 311.07 m

Outlet Station: 35.20 m

Outlet Elevation: 310.18 m

Number of Barrels: 1

Culvert Data Summary - 5025

Barrel Shape: Circular

Barrel Diameter: 800.00 mm

Barrel Material: Concrete

Embedment: 267.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

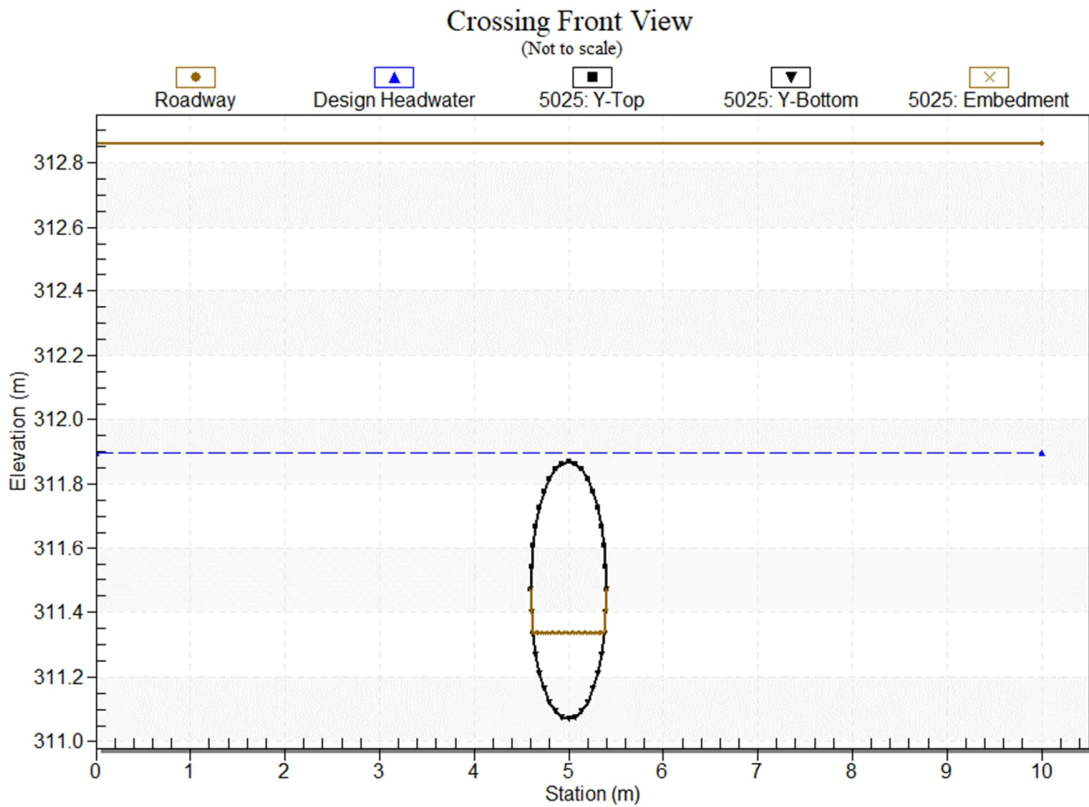
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 5025



Tailwater Data for Crossing: 5025

Table 22 - Downstream Channel Rating Curve (Crossing: 5025)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	310.22	0.04	1.28	184.15	2.15
0.29	310.25	0.07	1.91	346.80	2.37
0.43	310.27	0.09	2.21	437.98	2.45
0.67	310.30	0.12	2.59	568.65	2.55
0.86	310.31	0.13	2.82	658.38	2.60
1.05	310.33	0.15	3.02	739.76	2.64
1.24	310.35	0.17	3.20	814.78	2.68
1.43	310.36	0.18	3.35	884.87	2.71
1.62	310.37	0.19	3.50	950.96	2.73
1.81	310.39	0.21	3.63	1013.59	2.75
2.00	310.40	0.22	3.75	1073.31	2.78

Tailwater Channel Data - 5025

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.5000

Channel Manning's n: 0.0600

Channel Invert Elevation: 310.18 m

Roadway Data for Crossing: 5025

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 312.86 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 5025

Crossing Notes:

Culvert Data: 5310

Water Surface Profile Plot for Culvert: 5310

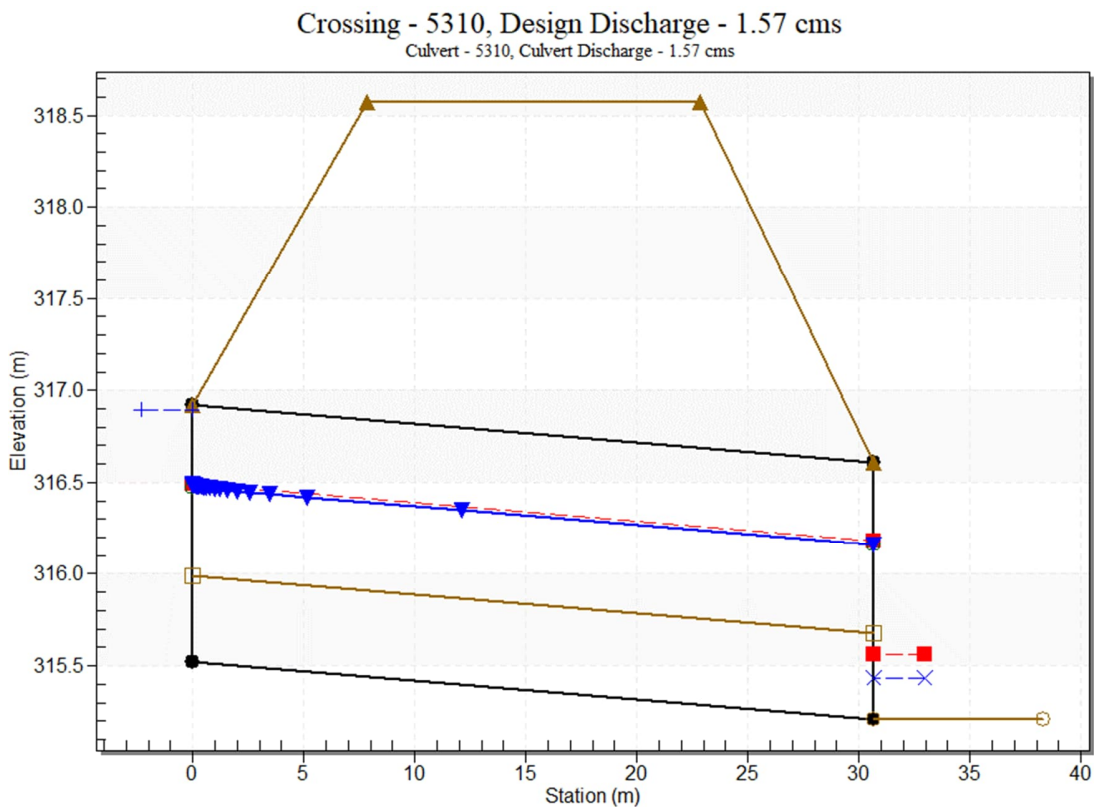


Table 23 - Culvert Summary Table: 5310

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	316.14	0.15	0.0*	1-S2n	0.08	0.08	0.08	0.04	0.90	1.10
0.59 cms	0.59 cms	316.45	0.46	0.001	1-S2n	0.26	0.27	0.26	0.13	1.69	2.10
1.08 cms	1.08 cms	316.68	0.69	0.227	1-S2n	0.37	0.40	0.37	0.18	2.09	2.58
1.57 cms	1.57 cms	316.89	0.90	0.481	1-S2n	0.48	0.50	0.48	0.22	2.38	2.91
2.06 cms	2.06 cms	317.14	1.15	0.771	5-S2n	0.59	0.60	0.59	0.26	2.60	3.18
2.55 cms	2.55 cms	317.43	1.45	1.307	7-M2c	0.70	0.68	0.68	0.29	2.85	3.40
3.04 cms	3.04 cms	317.78	1.80	1.515	7-M2c	0.93	0.74	0.74	0.32	3.16	3.59

3.53 cms	3.53 cms	318.19	2.20	1.895	7-M2c	0.93	0.80	0.80	0.35	3.49	3.76
4.02 cms	3.96 cms	318.59	2.61	2.267	7-M2c	0.93	0.84	0.84	0.37	3.81	3.91
4.51 cms	4.03 cms	318.66	2.68	2.326	7-M2c	0.93	0.84	0.84	0.40	3.86	4.04
5.00 cms	4.08 cms	318.72	2.73	2.373	7-M2c	0.93	0.84	0.84	0.42	3.90	4.17

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 315.99 m,

Outlet Elevation (invert): 315.68 m

Culvert Length: 30.66 m,

Culvert Slope: 0.0101

Site Data - 5310

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 315.52 m

Outlet Station: 30.66 m

Outlet Elevation: 315.21 m

Number of Barrels: 1

Culvert Data Summary - 5310

Barrel Shape: Circular

Barrel Diameter: 1400.00 mm

Barrel Material: Concrete

Embedment: 467.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

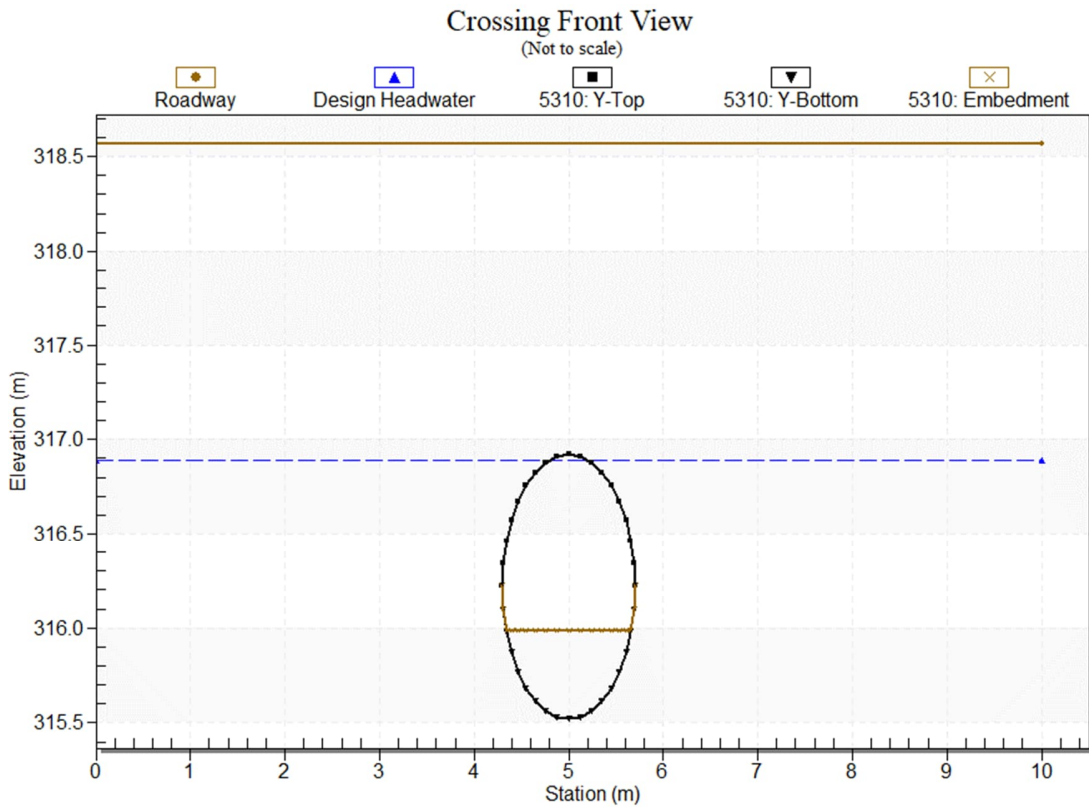
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 5310



Tailwater Data for Crossing: 5310

Table 23 - Downstream Channel Rating Curve (Crossing: 5310)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	315.25	0.04	1.10	128.52	1.71
0.59	315.34	0.13	2.10	367.94	1.99
1.08	315.39	0.18	2.58	523.28	2.09
1.57	315.43	0.22	2.91	648.90	2.15
2.06	315.47	0.26	3.18	757.49	2.19
2.55	315.50	0.29	3.40	854.44	2.23
3.04	315.53	0.32	3.59	942.83	2.26
3.53	315.56	0.35	3.76	1024.43	2.28
4.02	315.58	0.37	3.91	1100.65	2.30
4.51	315.61	0.40	4.04	1172.35	2.32
5.00	315.63	0.42	4.17	1240.28	2.33

Tailwater Channel Data - 5310

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.3000

Channel Manning's n: 0.0600

Channel Invert Elevation: 315.21 m

Roadway Data for Crossing: 5310

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 318.57 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 5310

Crossing Notes:

Culvert Data: 5670

Water Surface Profile Plot for Culvert: 5670

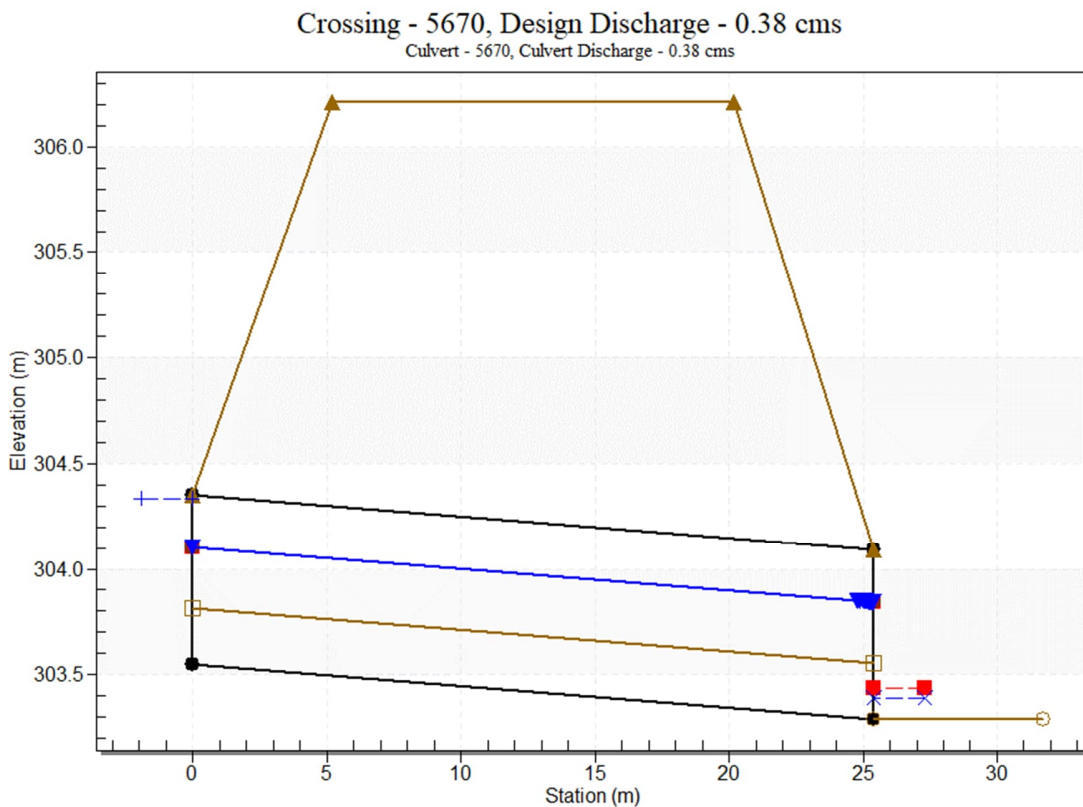


Table 24 - Culvert Summary Table: 5670

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	304.03	0.21	0.209	2-M2c	0.12	0.12	0.12	0.04	1.07	1.10
0.19 cms	0.19 cms	304.14	0.31	0.321	2-M2c	0.18	0.18	0.18	0.06	1.33	1.39
0.28 cms	0.28 cms	304.23	0.41	0.417	2-M2c	0.23	0.23	0.23	0.08	1.53	1.61
0.38 cms	0.38 cms	304.33	0.51	0.514	2-M2c	0.29	0.28	0.28	0.10	1.72	1.79
0.46 cms	0.46 cms	304.42	0.60	0.587	7-M2c	0.33	0.32	0.32	0.11	1.86	1.92
0.55 cms	0.55 cms	304.53	0.71	0.668	7-M2c	0.39	0.36	0.36	0.12	2.02	2.04
0.64 cms	0.64 cms	304.66	0.84	0.753	7-M2c	0.45	0.39	0.39	0.13	2.17	2.16

0.73 cms	0.73 cms	304.81	0.99	0.878	7-M2c	0.53	0.42	0.42	0.14	2.35	2.26
0.82 cms	0.82 cms	304.97	1.16	1.107	7-M2c	0.53	0.44	0.44	0.15	2.53	2.35
0.91 cms	0.91 cms	305.16	1.34	1.319	7-M2c	0.53	0.46	0.46	0.16	2.72	2.43
1.00 cms	1.00 cms	305.36	1.54	1.546	7-M2c	0.53	0.48	0.48	0.17	2.93	2.51

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 303.82 m,

Outlet Elevation (invert): 303.56 m

Culvert Length: 25.39 m,

Culvert Slope: 0.0102

Site Data - 5670

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 303.55 m

Outlet Station: 25.39 m

Outlet Elevation: 303.29 m

Number of Barrels: 1

Culvert Data Summary - 5670

Barrel Shape: Circular

Barrel Diameter: 800.00 mm

Barrel Material: Concrete

Embedment: 267.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

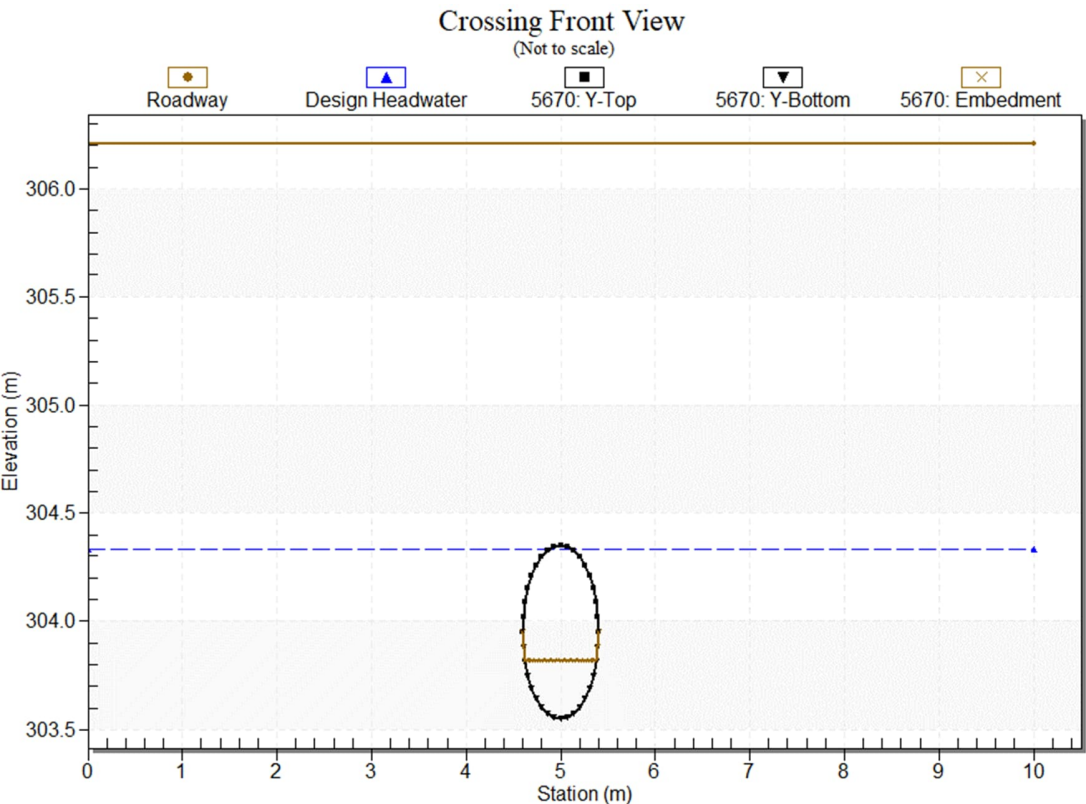
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 5670



Tailwater Data for Crossing: 5670

Table 24 - Downstream Channel Rating Curve (Crossing: 5670)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	303.33	0.04	1.10	128.52	1.71
0.19	303.35	0.06	1.39	188.43	1.81
0.28	303.37	0.08	1.61	237.11	1.87
0.38	303.39	0.10	1.79	284.02	1.92
0.46	303.40	0.11	1.92	317.88	1.95
0.55	303.41	0.12	2.04	353.08	1.98
0.64	303.42	0.13	2.16	385.85	2.01
0.73	303.43	0.14	2.26	416.66	2.03
0.82	303.44	0.15	2.35	445.93	2.05
0.91	303.45	0.16	2.43	473.79	2.06
1.00	303.46	0.17	2.51	500.44	2.08

Tailwater Channel Data - 5670

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.3000

Channel Manning's n: 0.0600

Channel Invert Elevation: 303.29 m

Roadway Data for Crossing: 5670

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 306.21 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 5670

Crossing Notes:

Culvert Data: 6175

Water Surface Profile Plot for Culvert: 6175

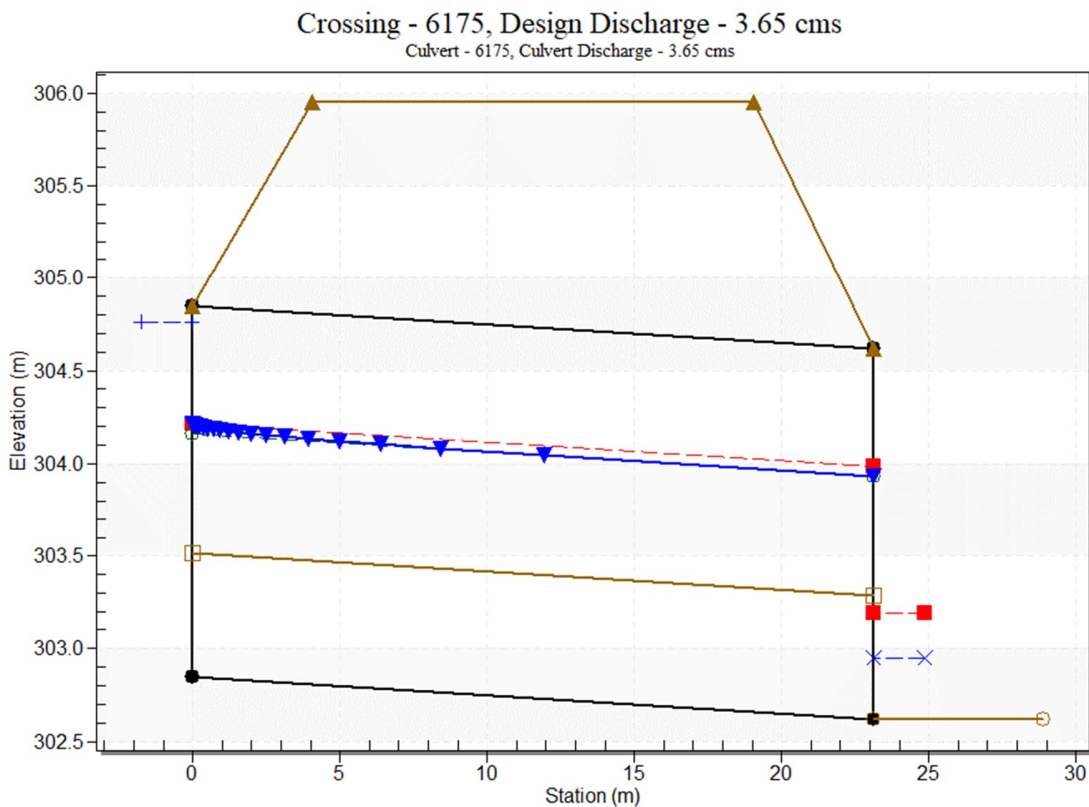


Table 25 - Culvert Summary Table: 6175

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	303.66	0.15	0.116	2-M2c	0.07	0.07	0.07	0.04	0.80	1.20
0.59 cms	0.59 cms	303.88	0.37	0.0*	1-S2n	0.20	0.21	0.20	0.11	1.53	2.30
1.08 cms	1.08 cms	304.06	0.55	0.113	1-S2n	0.29	0.32	0.29	0.16	1.88	2.84
1.57 cms	1.57 cms	304.22	0.70	0.230	1-S2n	0.37	0.40	0.37	0.20	2.15	3.21
2.06 cms	2.06 cms	304.35	0.84	0.348	1-S2n	0.44	0.48	0.44	0.24	2.37	3.51
2.55 cms	2.55 cms	304.48	0.96	0.468	1-S2n	0.51	0.55	0.51	0.27	2.56	3.75
3.04 cms	3.04 cms	304.60	1.09	0.594	1-S2n	0.57	0.62	0.57	0.30	2.72	3.97

3.65 cms	3.65 cms	304.76	1.24	0.758	1-S2n	0.64	0.70	0.64	0.33	2.90	4.20
4.02 cms	4.02 cms	304.86	1.34	0.861	5-S2n	0.69	0.74	0.69	0.35	2.99	4.32
4.51 cms	4.51 cms	305.00	1.49	1.006	5-S2n	0.75	0.80	0.75	0.37	3.11	4.47
5.00 cms	5.00 cms	305.15	1.64	1.156	5-S2n	0.80	0.85	0.81	0.39	3.21	4.61

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 303.52 m,

Outlet Elevation (invert): 303.29 m

Culvert Length: 23.12 m,

Culvert Slope: 0.0099

Site Data - 6175

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 302.85 m

Outlet Station: 23.12 m

Outlet Elevation: 302.62 m

Number of Barrels: 1

Culvert Data Summary - 6175

Barrel Shape: Circular

Barrel Diameter: 2000.00 mm

Barrel Material: Concrete

Embedment: 667.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

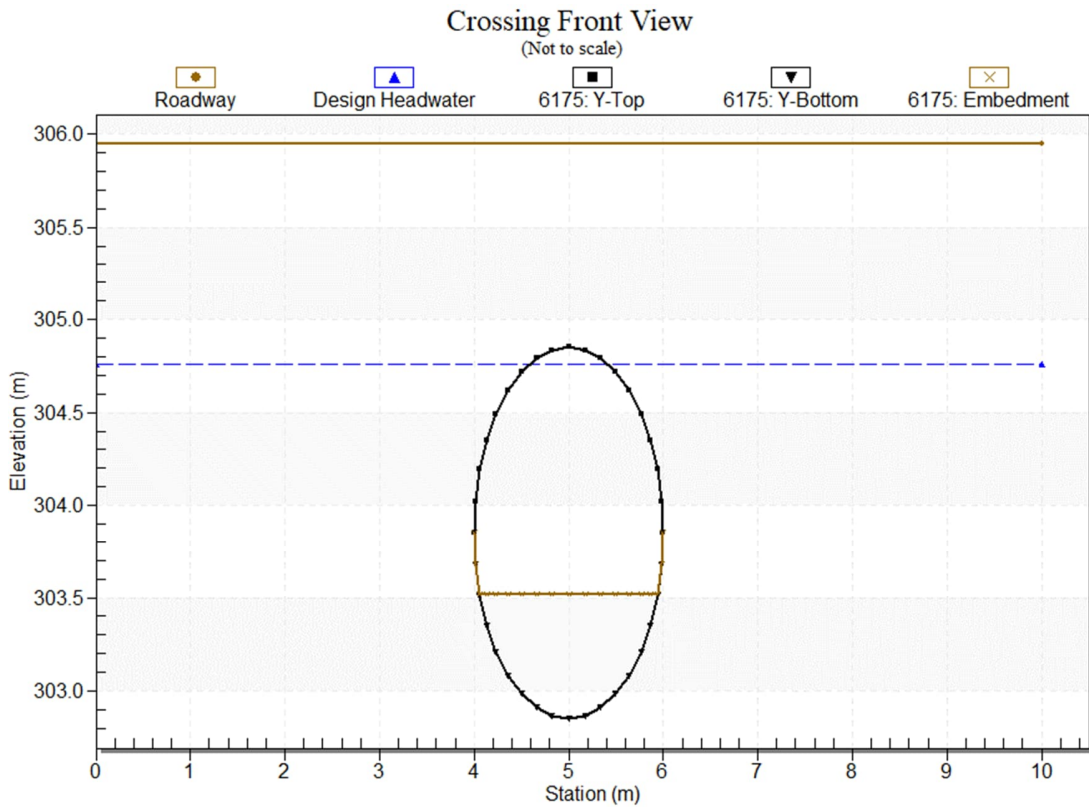
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes: Qbidrag fra 6240

Crossing Front View (Roadway Profile): 6175



Tailwater Data for Crossing: 6175

Table 25 - Downstream Channel Rating Curve (Crossing: 6175)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	302.66	0.04	1.20	157.25	1.95
0.59	302.73	0.11	2.30	450.84	2.27
1.08	302.78	0.16	2.84	641.77	2.39
1.57	302.82	0.20	3.21	796.74	2.46
2.06	302.86	0.24	3.51	930.75	2.51
2.55	302.89	0.27	3.75	1050.47	2.55
3.04	302.92	0.30	3.97	1159.78	2.58
3.65	302.95	0.33	4.20	1284.66	2.61
4.02	302.97	0.35	4.32	1355.43	2.63
4.51	302.99	0.37	4.47	1444.42	2.65
5.00	303.01	0.39	4.61	1528.68	2.67

Tailwater Channel Data - 6175

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.4000

Channel Manning's n: 0.0600

Channel Invert Elevation: 302.62 m

Roadway Data for Crossing: 6175

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 305.95 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 6175

Crossing Notes:

Culvert Data: 6240

Water Surface Profile Plot for Culvert: 6240

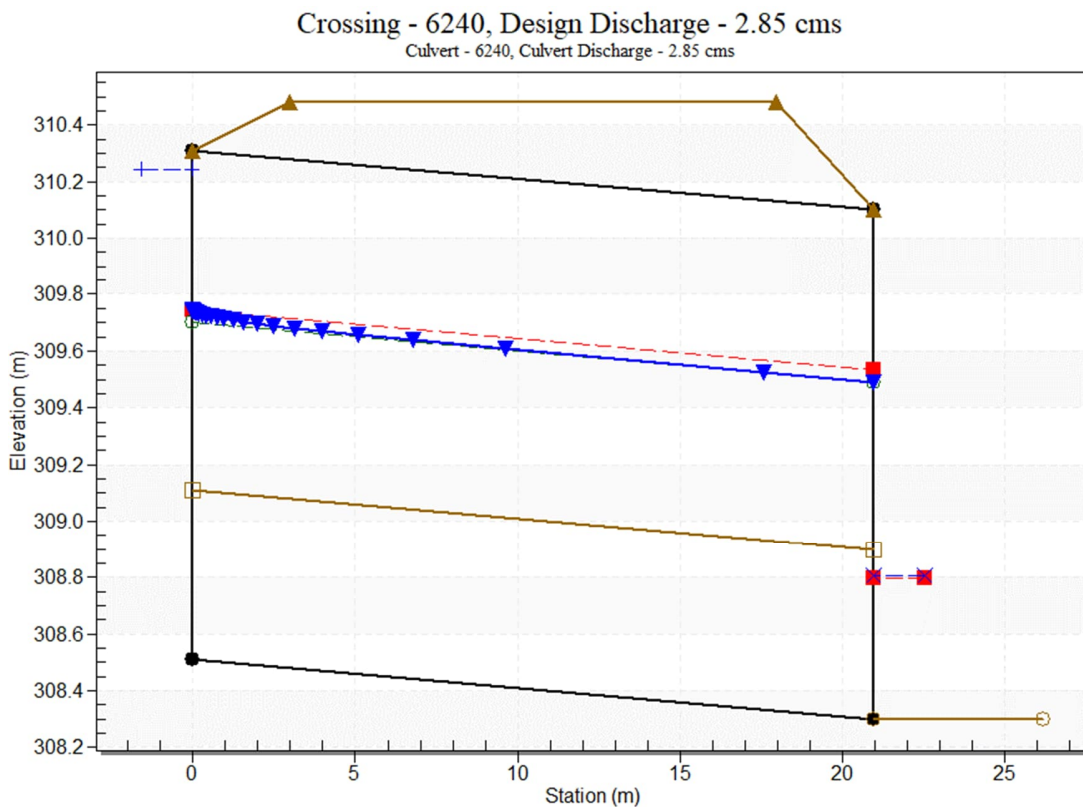


Table 26 - Culvert Summary Table: 6240

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	309.25	0.14	0.0*	1-S2n	0.07	0.07	0.07	0.07	0.83	0.62
0.59 cms	0.59 cms	309.50	0.39	0.030	1-S2n	0.21	0.23	0.21	0.21	1.57	1.16
1.08 cms	1.08 cms	309.70	0.59	0.169	1-S2n	0.32	0.34	0.32	0.30	1.94	1.40
1.57 cms	1.57 cms	309.86	0.75	0.307	1-S2n	0.40	0.43	0.40	0.37	2.22	1.57
2.06 cms	2.06 cms	310.01	0.90	0.449	1-S2n	0.48	0.51	0.48	0.42	2.45	1.71
2.55 cms	2.55 cms	310.15	1.04	0.601	1-S2n	0.55	0.59	0.55	0.48	2.64	1.82
2.85 cms	2.85 cms	310.24	1.13	0.696	1-S2n	0.59	0.63	0.59	0.50	2.74	1.88

3.53 cms	3.53 cms	310.47	1.36	0.929	5-S2n	0.69	0.73	0.69	0.57	2.94	1.99
4.02 cms	3.74 cms	310.55	1.44	1.005	5-S2n	0.72	0.75	0.72	0.61	3.00	2.07
4.51 cms	3.87 cms	310.59	1.48	1.053	5-S2n	0.74	0.77	0.74	0.64	3.02	2.13
5.00 cms	3.98 cms	310.64	1.53	1.092	5-S2n	0.75	0.78	0.75	0.68	3.05	2.20

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 309.11 m,

Outlet Elevation (invert): 308.90 m

Culvert Length: 20.95 m,

Culvert Slope: 0.0100

Site Data - 6240

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 308.51 m

Outlet Station: 20.95 m

Outlet Elevation: 308.30 m

Number of Barrels: 1

Culvert Data Summary - 6240

Barrel Shape: Circular

Barrel Diameter: 1800.00 mm

Barrel Material: Concrete

Embedment: 600.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

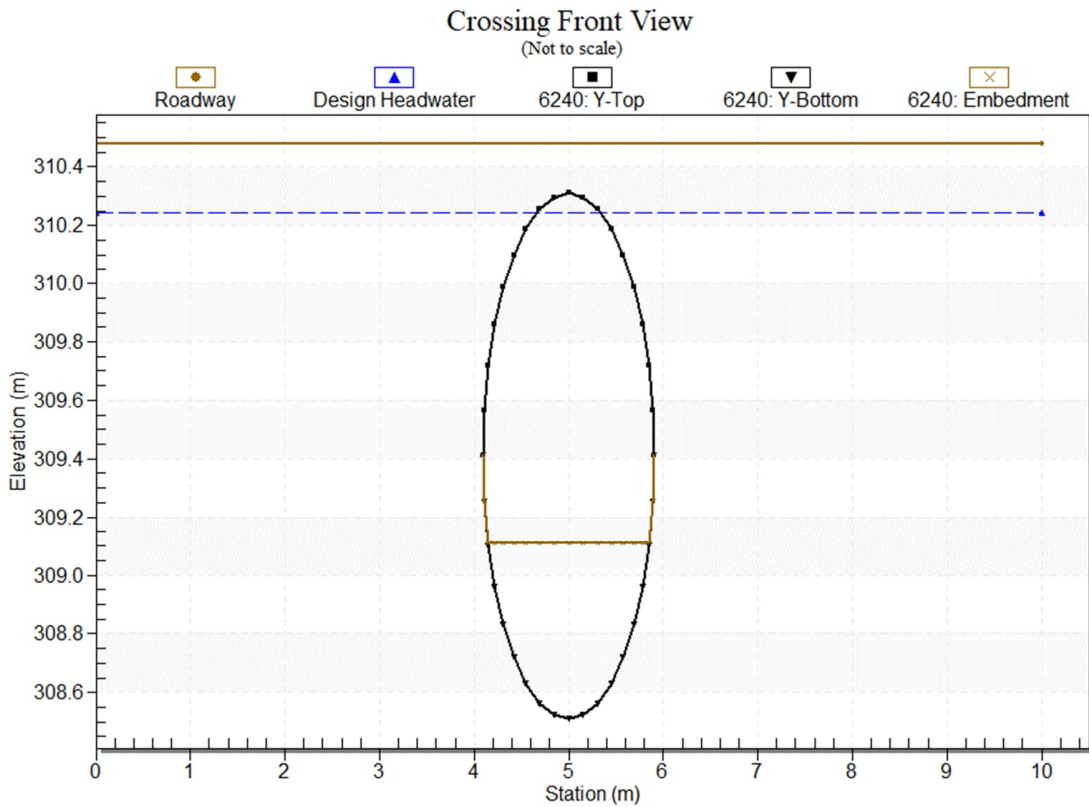
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes: Skal videre til 6175. Q plusses p der

Crossing Front View (Roadway Profile): 6240



Tailwater Data for Crossing: 6240

Table 26 - Downstream Channel Rating Curve (Crossing: 6240)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	308.37	0.07	0.62	36.51	0.76
0.59	308.51	0.21	1.16	103.14	0.87
1.08	308.60	0.30	1.40	145.37	0.91
1.57	308.67	0.37	1.57	179.03	0.94
2.06	308.72	0.42	1.71	207.74	0.95
2.55	308.78	0.48	1.82	233.16	0.97
2.85	308.80	0.50	1.88	247.48	0.97
3.53	308.87	0.57	1.99	277.23	0.99
4.02	308.91	0.61	2.07	296.82	1.00
4.51	308.94	0.64	2.13	315.16	1.00
5.00	308.98	0.68	2.20	332.43	1.01

Tailwater Channel Data - 6240

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (2:1)

Channel Slope: 0.0500

Channel Manning's n: 0.0600

Channel Invert Elevation: 308.30 m

Roadway Data for Crossing: 6240

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 310.48 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 6240

Crossing Notes:

Culvert Data: 6899

Water Surface Profile Plot for Culvert: 6899

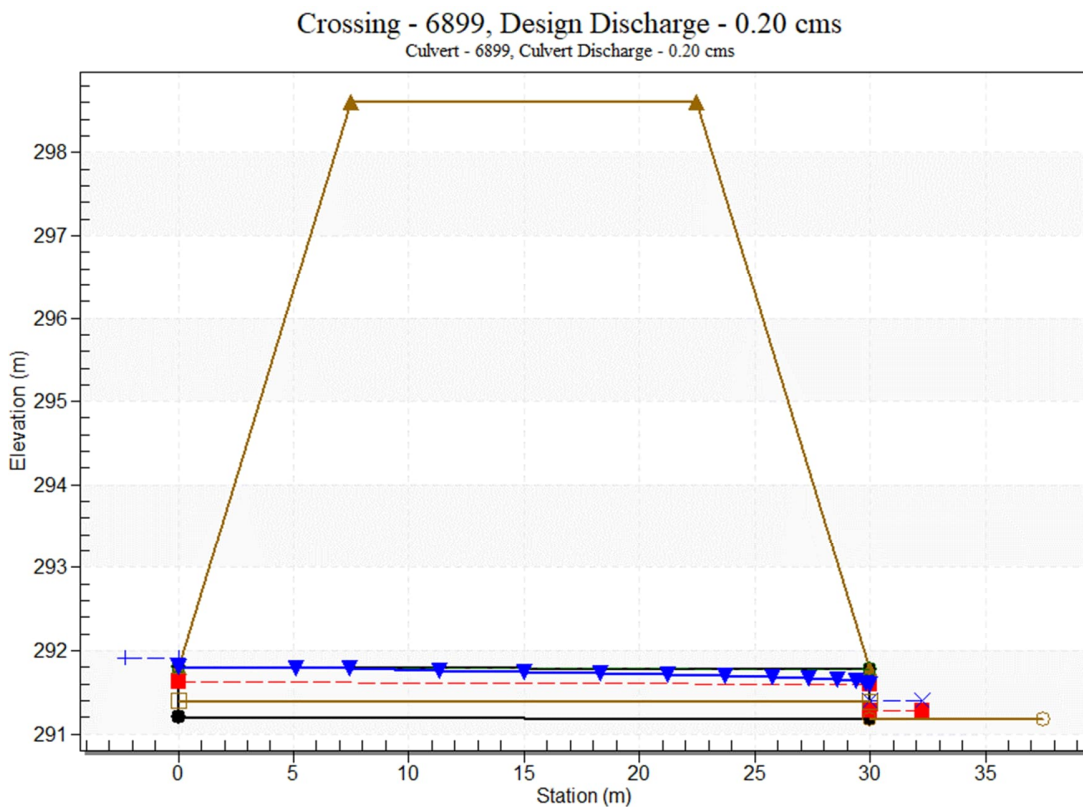


Table 27 - Culvert Summary Table: 6899

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	291.70	0.25	0.299	2-M2c	0.40	0.14	0.14	0.15	1.18	0.30
0.20 cms	0.20 cms	291.91	0.41	0.506	7-M2c	0.40	0.22	0.22	0.22	1.53	0.37
0.28 cms	0.28 cms	292.18	0.56	0.784	7-M2c	0.40	0.27	0.27	0.27	1.78	0.42
0.37 cms	0.37 cms	292.54	0.78	1.142	7-M2c	0.40	0.32	0.32	0.31	2.08	0.46
0.46 cms	0.46 cms	292.96	1.06	1.564	7-M2c	0.40	0.35	0.35	0.35	2.43	0.49
0.55 cms	0.55 cms	293.46	1.42	2.057	7-M2c	0.40	0.37	0.37	0.39	2.82	0.51
0.64 cms	0.64 cms	294.09	1.96	2.691	7-M2c	0.40	0.36	0.40	0.42	3.32	0.54

0.73 cms	0.73 cms	294.79	2.85	3.387	6-FFc	0.40	0.40	0.40	0.45	3.66	0.56
0.82 cms	0.82 cms	295.83	4.43	4.279	6-FFc	0.40	0.40	0.40	0.48	4.11	0.58
0.91 cms	0.91 cms	298.58	7.18	5.176	6-FFc	0.40	0.40	0.40	0.51	4.56	0.59
1.00 cms	0.91 cms	298.63	7.23	5.190	6-FFc	0.40	0.40	0.40	0.53	4.57	0.61

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 291.40 m,

Outlet Elevation (invert): 291.38 m

Culvert Length: 30.00 m,

Culvert Slope: 0.0007

Site Data - 6899

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 291.20 m

Outlet Station: 30.00 m

Outlet Elevation: 291.18 m

Number of Barrels: 1

Culvert Data Summary - 6899

Barrel Shape: Circular

Barrel Diameter: 600.00 mm

Barrel Material: Concrete

Embedment: 200.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

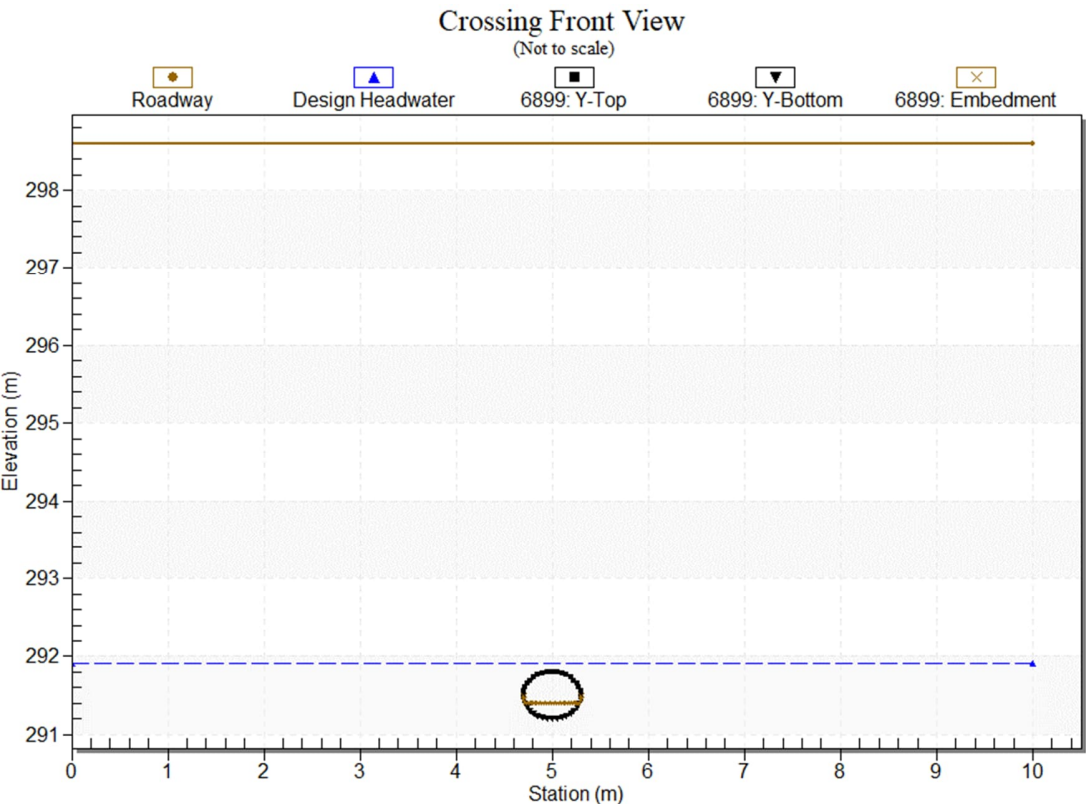
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes: Skal til 6900

Crossing Front View (Roadway Profile): 6899



Tailwater Data for Crossing: 6899

Table 27 - Downstream Channel Rating Curve (Crossing: 6899)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	291.33	0.15	0.30	7.19	0.26
0.20	291.40	0.22	0.37	10.73	0.28
0.28	291.45	0.27	0.42	13.00	0.28
0.37	291.49	0.31	0.46	15.20	0.29
0.46	291.53	0.35	0.49	17.16	0.29
0.55	291.57	0.39	0.51	18.94	0.30
0.64	291.60	0.42	0.54	20.57	0.30
0.73	291.63	0.45	0.56	22.10	0.30
0.82	291.66	0.48	0.58	23.53	0.31
0.91	291.69	0.51	0.59	24.88	0.31
1.00	291.71	0.53	0.61	26.16	0.31

Tailwater Channel Data - 6899

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0050

Channel Manning's n: 0.0600

Channel Invert Elevation: 291.18 m

Roadway Data for Crossing: 6899

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 298.60 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 6899

Crossing Notes:

Culvert Data: 6900_oppstrKryssing

Water Surface Profile Plot for Culvert: 6900_oppstrKryssing

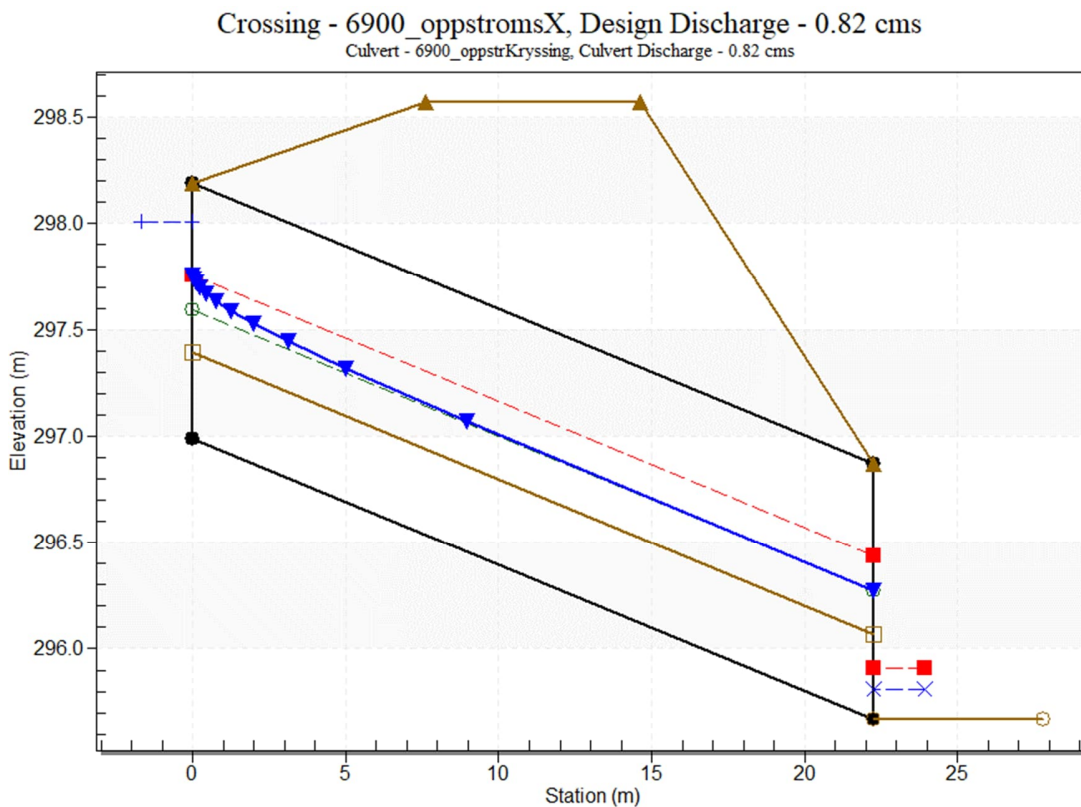


Table 28 - Culvert Summary Table: 6900_oppstrKryssing

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	297.53	0.14	0.0*	1-S2n	0.05	0.09	0.05	0.04	1.66	1.20
0.29 cms	0.29 cms	297.69	0.30	0.0*	1-S2n	0.10	0.19	0.10	0.08	2.43	1.78
0.48 cms	0.48 cms	297.82	0.43	0.0*	1-S2n	0.14	0.26	0.14	0.10	2.91	2.14
0.67 cms	0.67 cms	297.93	0.54	0.0*	1-S2n	0.18	0.32	0.18	0.12	3.26	2.41
0.82 cms	0.82 cms	298.01	0.62	0.0*	1-S2n	0.20	0.36	0.20	0.14	3.43	2.58
1.05 cms	1.05 cms	298.14	0.75	0.0*	1-S2n	0.23	0.43	0.24	0.16	3.70	2.81
1.24 cms	1.24 cms	298.25	0.86	0.0*	5-S2n	0.26	0.47	0.26	0.18	3.98	2.97

1.43 cms	1.43 cms	298.38	0.99	0.0*	5-S2n	0.28	0.52	0.29	0.19	4.19	3.11
1.62 cms	1.62 cms	298.52	1.13	0.0*	5-S2n	0.31	0.56	0.32	0.21	4.34	3.24
1.81 cms	1.72 cms	298.60	1.21	0.0*	5-S2n	0.32	0.58	0.33	0.22	4.40	3.36
2.00 cms	1.76 cms	298.63	1.24	0.0*	5-S2n	0.32	0.59	0.34	0.23	4.43	3.47

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 297.39 m,

Outlet Elevation (invert): 296.07 m

Culvert Length: 22.29 m,

Culvert Slope: 0.0593

Site Data - 6900_oppstrKryssing

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 296.99 m

Outlet Station: 22.25 m

Outlet Elevation: 295.67 m

Number of Barrels: 1

Culvert Data Summary - 6900_oppstrKryssing

Barrel Shape: Circular

Barrel Diameter: 1200.00 mm

Barrel Material: Concrete

Embedment: 400.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

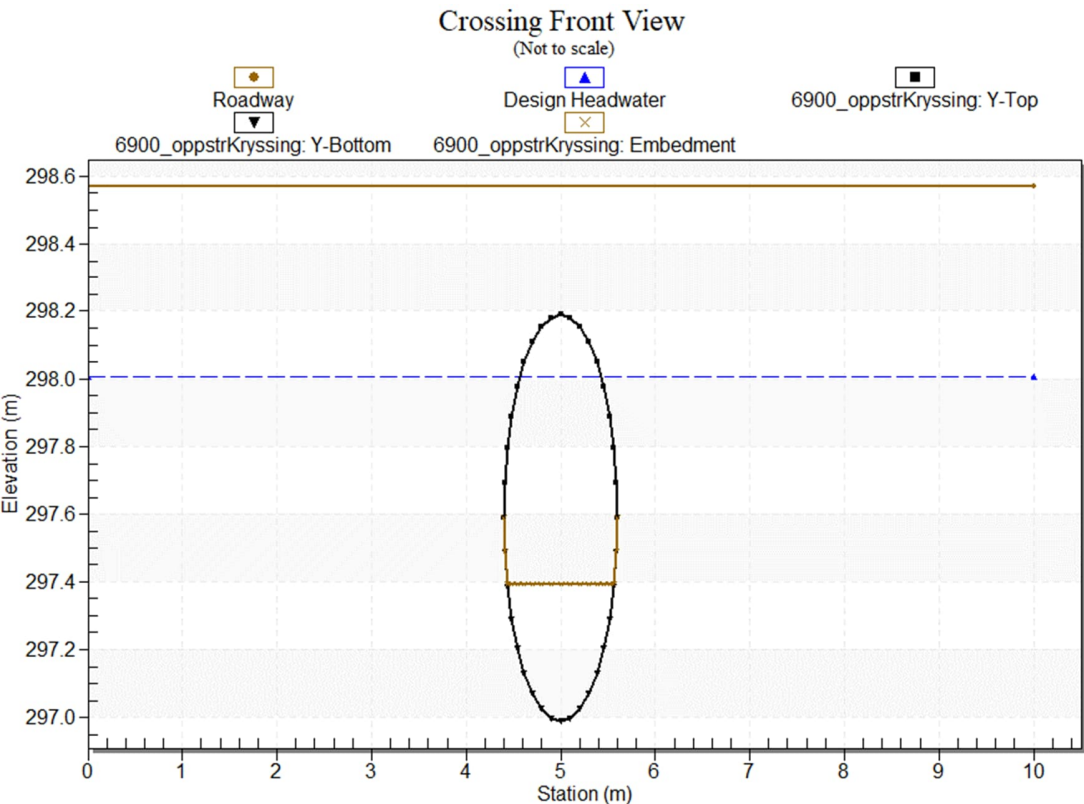
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 6900_oppstromsX



Tailwater Data for Crossing: 6900_oppstromsX

Table 28 - Downstream Channel Rating Curve (Crossing: 6900_oppstromsX)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	295.71	0.04	1.20	157.25	1.95
0.29	295.75	0.08	1.78	296.40	2.14
0.48	295.77	0.10	2.14	399.36	2.24
0.67	295.79	0.12	2.41	485.78	2.30
0.82	295.81	0.14	2.58	546.66	2.34
1.05	295.83	0.16	2.81	631.43	2.38
1.24	295.85	0.18	2.97	695.37	2.41
1.43	295.86	0.19	3.11	754.94	2.44
1.62	295.88	0.21	3.24	811.16	2.46
1.81	295.89	0.22	3.36	864.47	2.48
2.00	295.90	0.23	3.47	915.16	2.50

Tailwater Channel Data - 6900_oppstromsX

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.4000

Channel Manning's n: 0.0600

Channel Invert Elevation: 295.67 m

Roadway Data for Crossing: 6900_oppstromsX

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 298.57 m

Roadway Surface: Paved

Roadway Top Width: 7.00 m

Crossing Data: 6900_oppstromsX

Crossing Notes:

Culvert Data: 6900_E6-krysning

Water Surface Profile Plot for Culvert: 6900_E6-krysning

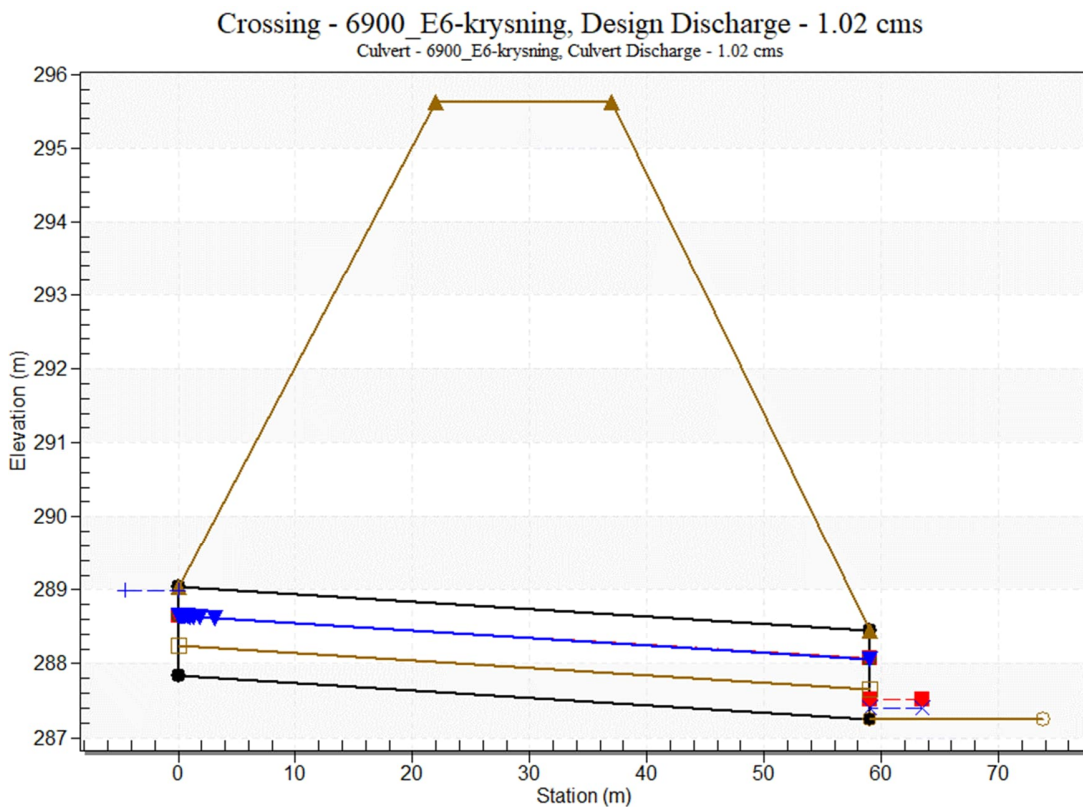


Table 29 - Culvert Summary Table: 6900_E6-krysning

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	288.40	0.16	0.162	2-M2c	0.09	0.09	0.09	0.04	0.94	1.27
0.29 cms	0.29 cms	288.56	0.32	0.0*	1-S2n	0.18	0.19	0.18	0.07	1.36	1.89
0.48 cms	0.48 cms	288.69	0.45	0.0*	1-S2n	0.25	0.26	0.25	0.10	1.63	2.27
0.67 cms	0.67 cms	288.79	0.55	0.0*	1-S2n	0.31	0.32	0.31	0.12	1.84	2.55
0.86 cms	0.86 cms	288.90	0.66	0.046	1-S2n	0.36	0.38	0.36	0.14	2.01	2.78
1.02 cms	1.02 cms	288.99	0.75	0.188	1-S2n	0.41	0.42	0.41	0.15	2.13	2.95
1.24 cms	1.24 cms	289.12	0.88	0.400	5-S2n	0.47	0.47	0.47	0.17	2.27	3.16

1.43 cms	1.43 cms	289.25	1.01	0.968	7-M2c	0.53	0.52	0.52	0.18	2.40	3.31
1.62 cms	1.62 cms	289.39	1.15	1.060	7-M2c	0.58	0.56	0.56	0.20	2.55	3.45
1.81 cms	1.81 cms	289.54	1.30	1.153	7-M2c	0.65	0.59	0.59	0.21	2.70	3.58
2.00 cms	2.00 cms	289.71	1.47	1.267	7-M2c	0.80	0.63	0.63	0.22	2.86	3.69

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 288.24 m,

Outlet Elevation (invert): 287.65 m

Culvert Length: 59.04 m,

Culvert Slope: 0.0100

Site Data - 6900_E6-krysning

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 287.84 m

Outlet Station: 59.04 m

Outlet Elevation: 287.25 m

Number of Barrels: 1

Culvert Data Summary - 6900_E6-krysning

Barrel Shape: Circular

Barrel Diameter: 1200.00 mm

Barrel Material: Concrete

Embedment: 400.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

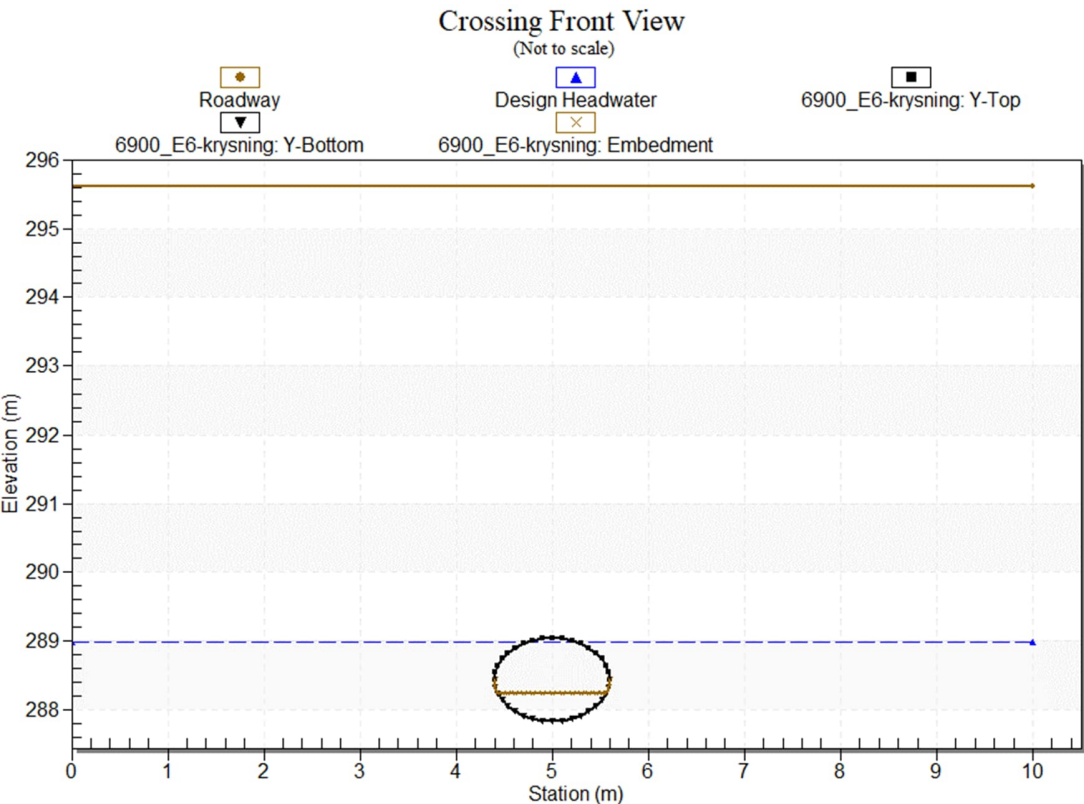
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 6900_E6-krysning



Tailwater Data for Crossing: 6900_E6-krysning

Table 29 - Downstream Channel Rating Curve (Crossing: 6900_E6-krysning)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	287.29	0.04	1.27	178.90	2.11
0.29	287.32	0.07	1.89	337.04	2.33
0.48	287.35	0.10	2.27	454.11	2.43
0.67	287.37	0.12	2.55	552.52	2.50
0.86	287.39	0.14	2.78	639.56	2.55
1.02	287.40	0.15	2.95	706.50	2.59
1.24	287.42	0.17	3.16	791.45	2.63
1.43	287.43	0.18	3.31	859.61	2.66
1.62	287.45	0.20	3.45	923.76	2.68
1.81	287.46	0.21	3.58	984.58	2.70
2.00	287.47	0.22	3.69	1042.44	2.72

Tailwater Channel Data - 6900_E6-krysning

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (2:1)

Channel Slope: 0.4800

Channel Manning's n: 0.0600

Channel Invert Elevation: 287.25 m

Roadway Data for Crossing: 6900_E6-krysning

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 295.62 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Crossing Data: 6900_E6-krysning

Crossing Notes:

Culvert Data: 7170

Water Surface Profile Plot for Culvert: 7170

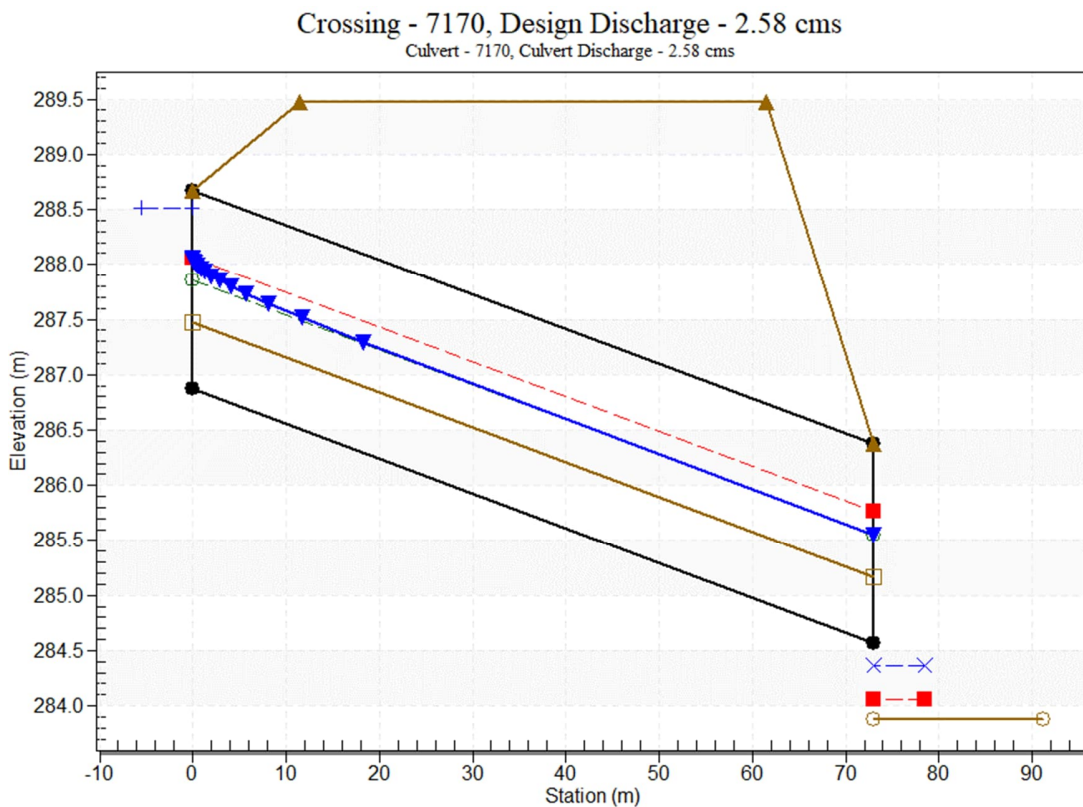


Table 30 - Culvert Summary Table: 7170

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	287.60	0.13	0.0*	1-S2n	0.05	0.07	0.05	0.07	1.20	0.13
0.59 cms	0.59 cms	287.85	0.38	0.0*	1-S2n	0.15	0.23	0.15	0.21	2.28	0.26
1.08 cms	1.08 cms	288.04	0.57	0.0*	1-S2n	0.22	0.34	0.22	0.29	2.82	0.32
1.57 cms	1.57 cms	288.20	0.73	0.0*	1-S2n	0.28	0.43	0.28	0.36	3.21	0.37
2.06 cms	2.06 cms	288.35	0.88	0.0*	1-S2n	0.33	0.51	0.33	0.43	3.53	0.40
2.58 cms	2.58 cms	288.51	1.04	0.0*	1-S2n	0.38	0.60	0.38	0.48	3.83	0.43
3.04 cms	3.04 cms	288.65	1.18	0.0*	1-S2n	0.42	0.66	0.43	0.53	3.99	0.45

3.53 cms	3.53 cms	288.82	1.35	0.0*	5-S2n	0.47	0.73	0.47	0.58	4.29	0.48
4.02 cms	4.02 cms	289.00	1.53	0.0*	5-S2n	0.51	0.79	0.51	0.62	4.49	0.50
4.51 cms	4.51 cms	289.20	1.73	0.0*	5-S2n	0.55	0.84	0.55	0.66	4.67	0.51
5.00 cms	5.00 cms	289.42	1.95	0.0*	5-S2n	0.59	0.89	0.59	0.70	4.84	0.53

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 287.47 m,

Outlet Elevation (invert): 285.17 m

Culvert Length: 73.03 m,

Culvert Slope: 0.0315

Site Data - 7170

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 286.87 m

Outlet Station: 72.99 m

Outlet Elevation: 284.57 m

Number of Barrels: 1

Culvert Data Summary - 7170

Barrel Shape: Circular

Barrel Diameter: 1800.00 mm

Barrel Material: Concrete

Embedment: 600.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

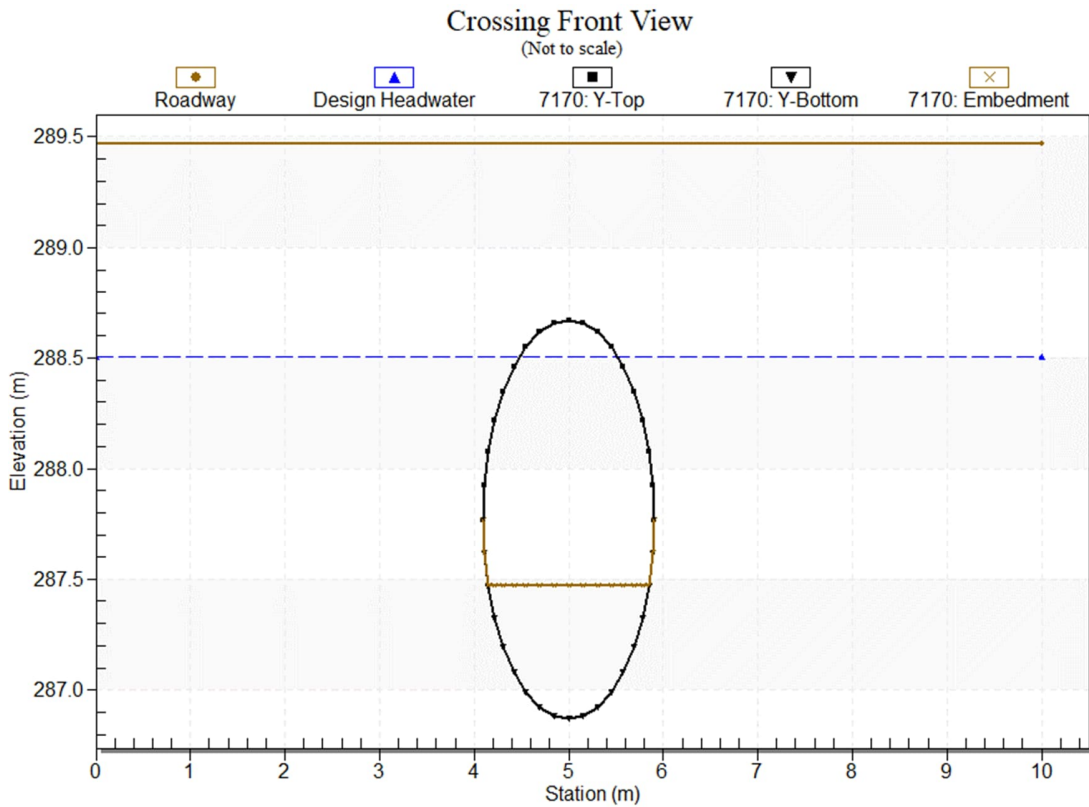
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes: Tar med bidrag fra sydlig omrde mellom veier

Crossing Front View (Roadway Profile): 7170



Tailwater Data for Crossing: 7170

Table 30 - Downstream Channel Rating Curve (Crossing: 7170)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	283.95	0.07	0.13	0.71	0.16
0.59	284.09	0.21	0.26	2.02	0.19
1.08	284.17	0.29	0.32	2.87	0.20
1.57	284.24	0.36	0.37	3.57	0.21
2.06	284.31	0.43	0.40	4.17	0.21
2.58	284.36	0.48	0.43	4.73	0.22
3.04	284.41	0.53	0.45	5.19	0.22
3.53	284.46	0.58	0.48	5.64	0.22
4.02	284.50	0.62	0.50	6.07	0.22
4.51	284.54	0.66	0.51	6.47	0.23
5.00	284.58	0.70	0.53	6.84	0.23

Tailwater Channel Data - 7170

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 m

Side Slope (H:V): 5.00 (_:1)

Channel Slope: 0.0010

Channel Manning's n: 0.0400

Channel Invert Elevation: 283.88 m

Roadway Data for Crossing: 7170

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 289.47 m

Roadway Surface: Paved

Roadway Top Width: 50.00 m

Crossing Data: 7170

Crossing Notes:

Culvert Data: 7550

Water Surface Profile Plot for Culvert: 7550

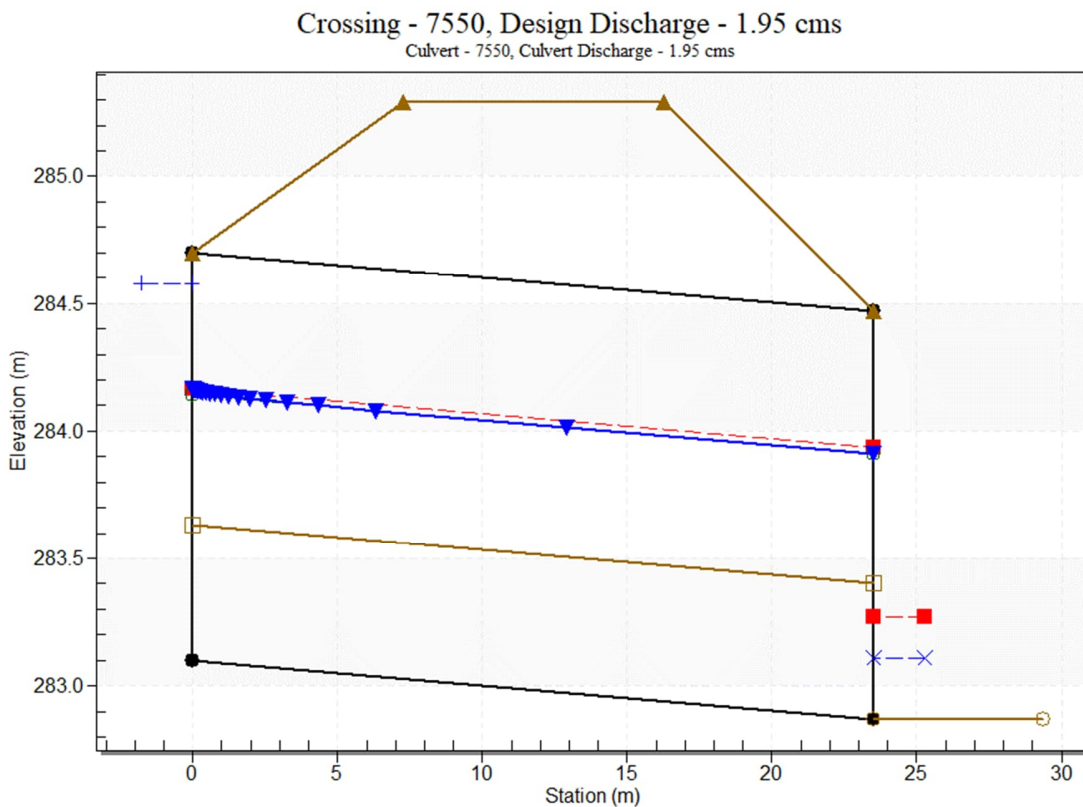


Table 31 - Culvert Summary Table: 7550

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	283.78	0.15	0.134	2-M2c	0.08	0.08	0.08	0.04	0.86	1.15
0.59 cms	0.59 cms	284.06	0.42	0.037	1-S2n	0.23	0.25	0.23	0.12	1.61	2.20
1.08 cms	1.08 cms	284.26	0.63	0.205	1-S2n	0.34	0.36	0.34	0.17	2.00	2.71
1.57 cms	1.57 cms	284.44	0.81	0.380	1-S2n	0.44	0.46	0.44	0.21	2.28	3.07
1.95 cms	1.95 cms	284.58	0.94	0.526	1-S2n	0.51	0.53	0.51	0.24	2.46	3.29
2.55 cms	2.55 cms	284.81	1.18	0.776	5-S2n	0.61	0.63	0.61	0.28	2.68	3.59
3.04 cms	3.04 cms	285.02	1.39	0.999	5-S2n	0.70	0.70	0.70	0.31	2.83	3.79

3.53 cms	3.53 cms	285.27	1.64	1.486	7-M2c	0.79	0.77	0.77	0.33	3.03	3.96
4.02 cms	3.70 cms	285.36	1.73	1.539	7-M2c	0.83	0.79	0.79	0.36	3.11	4.12
4.51 cms	3.79 cms	285.41	1.78	1.568	7-M2c	0.85	0.80	0.80	0.38	3.15	4.27
5.00 cms	3.87 cms	285.46	1.82	1.593	7-M2c	0.87	0.81	0.81	0.40	3.19	4.40

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 283.63 m,

Outlet Elevation (invert): 283.40 m

Culvert Length: 23.51 m,

Culvert Slope: 0.0098

Site Data - 7550

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 283.10 m

Outlet Station: 23.51 m

Outlet Elevation: 282.87 m

Number of Barrels: 1

Culvert Data Summary - 7550

Barrel Shape: Circular

Barrel Diameter: 1600.00 mm

Barrel Material: Concrete

Embedment: 533.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

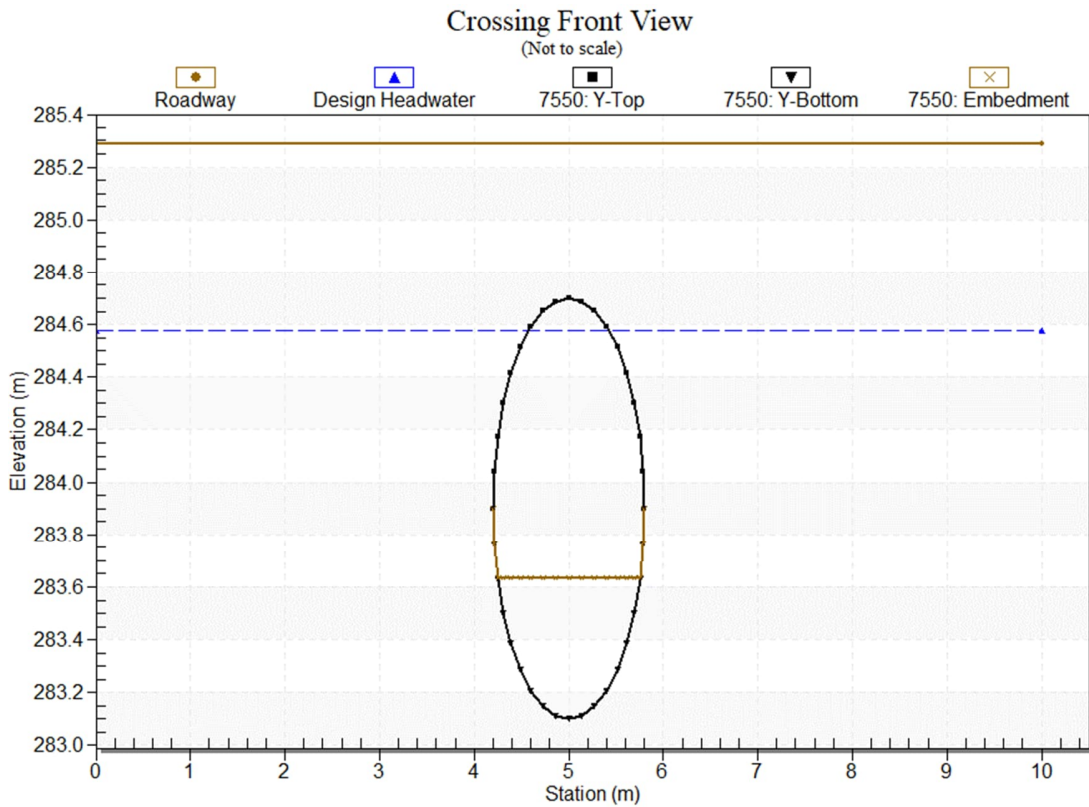
Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Culvert Notes:

Crossing Front View (Roadway Profile): 7550



Tailwater Data for Crossing: 7550

Table 31 - Downstream Channel Rating Curve (Crossing: 7550)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	282.91	0.04	1.15	143.19	1.83
0.59	282.99	0.12	2.20	410.27	2.14
1.08	283.04	0.17	2.71	583.72	2.25
1.57	283.08	0.21	3.07	724.30	2.31
1.95	283.11	0.24	3.29	819.88	2.35
2.55	283.15	0.28	3.59	954.52	2.39
3.04	283.18	0.31	3.79	1053.62	2.42
3.53	283.20	0.33	3.96	1145.18	2.45
4.02	283.23	0.36	4.12	1230.71	2.47
4.51	283.25	0.38	4.27	1311.22	2.49
5.00	283.27	0.40	4.40	1387.46	2.51

Tailwater Channel Data - 7550

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.3500

Channel Manning's n: 0.0600

Channel Invert Elevation: 282.87 m

Roadway Data for Crossing: 7550

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 285.29 m

Roadway Surface: Paved

Roadway Top Width: 9.00 m

Crossing Data: 7550

Crossing Notes:

Vedlegg 2: HY-8 Culvert Analysis Report

Culvert Data: 4600

Water Surface Profile Plot for Culvert: 4600

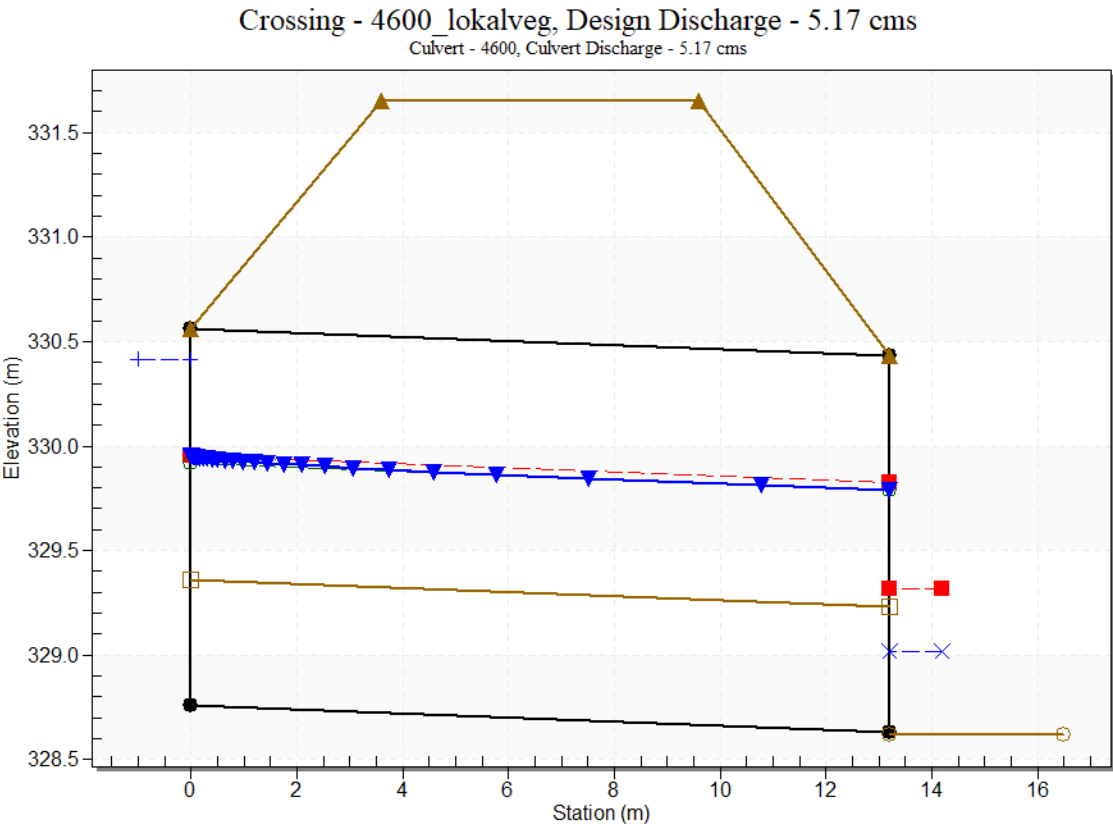


Table 4 - Culvert Summary Table: 4600

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	329.48	0.12	0.078	2-M2c	0.05	0.04	0.04	0.04	0.66	1.20
1.09 cms	1.09 cms	329.73	0.37	0.096	1-S2n	0.20	0.22	0.21	0.16	1.52	2.84
2.08 cms	2.08 cms	329.93	0.57	0.234	1-S2n	0.31	0.33	0.31	0.24	1.90	3.52
3.07 cms	3.07 cms	330.10	0.74	0.368	1-S2n	0.40	0.43	0.40	0.30	2.19	3.98
4.06 cms	4.06 cms	330.25	0.89	0.506	1-S2n	0.47	0.51	0.47	0.35	2.42	4.33
5.17 cms	5.17 cms	330.41	1.05	0.668	1-S2n	0.56	0.60	0.56	0.40	2.63	4.66
6.04 cms	6.04 cms	330.55	1.19	0.802	1-S2n	0.62	0.66	0.62	0.43	2.77	4.88
7.03 cms	7.03 cms	330.71	1.35	0.964	5-S2n	0.69	0.72	0.69	0.47	2.91	5.10
8.02 cms	8.02 cms	330.90	1.54	1.134	5-S2n	0.76	0.78	0.76	0.50	3.04	5.30
9.01 cms	9.01 cms	331.10	1.74	1.312	5-S2n	0.84	0.84	0.84	0.54	3.15	5.48
10.00 cms	10.00 cms	331.32	1.96	1.748	7-M2c	0.92	0.89	0.89	0.57	3.31	5.64

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 329.36 m,

Outlet Elevation (invert): 329.23 m

Culvert Length: 13.20 m,

Culvert Slope: 0.0098

Culvert Data Summary - 4600

Barrel Shape: Circular

Barrel Diameter: 1800.00 mm

Barrel Material: Concrete

Embedment: 600.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 4600

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

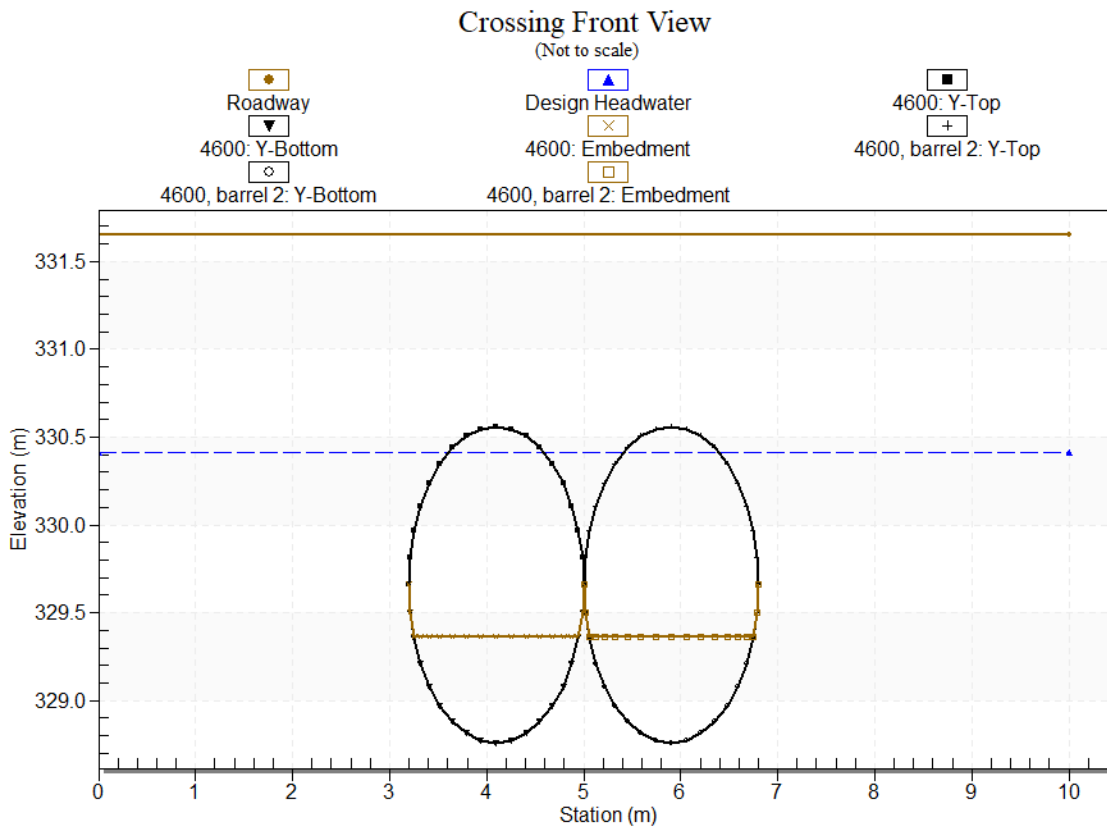
Inlet Elevation: 328.76 m

Outlet Station: 13.20 m

Outlet Elevation: 328.63 m

Number of Barrels: 2

Crossing Front View (Roadway Profile): 4600_lokalveg



Roadway Data for Crossing: 4600_lokalveg

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 331.65 m

Roadway Surface: Paved

Roadway Top Width: 6.00 m

Tailwater Data for Crossing: 4600_lokalveg

Table 4 - Downstream Channel Rating Curve (Crossing: 4600_lokalveg)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	328.66	0.04	1.20	157.25	1.95
1.09	328.78	0.16	2.84	645.27	2.39
2.08	328.86	0.24	3.52	935.84	2.51
3.07	328.92	0.30	3.98	1166.24	2.58
4.06	328.97	0.35	4.33	1362.89	2.63
5.17	329.02	0.40	4.66	1556.96	2.67
6.04	329.05	0.43	4.88	1694.76	2.70
7.03	329.09	0.47	5.10	1839.73	2.73
8.02	329.12	0.50	5.30	1974.37	2.75
9.01	329.16	0.54	5.48	2100.69	2.77
10.00	329.19	0.57	5.64	2219.68	2.79

Tailwater Channel Data - 4600_lokalveg

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (└:1)

Channel Slope: 0.4000

Channel Manning's n: 0.0600

Channel Invert Elevation: 328.62 m

Culvert Data: 3451

Water Surface Profile Plot for Culvert: 3451

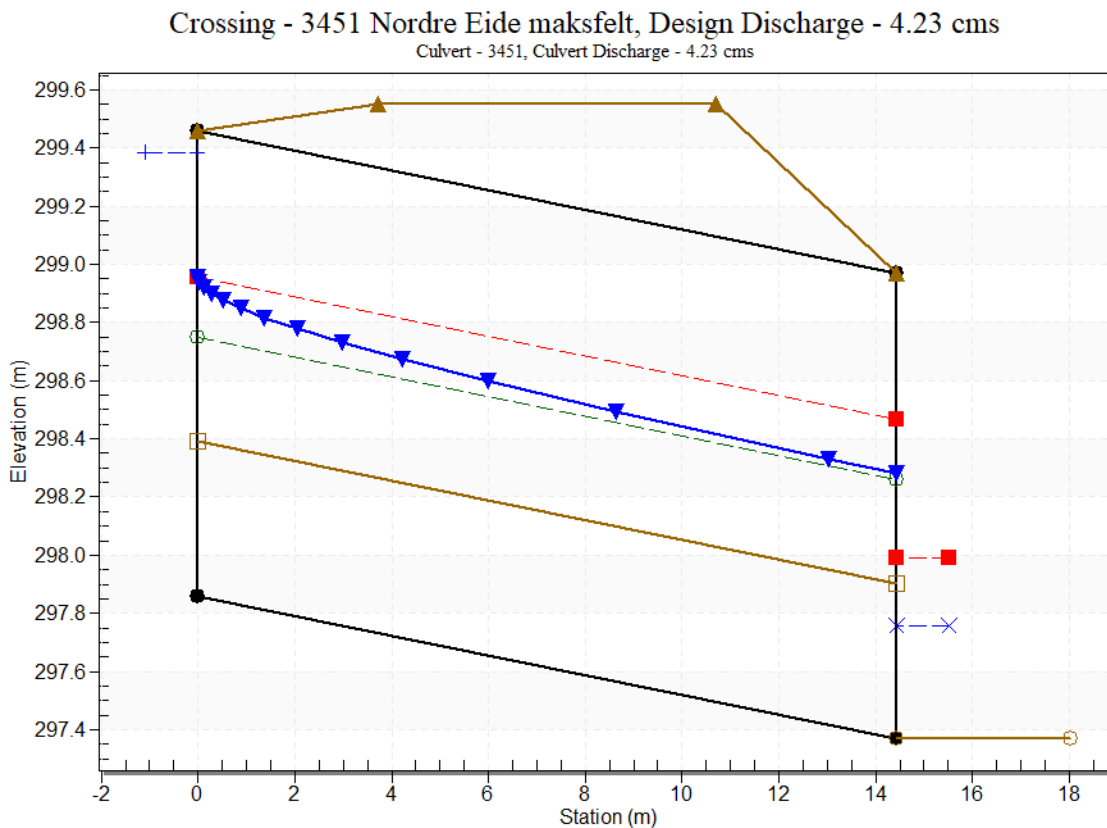


Table 6 - Culvert Summary Table: 3451

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	298.49	0.10	0.0*	1-S2n	0.03	0.05	0.03	0.04	0.99	1.10
1.09 cms	1.09 cms	298.78	0.39	0.0*	1-S2n	0.15	0.23	0.15	0.18	2.35	2.58
2.08 cms	2.08 cms	299.00	0.60	0.0*	1-S2n	0.23	0.36	0.23	0.26	2.87	3.19
3.07 cms	3.07 cms	299.18	0.78	0.092	1-S2n	0.29	0.46	0.30	0.32	3.23	3.60
4.23 cms	4.23 cms	299.38	0.99	0.305	1-S2n	0.36	0.56	0.38	0.38	3.57	3.97
5.05 cms	5.05 cms	299.54	1.15	0.469	5-S2n	0.40	0.63	0.43	0.42	3.76	4.18
6.04 cms	5.54 cms	299.65	1.25	0.571	5-S2n	0.42	0.67	0.45	0.47	3.87	4.41
7.03 cms	5.86 cms	299.72	1.33	0.640	5-S2n	0.44	0.69	0.47	0.51	3.94	4.60
8.02 cms	6.13 cms	299.78	1.39	0.701	5-S2n	0.45	0.71	0.49	0.54	3.99	4.78
9.01 cms	6.37 cms	299.84	1.45	0.757	5-S2n	0.46	0.72	0.50	0.58	4.03	4.94
10.00 cms	6.59 cms	299.90	1.50	0.806	5-S2n	0.47	0.74	0.52	0.61	4.08	5.09

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 298.39 m,

Outlet Elevation (invert): 297.90 m

Culvert Length: 14.44 m,

Culvert Slope: 0.0340

Culvert Data Summary - 3451

Barrel Shape: Circular

Barrel Diameter: 1600.00 mm

Barrel Material: Concrete

Embedment: 533.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 3451

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

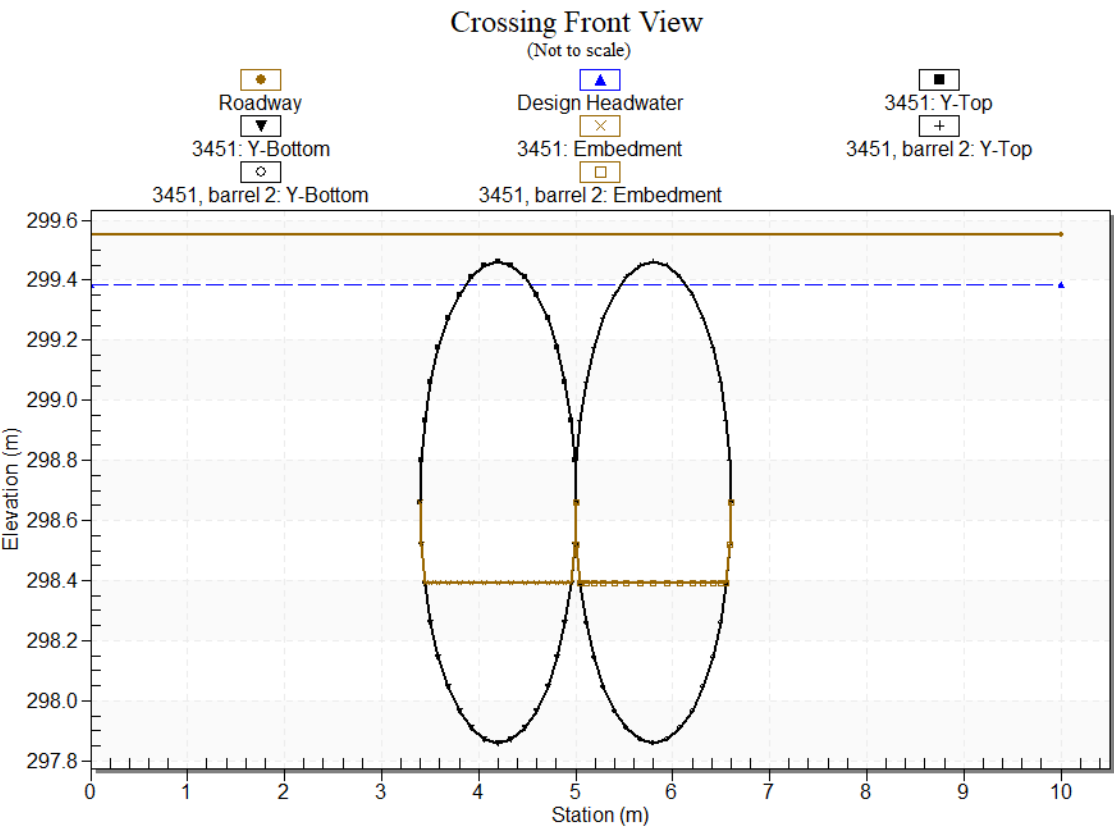
Inlet Elevation: 297.86 m

Outlet Station: 14.43 m

Outlet Elevation: 297.37 m

Number of Barrels: 2

Crossing Front View (Roadway Profile): 3451 Nordre Eide maksfelt



Roadway Data for Crossing: 3451 Nordre Eide maksfelt

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 299.55 m

Roadway Surface: Paved

Roadway Top Width: 7.00 m

Tailwater Data for Crossing: 3451 Nordre Eide maksfelt

Table 6 - Downstream Channel Rating Curve (Crossing: 3451 Nordre Eide maksfelt)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	297.41	0.04	1.10	128.52	1.71
1.09	297.55	0.18	2.58	526.01	2.09
2.08	297.63	0.26	3.19	761.64	2.20
3.07	297.69	0.32	3.60	947.99	2.26
4.23	297.75	0.38	3.97	1131.98	2.31
5.05	297.79	0.42	4.18	1247.06	2.33
6.04	297.84	0.47	4.41	1373.88	2.36
7.03	297.88	0.51	4.60	1490.36	2.39
8.02	297.91	0.54	4.78	1598.55	2.41
9.01	297.95	0.58	4.94	1699.85	2.42
10.00	297.98	0.61	5.09	1795.36	2.44

Tailwater Channel Data - 3451 Nordre Eide maksfelt

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (└:1)

Channel Slope: 0.3000

Channel Manning's n: 0.0600

Channel Invert Elevation: 297.37 m

Culvert Data: 3450

Water Surface Profile Plot for Culvert: 3450

Crossing - 3450 Nordre Eide minimum, Design Discharge - 1.44 cms

Culvert - 3450, Culvert Discharge - 1.44 cms

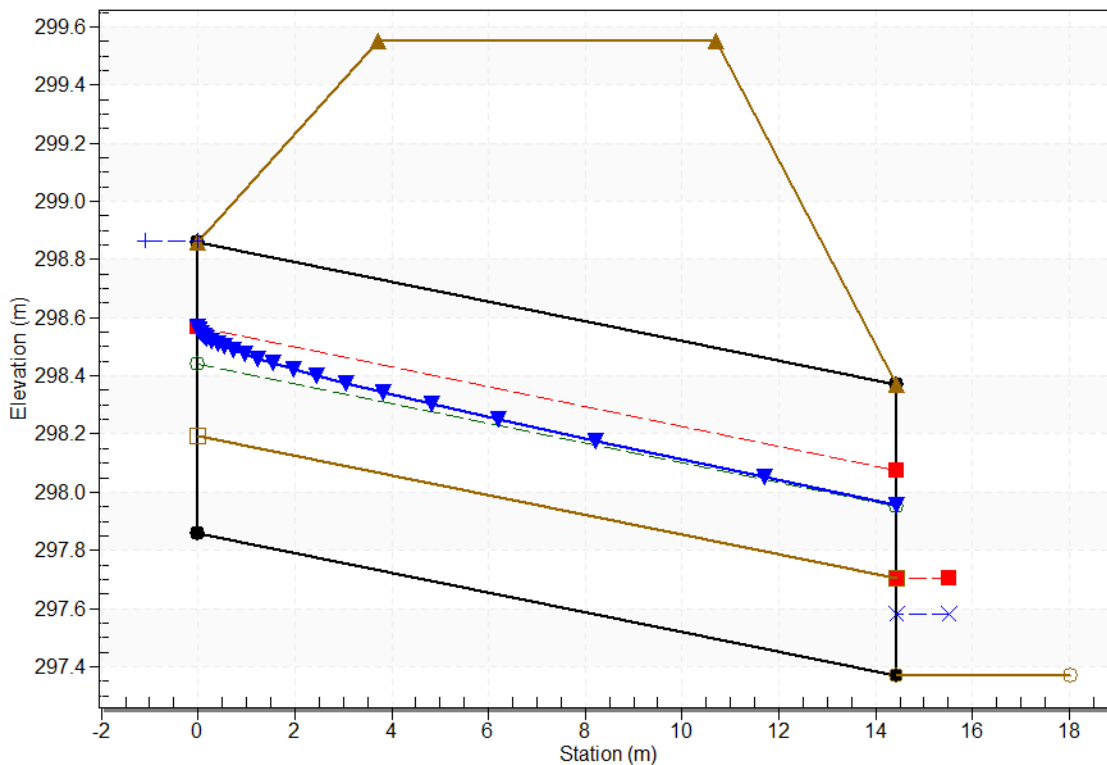


Table 7 - Culvert Summary Table: 3450

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	298.30	0.11	0.0*	1-S2n	0.05	0.07	0.05	0.04	1.14	1.10
1.44 cms	1.44 cms	298.86	0.67	0.097	5-S2n	0.25	0.37	0.25	0.21	2.88	2.83
2.08 cms	2.08 cms	299.15	0.96	0.413	5-S2n	0.32	0.47	0.33	0.26	3.23	3.19
3.07 cms	2.84 cms	299.61	1.42	0.910	5-S2n	0.39	0.55	0.41	0.32	3.57	3.60
4.06 cms	2.98 cms	299.71	1.52	1.000	5-S2n	0.41	0.57	0.43	0.38	3.64	3.92
5.05 cms	3.09 cms	299.79	1.60	1.064	5-S2n	0.42	0.57	0.44	0.42	3.69	4.18
6.04 cms	3.18 cms	299.86	1.66	1.119	5-S2n	0.43	0.58	0.45	0.47	3.72	4.41
7.03 cms	3.26 cms	299.92	1.73	1.172	5-S2n	0.44	0.59	0.46	0.51	3.74	4.60
8.02 cms	3.33 cms	299.98	1.78	1.215	5-S2n	0.45	0.59	0.47	0.54	3.77	4.78
9.01 cms	3.40 cms	300.03	1.84	1.261	5-S2n	0.45	0.60	0.47	0.58	3.79	4.94
10.00 cms	3.46 cms	300.08	1.89	1.303	5-S2n	0.46	0.60	0.48	0.61	3.82	5.09

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 298.19 m,

Outlet Elevation (invert): 297.70 m

Culvert Length: 14.44 m,

Culvert Slope: 0.0340

Culvert Data Summary - 3450

Barrel Shape: Circular

Barrel Diameter: 1000.00 mm

Barrel Material: Concrete

Embedment: 333.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 3450

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

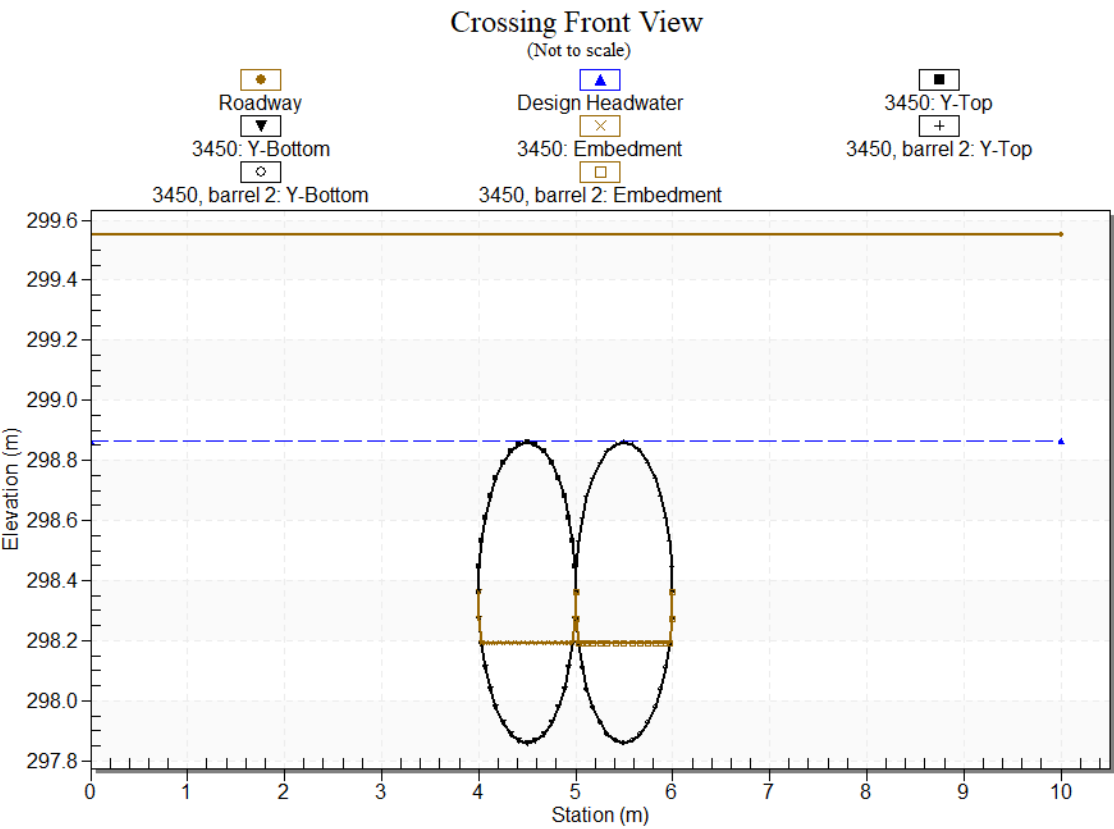
Inlet Elevation: 297.86 m

Outlet Station: 14.43 m

Outlet Elevation: 297.37 m

Number of Barrels: 2

Crossing Front View (Roadway Profile): 3450 Nordre Eide minimum



Roadway Data for Crossing: 3450 Nordre Eide minimum

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 299.55 m

Roadway Surface: Paved

Roadway Top Width: 7.00 m

Tailwater Data for Crossing: 3450 Nordre Eide minimum

Table 7 - Downstream Channel Rating Curve (Crossing: 3450 Nordre Eide minimum)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	297.41	0.04	1.10	128.52	1.71
1.44	297.58	0.21	2.83	617.55	2.14
2.08	297.63	0.26	3.19	761.64	2.20
3.07	297.69	0.32	3.60	947.99	2.26
4.06	297.75	0.38	3.92	1106.68	2.30
5.05	297.79	0.42	4.18	1247.06	2.33
6.04	297.84	0.47	4.41	1373.88	2.36
7.03	297.88	0.51	4.60	1490.36	2.39
8.02	297.91	0.54	4.78	1598.55	2.41
9.01	297.95	0.58	4.94	1699.85	2.42
10.00	297.98	0.61	5.09	1795.36	2.44

Tailwater Channel Data - 3450 Nordre Eide minimum

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (.:1)

Channel Slope: 0.3000

Channel Manning's n: 0.0600

Channel Invert Elevation: 297.37 m

Culvert Data: 3771

Water Surface Profile Plot for Culvert: 3771

Crossing - 3771, Design Discharge - 1.33 cms

Culvert - 3771, Culvert Discharge - 1.33 cms

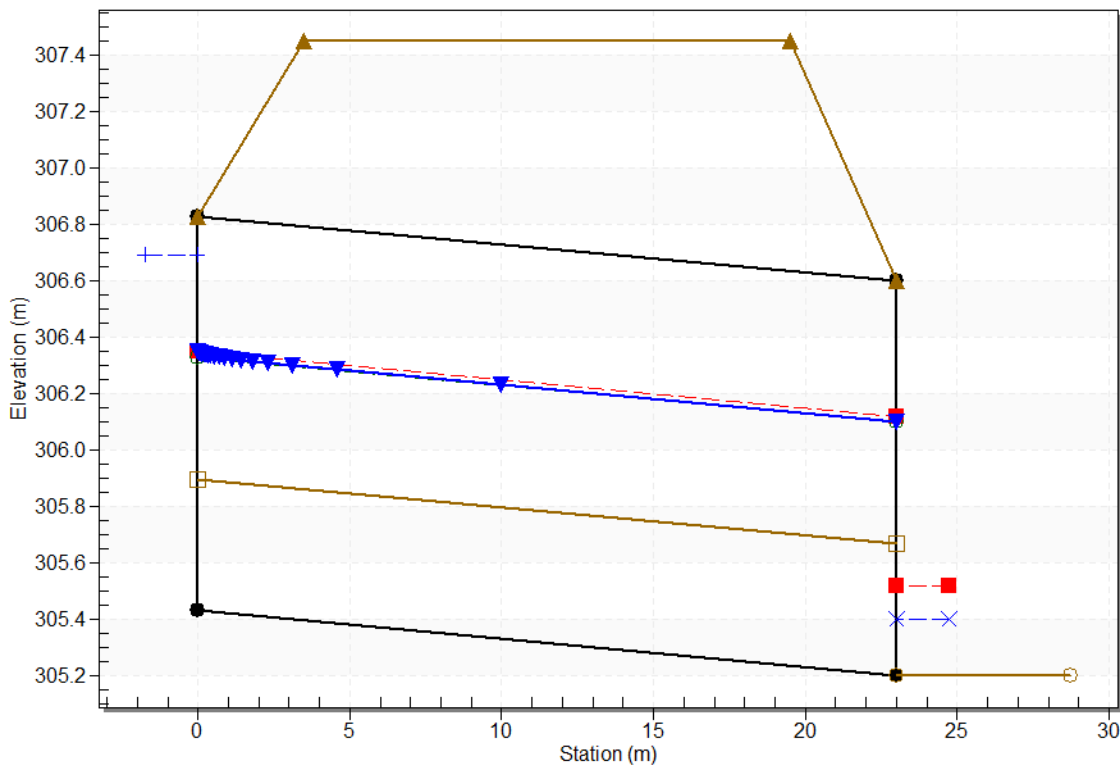


Table 8 - Culvert Summary Table: 3771

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	306.05	0.15	0.0*	1-S2n	0.08	0.08	0.08	0.04	0.90	1.10
0.59 cms	0.59 cms	306.36	0.46	0.077	1-S2n	0.26	0.27	0.26	0.13	1.68	2.10
1.08 cms	1.08 cms	306.59	0.69	0.292	1-S2n	0.38	0.40	0.38	0.18	2.08	2.58
1.33 cms	1.33 cms	306.69	0.80	0.410	1-S2n	0.43	0.45	0.43	0.20	2.24	2.76
2.06 cms	2.06 cms	307.05	1.15	0.802	5-S2n	0.59	0.60	0.59	0.26	2.59	3.18
2.55 cms	2.55 cms	307.34	1.45	1.306	7-M2c	0.71	0.68	0.68	0.29	2.85	3.40
3.04 cms	2.79 cms	307.51	1.61	1.403	7-M2c	0.78	0.71	0.71	0.32	3.00	3.59
3.53 cms	2.87 cms	307.57	1.67	1.436	7-M2c	0.81	0.72	0.72	0.35	3.05	3.76
4.02 cms	2.93 cms	307.61	1.71	1.463	7-M2c	0.84	0.73	0.73	0.37	3.09	3.91
4.51 cms	2.99 cms	307.65	1.76	1.488	7-M2c	0.93	0.74	0.74	0.40	3.12	4.04
5.00 cms	3.04 cms	307.69	1.79	1.512	7-M2c	0.93	0.74	0.74	0.42	3.15	4.17

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 305.90 m,

Outlet Elevation (invert): 305.67 m

Culvert Length: 23.00 m,

Culvert Slope: 0.0100

Culvert Data Summary - 3771

Barrel Shape: Circular

Barrel Diameter: 1400.00 mm

Barrel Material: Concrete

Embedment: 467.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 3771

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

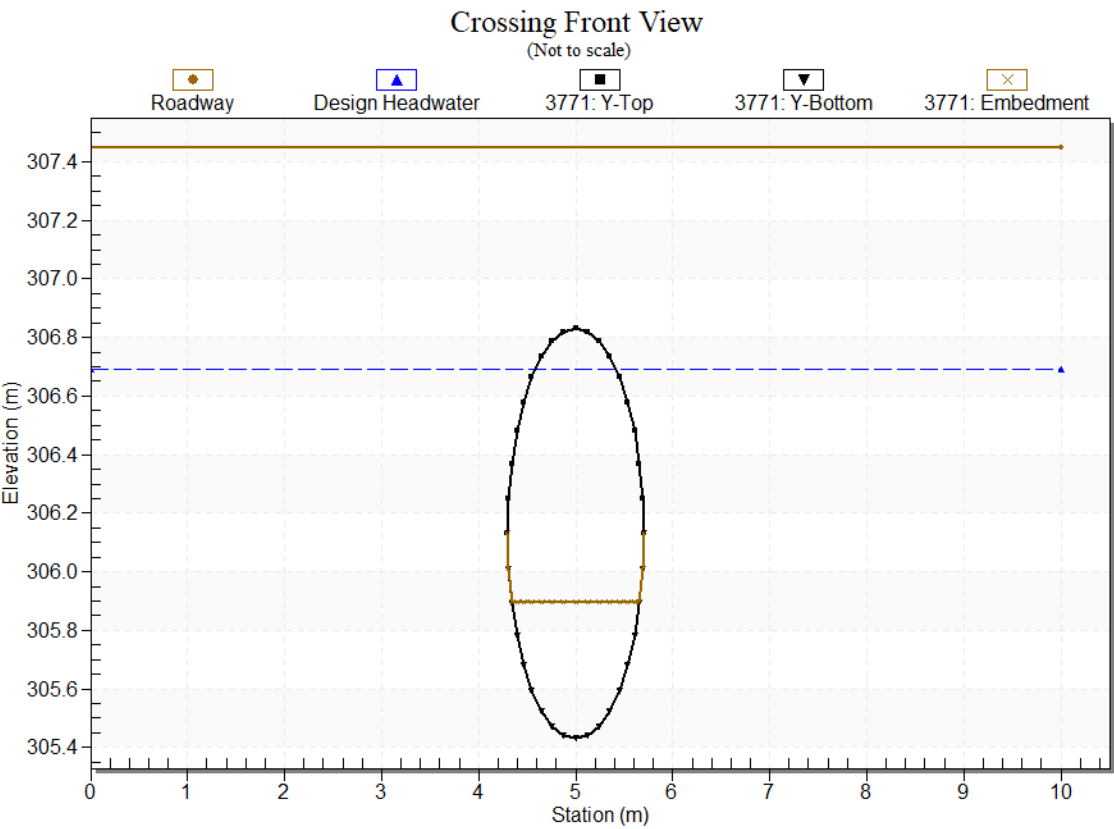
Inlet Elevation: 305.43 m

Outlet Station: 23.00 m

Outlet Elevation: 305.20 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 3771



Roadway Data for Crossing: 3771

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 307.45 m

Roadway Surface: Paved

Roadway Top Width: 16.00 m

Tailwater Data for Crossing: 3771

Table 8 - Downstream Channel Rating Curve (Crossing: 3771)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	305.24	0.04	1.10	128.52	1.71
0.59	305.33	0.13	2.10	367.94	1.99
1.08	305.38	0.18	2.58	523.28	2.09
1.33	305.40	0.20	2.76	590.02	2.13
2.06	305.46	0.26	3.18	757.49	2.19
2.55	305.49	0.29	3.40	854.44	2.23
3.04	305.52	0.32	3.59	942.83	2.26
3.53	305.55	0.35	3.76	1024.43	2.28
4.02	305.58	0.37	3.91	1100.65	2.30
4.51	305.60	0.40	4.04	1172.35	2.32
5.00	305.62	0.42	4.17	1240.28	2.33

Tailwater Channel Data - 3771

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (└:1)

Channel Slope: 0.3000

Channel Manning's n: 0.0600

Channel Invert Elevation: 305.20 m

Culvert Data: 3770

Water Surface Profile Plot for Culvert: 3770

Crossing - 3770, Design Discharge - 0.75 cms

Culvert - 3770, Culvert Discharge - 0.75 cms

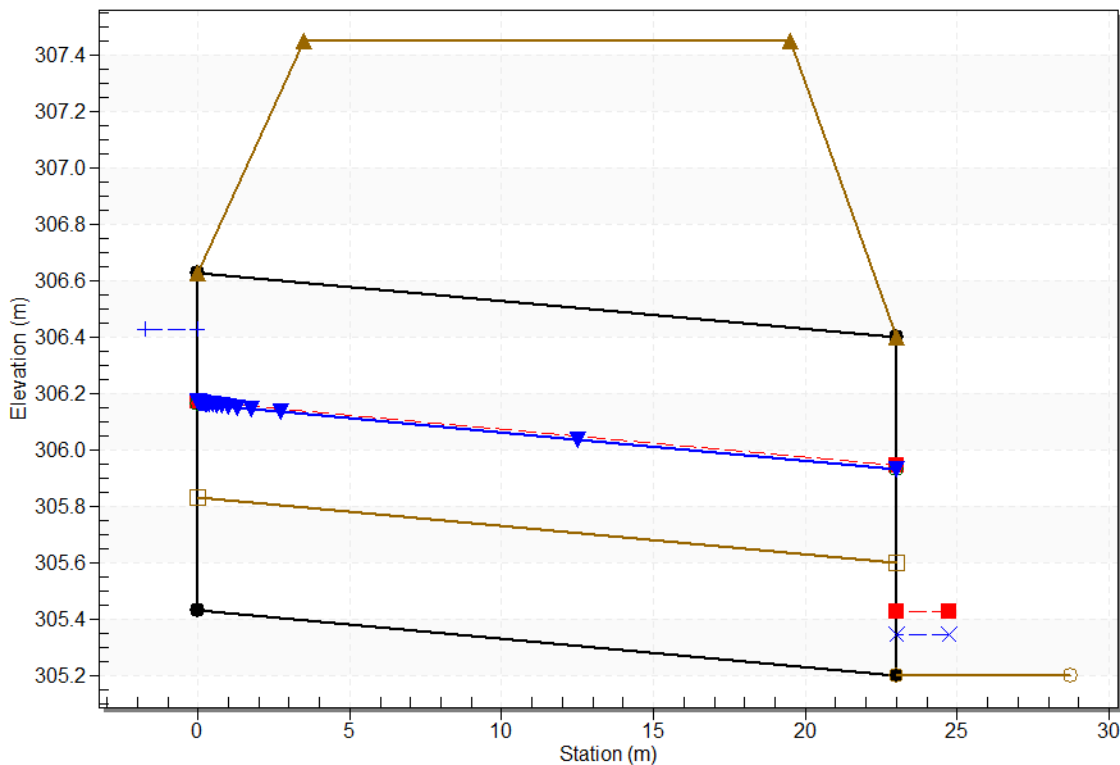


Table 9 - Culvert Summary Table: 3770

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	305.99	0.16	0.162	2-M2c	0.09	0.09	0.09	0.04	0.94	1.10
0.75 cms	0.75 cms	306.43	0.60	0.235	1-S2n	0.33	0.34	0.33	0.14	1.91	2.28
1.08 cms	1.08 cms	306.61	0.78	0.449	1-S2n	0.43	0.43	0.43	0.18	2.16	2.58
1.57 cms	1.57 cms	306.94	1.11	1.035	7-M2c	0.57	0.55	0.55	0.22	2.51	2.91
2.06 cms	2.06 cms	307.36	1.53	1.298	7-M2c	0.80	0.64	0.64	0.26	2.91	3.18
2.55 cms	2.22 cms	307.52	1.69	1.438	7-M2c	0.80	0.66	0.66	0.29	3.06	3.40
3.04 cms	2.28 cms	307.58	1.75	1.496	7-M2c	0.80	0.67	0.67	0.32	3.11	3.59
3.53 cms	2.32 cms	307.62	1.79	1.548	7-M2c	0.80	0.67	0.67	0.35	3.15	3.76
4.02 cms	2.36 cms	307.66	1.83	1.581	7-M2c	0.80	0.68	0.68	0.37	3.19	3.91
4.51 cms	2.39 cms	307.70	1.87	1.617	7-M2c	0.80	0.68	0.68	0.40	3.22	4.04
5.00 cms	2.42 cms	307.74	1.91	1.654	7-M2c	0.80	0.69	0.69	0.42	3.25	4.17

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 305.83 m,

Outlet Elevation (invert): 305.60 m

Culvert Length: 23.00 m,

Culvert Slope: 0.0100

Culvert Data Summary - 3770

Barrel Shape: Circular

Barrel Diameter: 1200.00 mm

Barrel Material: Concrete

Embedment: 400.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 3770

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

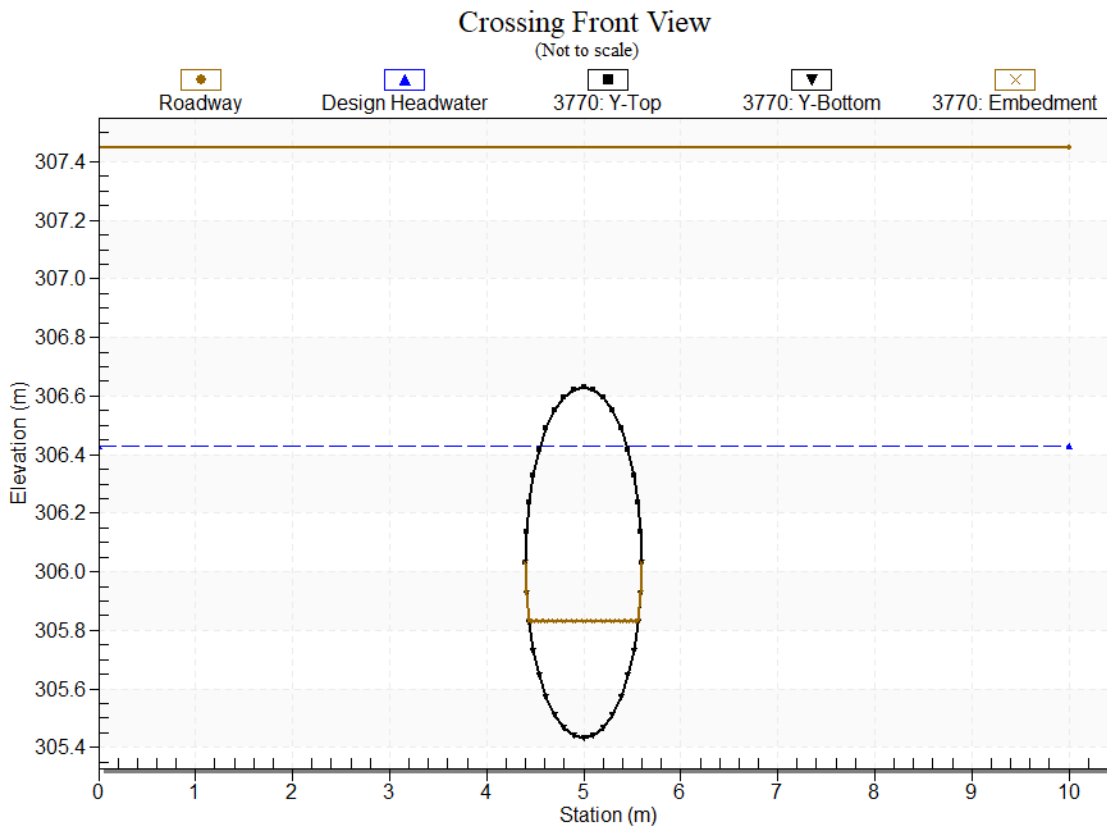
Inlet Elevation: 305.43 m

Outlet Station: 23.00 m

Outlet Elevation: 305.20 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 3770



Roadway Data for Crossing: 3770

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 307.45 m

Roadway Surface: Paved

Roadway Top Width: 16.00 m

Tailwater Data for Crossing: 3770

Table 9 - Downstream Channel Rating Curve (Crossing: 3770)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	305.24	0.04	1.10	128.52	1.71
0.75	305.34	0.14	2.28	423.32	2.03
1.08	305.38	0.18	2.58	523.28	2.09
1.57	305.42	0.22	2.91	648.90	2.15
2.06	305.46	0.26	3.18	757.49	2.19
2.55	305.49	0.29	3.40	854.44	2.23
3.04	305.52	0.32	3.59	942.83	2.26
3.53	305.55	0.35	3.76	1024.43	2.28
4.02	305.58	0.37	3.91	1100.65	2.30
4.51	305.60	0.40	4.04	1172.35	2.32
5.00	305.62	0.42	4.17	1240.28	2.33

Tailwater Channel Data - 3770

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.3000

Channel Manning's n: 0.0600

Channel Invert Elevation: 305.20 m

Culvert Data: 4161

Water Surface Profile Plot for Culvert: 4161

Crossing - 4161, Design Discharge - 2.85 cms

Culvert - 4161, Culvert Discharge - 2.85 cms

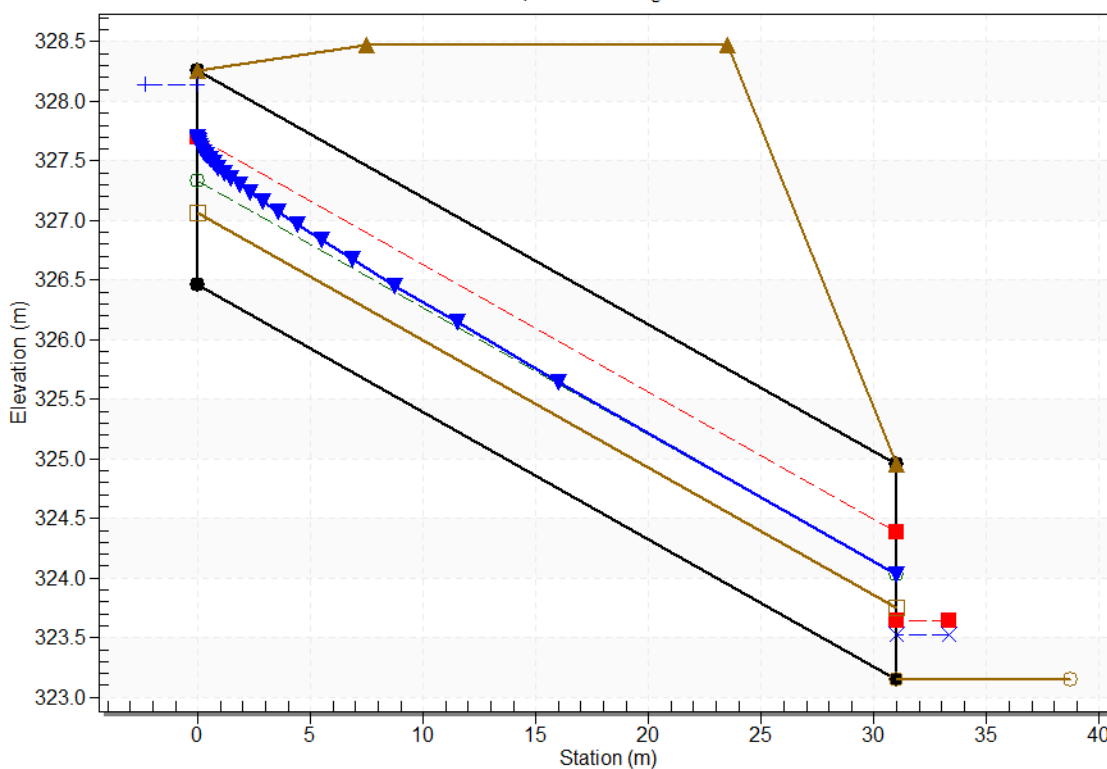


Table 10 - Culvert Summary Table: 4161

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	327.15	0.09	0.0*	1-S2n	0.03	0.07	0.03	0.05	1.73	0.88
1.09 cms	1.09 cms	327.59	0.53	0.0*	1-S2n	0.15	0.34	0.15	0.22	4.20	2.05
2.08 cms	2.08 cms	327.90	0.84	0.0*	1-S2n	0.23	0.52	0.23	0.31	5.28	2.51
2.85 cms	2.85 cms	328.14	1.08	0.0*	1-S2n	0.28	0.63	0.28	0.37	5.88	2.77
4.06 cms	3.93 cms	328.51	1.45	0.0*	5-S2n	0.34	0.77	0.35	0.45	6.39	3.07
5.05 cms	4.19 cms	328.61	1.55	0.0*	5-S2n	0.35	0.80	0.36	0.51	6.50	3.27
6.04 cms	4.37 cms	328.68	1.62	0.0*	5-S2n	0.36	0.83	0.38	0.56	6.56	3.44
7.03 cms	4.53 cms	328.75	1.69	0.0*	5-S2n	0.37	0.84	0.39	0.61	6.65	3.59
8.02 cms	4.67 cms	328.81	1.75	0.0*	5-S2n	0.38	0.86	0.39	0.65	6.69	3.72
9.01 cms	4.79 cms	328.87	1.81	0.0*	5-S2n	0.38	0.87	0.40	0.69	6.77	3.85
10.00 cms	4.91 cms	328.92	1.86	0.0*	5-S2n	0.39	0.88	0.41	0.73	6.80	3.96

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 327.06 m,

Outlet Elevation (invert): 323.75 m

Culvert Length: 31.18 m,

Culvert Slope: 0.1068

Culvert Data Summary - 4161

Barrel Shape: Circular

Barrel Diameter: 1800.00 mm

Barrel Material: Concrete

Embedment: 600.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 4161

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

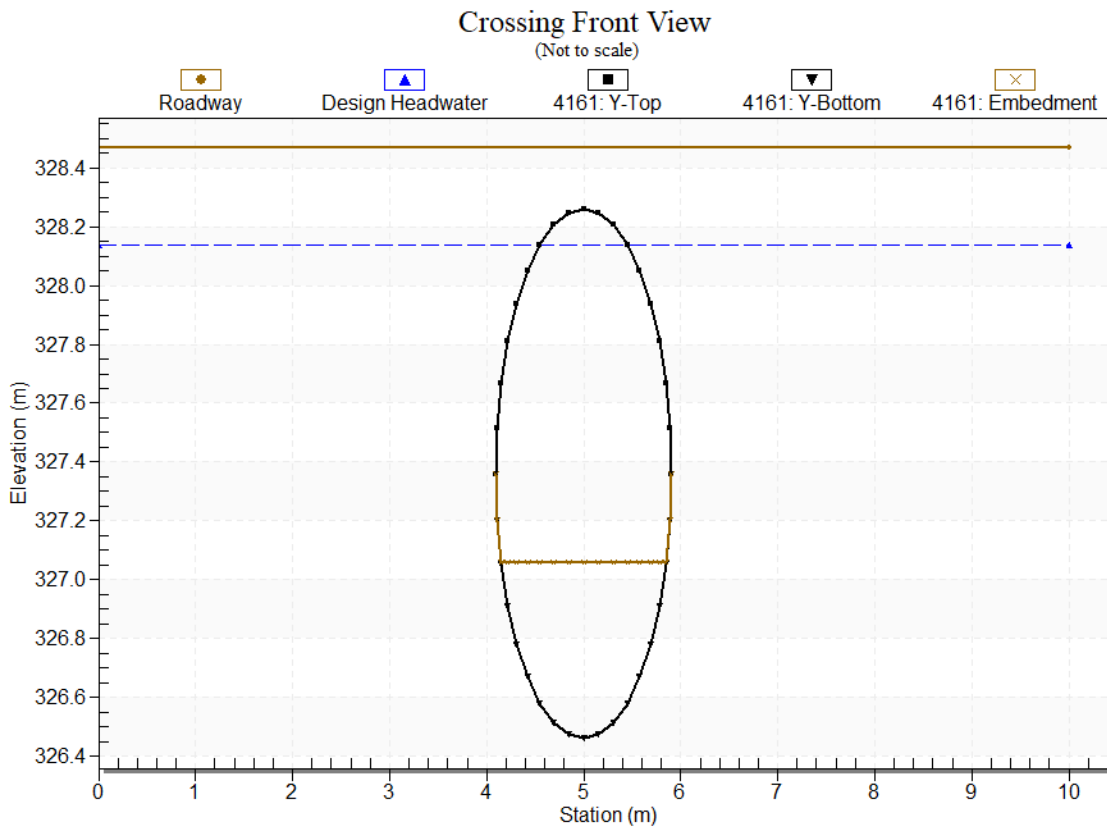
Inlet Elevation: 326.46 m

Outlet Station: 31.00 m

Outlet Elevation: 323.15 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 4161



Roadway Data for Crossing: 4161

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 328.47 m

Roadway Surface: Paved

Roadway Top Width: 16.00 m

Tailwater Data for Crossing: 4161

Table 10 - Downstream Channel Rating Curve (Crossing: 4161)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	323.20	0.05	0.88	79.06	1.25
1.09	323.37	0.22	2.05	321.06	1.52
2.08	323.46	0.31	2.51	462.80	1.59
2.85	323.52	0.37	2.77	551.13	1.63
4.06	323.60	0.45	3.07	668.42	1.67
5.05	323.66	0.51	3.27	751.48	1.69
6.04	323.71	0.56	3.44	826.35	1.71
7.03	323.76	0.61	3.59	894.95	1.72
8.02	323.80	0.65	3.72	958.46	1.74
9.01	323.84	0.69	3.85	1017.85	1.75
10.00	323.88	0.73	3.96	1073.75	1.76

Tailwater Channel Data - 4161

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (└:1)

Channel Slope: 0.1500

Channel Manning's n: 0.0600

Channel Invert Elevation: 323.15 m

Culvert Data: 4160

Water Surface Profile Plot for Culvert: 4160

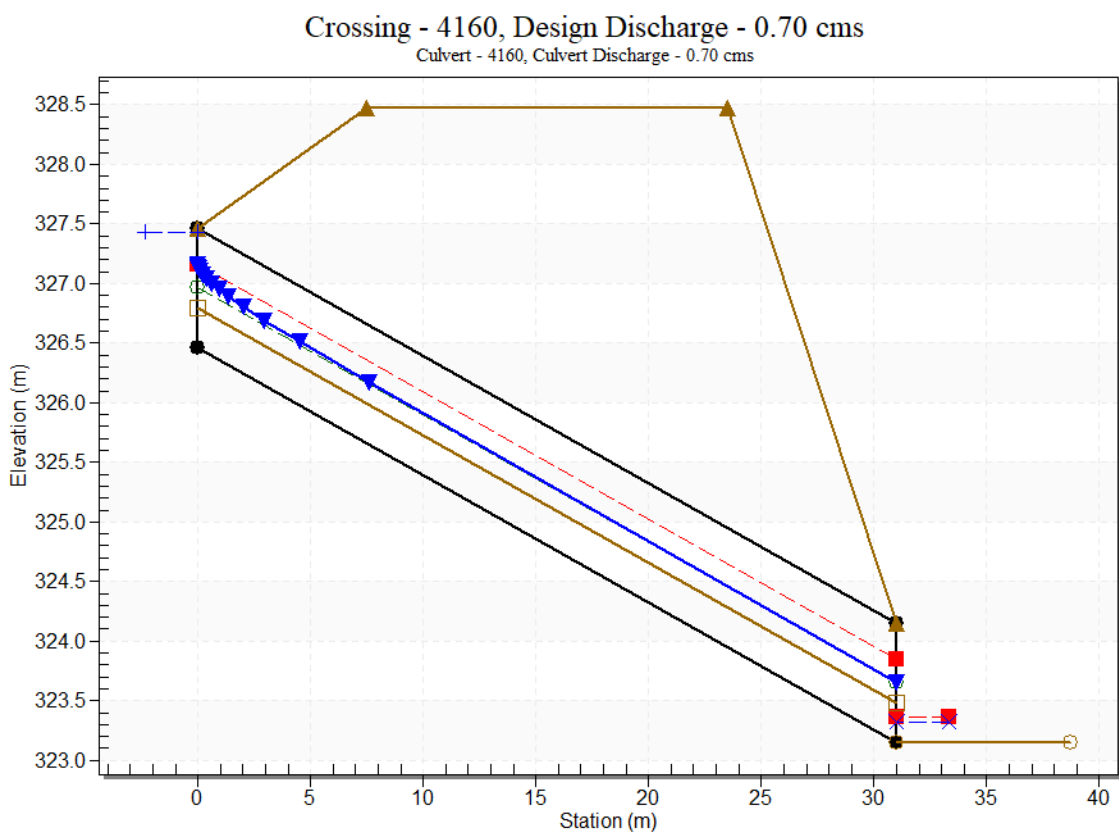


Table 11 - Culvert Summary Table: 4160

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	326.94	0.15	0.0*	1-S2n	0.05	0.10	0.05	0.05	2.10	0.88
0.70 cms	0.70 cms	327.42	0.63	0.0*	1-S2n	0.17	0.37	0.17	0.17	4.20	1.77
1.08 cms	1.08 cms	327.77	0.98	0.0*	5-S2n	0.22	0.48	0.23	0.22	4.84	2.04
1.57 cms	1.57 cms	328.40	1.61	0.0*	5-S2n	0.28	0.58	0.28	0.27	5.62	2.30
2.06 cms	1.67 cms	328.55	1.76	0.0*	5-S2n	0.30	0.59	0.30	0.31	5.73	2.51
2.55 cms	1.70 cms	328.61	1.81	0.0*	5-S2n	0.30	0.60	0.30	0.35	5.77	2.67
3.04 cms	1.73 cms	328.65	1.86	0.0*	5-S2n	0.30	0.60	0.30	0.39	5.81	2.82
3.53 cms	1.75 cms	328.69	1.90	0.0*	5-S2n	0.31	0.60	0.31	0.42	5.83	2.95
4.02 cms	1.77 cms	328.73	1.94	0.0*	5-S2n	0.31	0.61	0.31	0.45	5.86	3.06
4.51 cms	1.79 cms	328.77	1.97	0.0*	5-S2n	0.31	0.61	0.31	0.48	5.88	3.16
5.00 cms	1.81 cms	328.80	2.01	0.0*	5-S2n	0.31	0.61	0.31	0.51	5.90	3.26

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 326.79 m,

Outlet Elevation (invert): 323.48 m

Culvert Length: 31.18 m,

Culvert Slope: 0.1068

Culvert Data Summary - 4160

Barrel Shape: Circular

Barrel Diameter: 1000.00 mm

Barrel Material: Concrete

Embedment: 333.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 4160

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

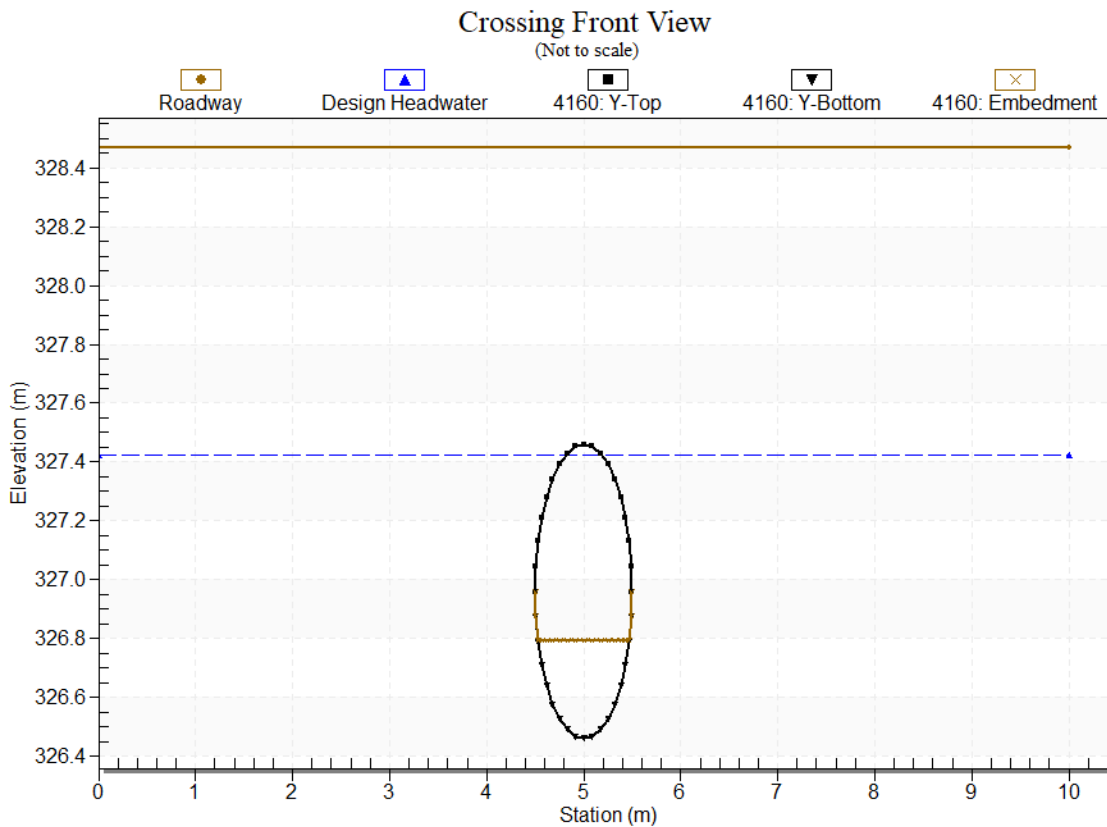
Inlet Elevation: 326.46 m

Outlet Station: 31.00 m

Outlet Elevation: 323.15 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 4160



Roadway Data for Crossing: 4160

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 328.47 m

Roadway Surface: Paved

Roadway Top Width: 16.00 m

Tailwater Data for Crossing: 4160

Table 11 - Downstream Channel Rating Curve (Crossing: 4160)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	323.20	0.05	0.88	79.06	1.25
0.70	323.32	0.17	1.77	248.75	1.47
1.08	323.37	0.22	2.04	319.37	1.52
1.57	323.42	0.27	2.30	395.13	1.56
2.06	323.46	0.31	2.51	460.32	1.59
2.55	323.50	0.35	2.67	518.30	1.61
3.04	323.54	0.39	2.82	571.05	1.63
3.53	323.57	0.42	2.95	619.60	1.65
4.02	323.60	0.45	3.06	664.87	1.66
4.51	323.63	0.48	3.16	707.34	1.68
5.00	323.66	0.51	3.26	747.49	1.69

Tailwater Channel Data - 4160

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.1500

Channel Manning's n: 0.0600

Channel Invert Elevation: 323.15 m

Culvert Data: 4026

Water Surface Profile Plot for Culvert: 4026

Crossing - 4026, Design Discharge - 2.65 cms

Culvert - 4026, Culvert Discharge - 2.65 cms

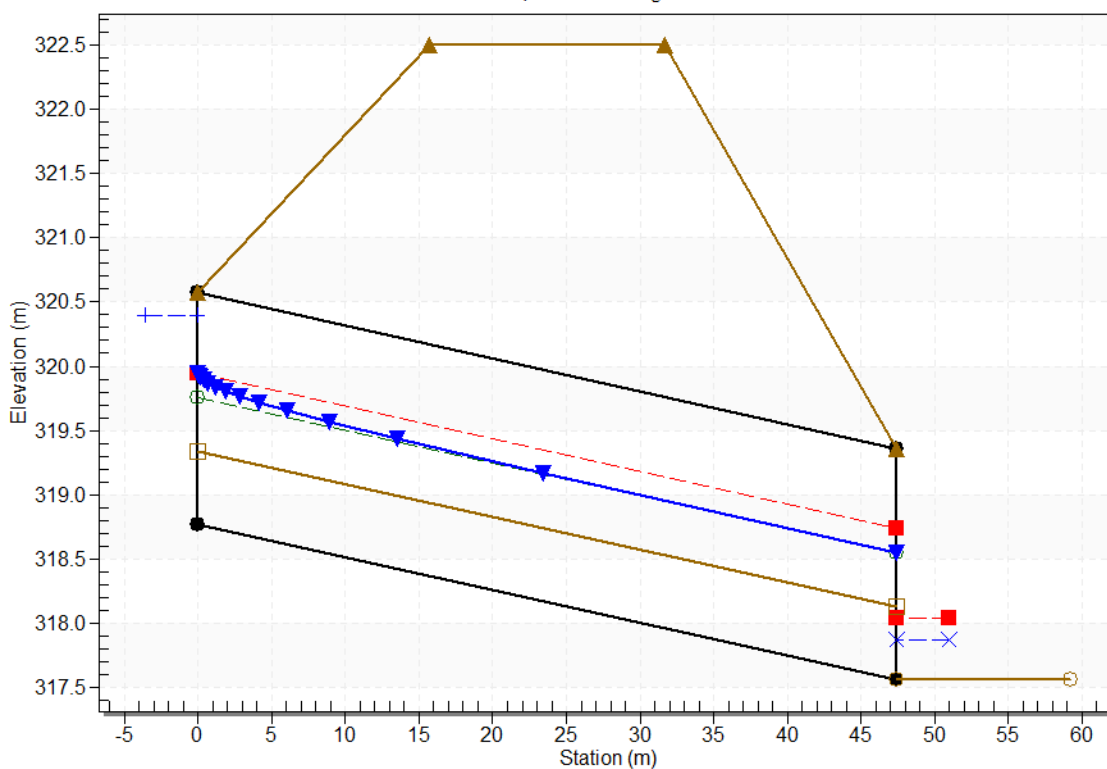


Table 12 - Culvert Summary Table: 4026

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	319.48	0.14	0.0*	1-S2n	0.05	0.07	0.05	0.05	1.13	1.05
1.09 cms	1.09 cms	319.92	0.58	0.0*	1-S2n	0.24	0.34	0.24	0.19	2.67	2.46
2.08 cms	2.08 cms	320.23	0.89	0.0*	1-S2n	0.36	0.52	0.36	0.27	3.30	3.04
2.65 cms	2.65 cms	320.39	1.06	0.0*	1-S2n	0.42	0.61	0.42	0.31	3.56	3.28
4.06 cms	4.06 cms	320.86	1.52	0.285	5-S2n	0.55	0.79	0.55	0.39	4.17	3.73
5.05 cms	5.05 cms	321.26	1.92	0.755	5-S2n	0.63	0.90	0.64	0.44	4.47	3.98
6.04 cms	6.04 cms	321.74	2.40	1.403	5-S2n	0.72	0.99	0.73	0.49	4.73	4.19
7.03 cms	7.03 cms	322.29	2.96	1.935	5-S2n	0.81	1.07	0.82	0.53	4.96	4.37
8.02 cms	7.51 cms	322.60	3.26	2.207	5-S2n	0.85	1.10	0.87	0.56	5.06	4.54
9.01 cms	7.65 cms	322.69	3.35	2.293	5-S2n	0.87	1.10	0.88	0.60	5.08	4.69
10.00 cms	7.76 cms	322.76	3.42	2.362	5-S2n	0.88	1.11	0.89	0.63	5.11	4.83

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 319.34 m,

Outlet Elevation (invert): 318.13 m

Culvert Length: 47.42 m,

Culvert Slope: 0.0255

Culvert Data Summary - 4026

Barrel Shape: Circular

Barrel Diameter: 1800.00 mm

Barrel Material: Concrete

Embedment: 567.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 4026

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

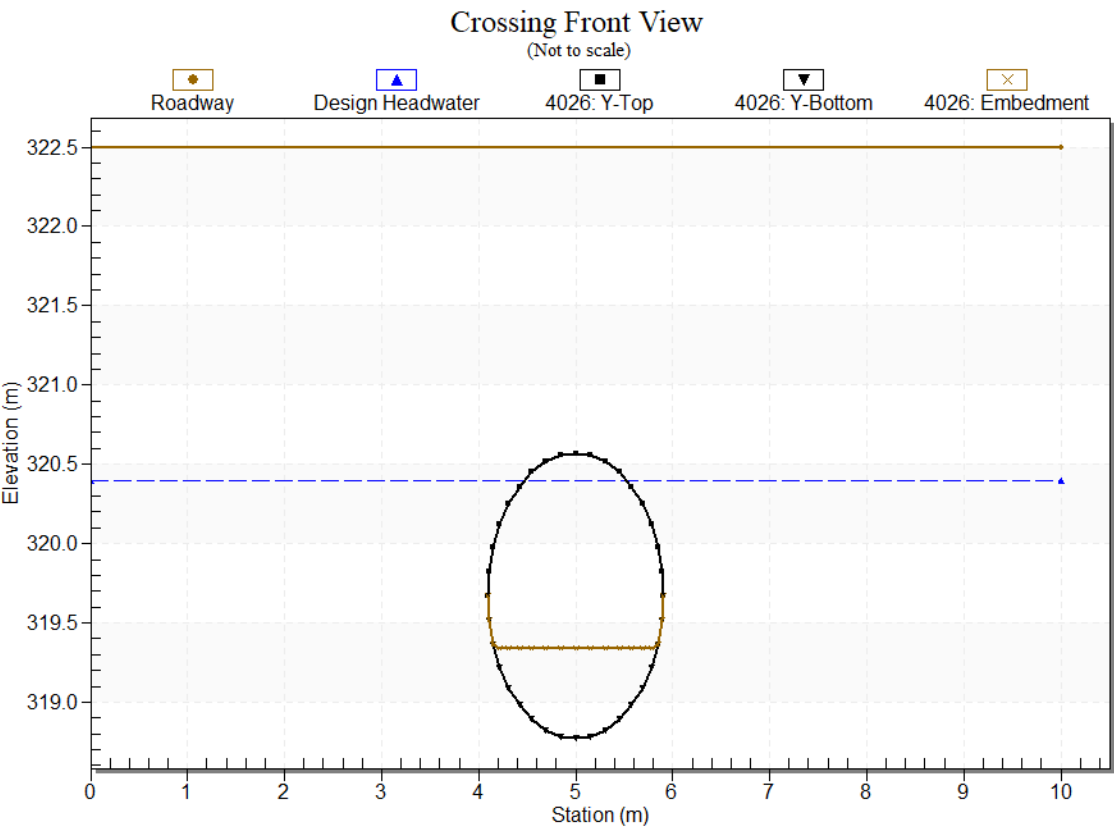
Inlet Elevation: 318.77 m

Outlet Station: 47.40 m

Outlet Elevation: 317.56 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 4026



Roadway Data for Crossing: 4026

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 322.50 m

Roadway Surface: Paved

Roadway Top Width: 16.00 m

Tailwater Data for Crossing: 4026

Table 12 - Downstream Channel Rating Curve (Crossing: 4026)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	317.61	0.05	1.05	116.26	1.60
1.09	317.75	0.19	2.46	475.09	1.96
2.08	317.83	0.27	3.04	687.34	2.06
2.65	317.87	0.31	3.28	787.63	2.09
4.06	317.95	0.39	3.73	997.56	2.15
5.05	318.00	0.44	3.98	1123.52	2.18
6.04	318.05	0.49	4.19	1237.34	2.21
7.03	318.09	0.53	4.37	1341.84	2.23
8.02	318.12	0.56	4.54	1438.78	2.25
9.01	318.16	0.60	4.69	1529.58	2.27
10.00	318.19	0.63	4.83	1615.09	2.28

Tailwater Channel Data - 4026

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.2600

Channel Manning's n: 0.0600

Channel Invert Elevation: 317.56 m

Culvert Data: 4025

Water Surface Profile Plot for Culvert: 4025

Crossing - 4025, Design Discharge - 0.33 cms

Culvert - 4025, Culvert Discharge - 0.33 cms

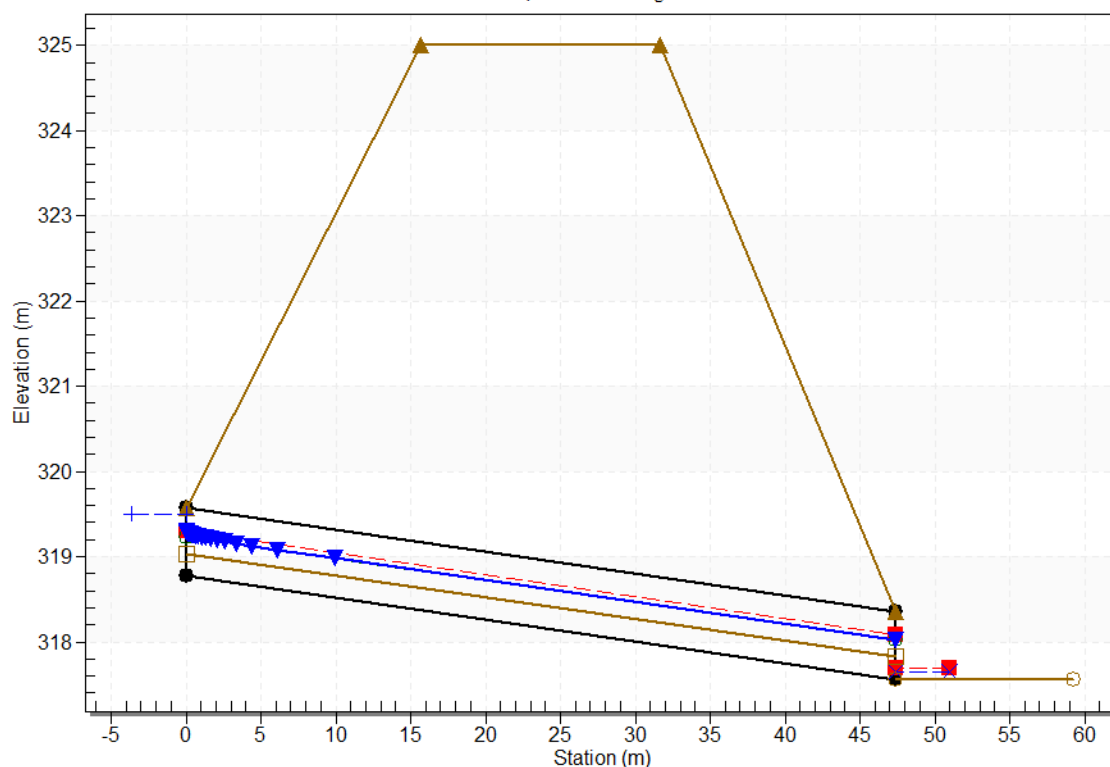


Table 13 - Culvert Summary Table: 4025

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	319.24	0.20	0.0*	1-S2n	0.09	0.12	0.09	0.05	1.42	1.05
0.33 cms	0.33 cms	319.49	0.45	0.0*	1-S2n	0.19	0.26	0.19	0.09	2.17	1.63
0.48 cms	0.48 cms	319.66	0.62	0.0*	5-S2n	0.25	0.33	0.25	0.12	2.47	1.86
0.67 cms	0.67 cms	319.92	0.89	0.205	5-S2n	0.31	0.40	0.31	0.14	2.76	2.09
0.86 cms	0.86 cms	320.27	1.23	0.776	5-S2n	0.38	0.45	0.38	0.16	2.98	2.28
1.05 cms	1.05 cms	320.71	1.67	1.389	5-S2n	0.48	0.49	0.48	0.18	3.10	2.43
1.24 cms	1.24 cms	321.32	2.28	2.133	7-M2c	0.53	0.51	0.51	0.20	3.54	2.57
1.43 cms	1.43 cms	322.32	3.28	3.119	6-FFc	0.53	0.53	0.53	0.22	4.04	2.69
1.62 cms	1.62 cms	324.10	5.06	4.295	6-FFc	0.53	0.53	0.53	0.23	4.57	2.80
1.81 cms	1.69 cms	325.04	6.00	4.826	6-FFc	0.53	0.53	0.53	0.25	4.77	2.91
2.00 cms	1.69 cms	325.07	6.03	4.840	6-FFc	0.53	0.53	0.53	0.26	4.77	3.00

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 319.04 m,

Outlet Elevation (invert): 317.83 m

Culvert Length: 47.42 m,

Culvert Slope: 0.0255

Culvert Data Summary - 4025

Barrel Shape: Circular

Barrel Diameter: 800.00 mm

Barrel Material: Concrete

Embedment: 267.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 4025

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

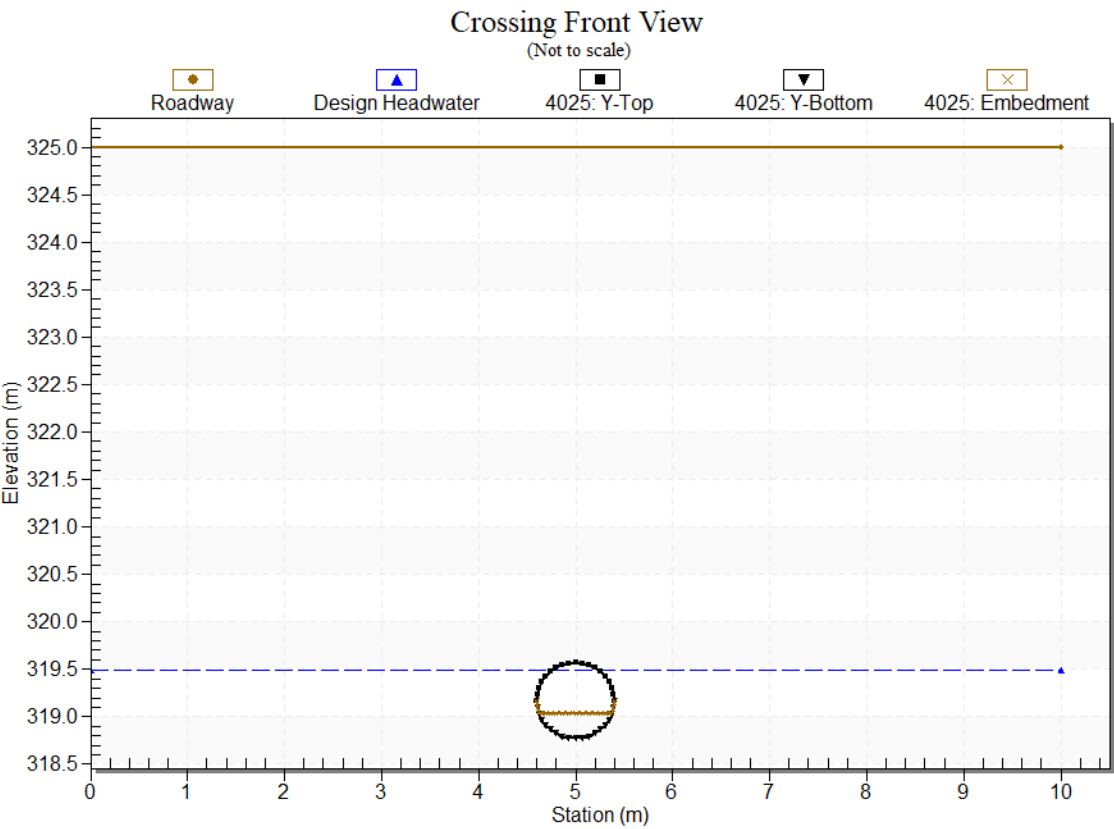
Inlet Elevation: 318.77 m

Outlet Station: 47.40 m

Outlet Elevation: 317.56 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 4025



Roadway Data for Crossing: 4025

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 325.00 m

Roadway Surface: Paved

Roadway Top Width: 16.00 m

Tailwater Data for Crossing: 4025

Table 13 - Downstream Channel Rating Curve (Crossing: 4025)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	317.61	0.05	1.05	116.26	1.60
0.33	317.65	0.09	1.63	236.22	1.78
0.48	317.68	0.12	1.86	294.58	1.84
0.67	317.70	0.14	2.09	358.17	1.89
0.86	317.72	0.16	2.28	414.22	1.92
1.05	317.74	0.18	2.43	464.96	1.95
1.24	317.76	0.20	2.57	511.73	1.98
1.43	317.78	0.22	2.69	555.38	2.00
1.62	317.79	0.23	2.80	596.46	2.02
1.81	317.81	0.25	2.91	635.28	2.03
2.00	317.82	0.26	3.00	672.30	2.05

Tailwater Channel Data - 4025

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (└:1)

Channel Slope: 0.2600

Channel Manning's n: 0.0600

Channel Invert Elevation: 317.56 m

Culvert Data: 5740

Water Surface Profile Plot for Culvert: 5740

Crossing - 5740, Design Discharge - 1.70 cms

Culvert - 5740, Culvert Discharge - 1.70 cms

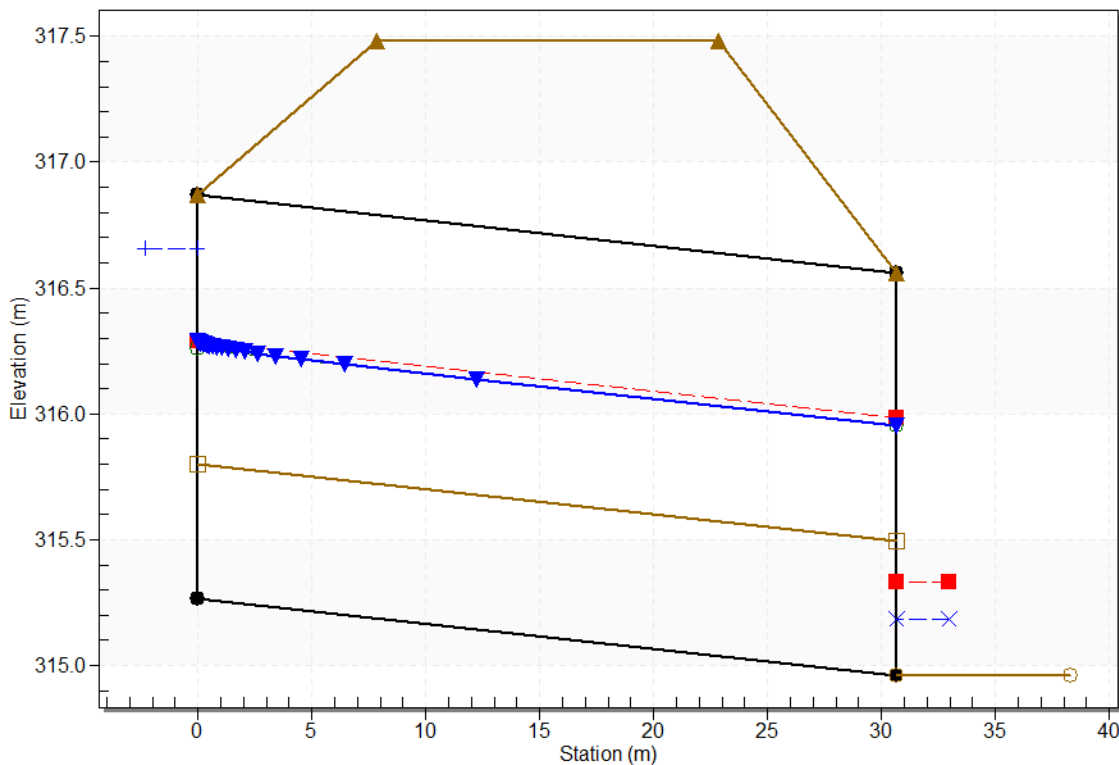


Table 14 - Culvert Summary Table: 5740

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	315.95	0.15	0.0*	1-S2n	0.08	0.08	0.08	0.04	0.86	1.13
0.59 cms	0.59 cms	316.22	0.42	0.0*	1-S2n	0.23	0.25	0.23	0.12	1.62	2.16
1.08 cms	1.08 cms	316.43	0.63	0.136	1-S2n	0.34	0.36	0.34	0.17	2.01	2.66
1.70 cms	1.70 cms	316.66	0.85	0.370	1-S2n	0.46	0.49	0.46	0.22	2.36	3.09
2.06 cms	2.06 cms	316.79	0.98	0.517	1-S2n	0.52	0.55	0.52	0.25	2.52	3.28
2.55 cms	2.55 cms	316.98	1.17	0.735	5-S2n	0.61	0.63	0.61	0.28	2.71	3.51
3.04 cms	3.04 cms	317.19	1.39	0.971	5-S2n	0.69	0.70	0.69	0.31	2.86	3.71
3.53 cms	3.53 cms	317.44	1.64	1.490	7-M2c	0.79	0.77	0.77	0.34	3.03	3.88
4.02 cms	3.73 cms	317.55	1.75	1.552	7-M2c	0.83	0.79	0.79	0.36	3.13	4.04
4.51 cms	3.82 cms	317.60	1.80	1.581	7-M2c	0.85	0.81	0.81	0.39	3.17	4.18
5.00 cms	3.90 cms	317.64	1.84	1.606	7-M2c	0.87	0.81	0.81	0.41	3.21	4.31

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 315.80 m,

Outlet Elevation (invert): 315.49 m

Culvert Length: 30.66 m,

Culvert Slope: 0.0100

Culvert Data Summary - 5740

Barrel Shape: Circular

Barrel Diameter: 1600.00 mm

Barrel Material: Concrete

Embedment: 533.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 5740

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

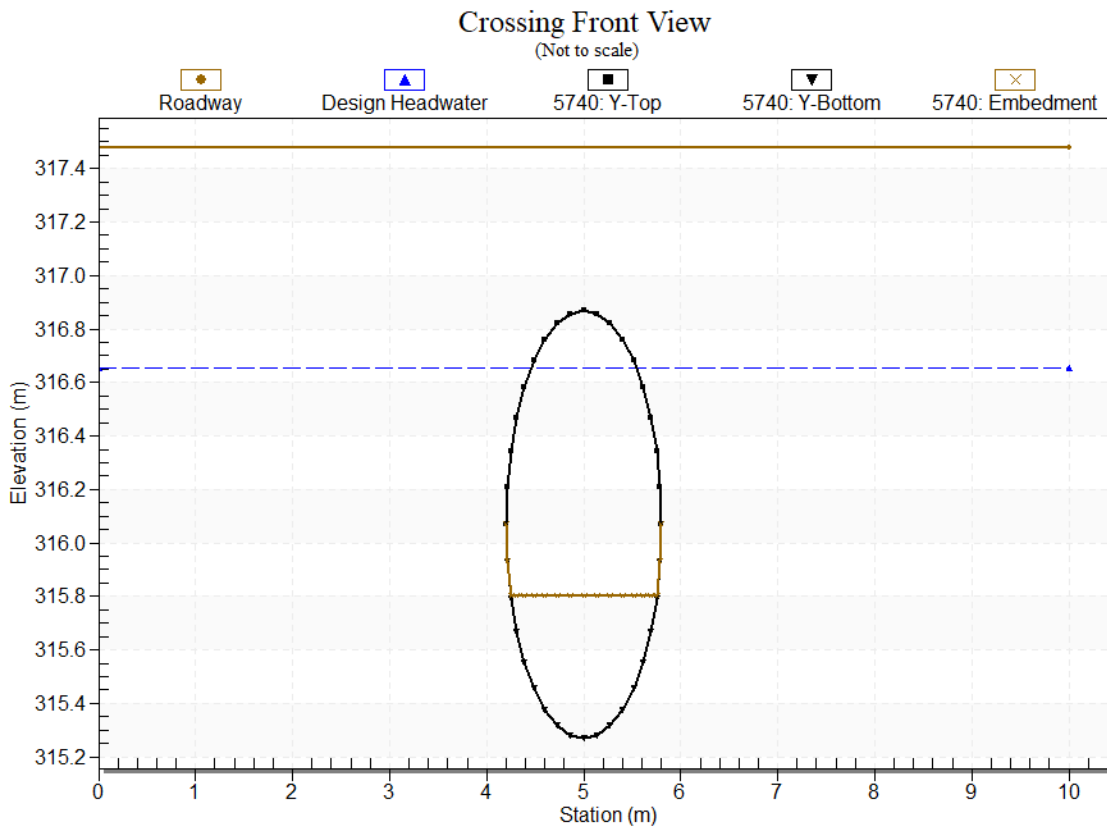
Inlet Elevation: 315.27 m

Outlet Station: 30.66 m

Outlet Elevation: 314.96 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 5740



Roadway Data for Crossing: 5740

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 317.48 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Tailwater Data for Crossing: 5740

Table 14 - Downstream Channel Rating Curve (Crossing: 5740)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	315.00	0.04	1.13	137.55	1.78
0.59	315.08	0.12	2.16	393.56	2.08
1.08	315.13	0.17	2.66	559.86	2.19
1.70	315.19	0.22	3.09	726.89	2.26
2.06	315.21	0.25	3.28	811.00	2.29
2.55	315.24	0.28	3.51	915.02	2.33
3.04	315.27	0.31	3.71	1009.87	2.36
3.53	315.30	0.34	3.88	1097.50	2.38
4.02	315.33	0.36	4.04	1179.33	2.40
4.51	315.35	0.39	4.18	1256.42	2.42
5.00	315.37	0.41	4.31	1329.37	2.44

Tailwater Channel Data - 5740

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.3300

Channel Manning's n: 0.0600

Channel Invert Elevation: 314.96 m

Culvert Data: 5200

Water Surface Profile Plot for Culvert: 5200

Crossing - 5200, Design Discharge - 0.98 cms

Culvert - 5200, Culvert Discharge - 0.98 cms

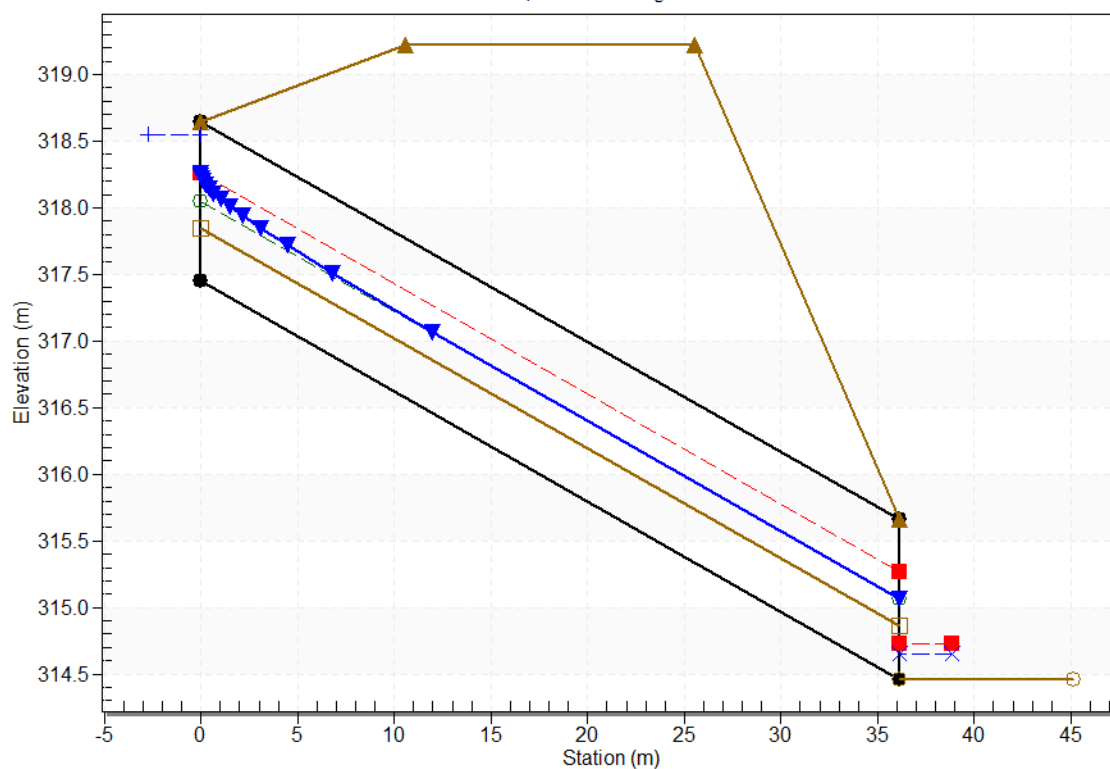


Table 15 - Culvert Summary Table: 5200

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	317.98	0.13	0.0*	1-S2n	0.05	0.09	0.05	0.05	1.84	0.97
0.29 cms	0.29 cms	318.14	0.29	0.0*	1-S2n	0.09	0.19	0.09	0.09	2.71	1.43
0.48 cms	0.48 cms	318.26	0.42	0.0*	1-S2n	0.13	0.26	0.13	0.12	3.24	1.71
0.67 cms	0.67 cms	318.37	0.53	0.0*	1-S2n	0.16	0.32	0.16	0.15	3.57	1.92
0.86 cms	0.86 cms	318.48	0.63	0.0*	1-S2n	0.19	0.38	0.19	0.18	3.96	2.09
0.98 cms	0.98 cms	318.54	0.70	0.0*	1-S2n	0.20	0.41	0.21	0.19	4.00	2.18
1.24 cms	1.24 cms	318.70	0.85	0.0*	5-S2n	0.23	0.47	0.24	0.22	4.48	2.35
1.43 cms	1.43 cms	318.83	0.98	0.0*	5-S2n	0.26	0.52	0.26	0.23	4.76	2.46
1.62 cms	1.62 cms	318.97	1.12	0.0*	5-S2n	0.28	0.56	0.28	0.25	4.97	2.57
1.81 cms	1.81 cms	319.12	1.27	0.0*	5-S2n	0.30	0.59	0.30	0.27	5.17	2.66
2.00 cms	1.95 cms	319.24	1.39	0.0*	5-S2n	0.31	0.62	0.31	0.28	5.31	2.74

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 317.85 m,

Outlet Elevation (invert): 314.86 m

Culvert Length: 36.25 m,

Culvert Slope: 0.0827

Culvert Data Summary - 5200

Barrel Shape: Circular

Barrel Diameter: 1200.00 mm

Barrel Material: Concrete

Embedment: 400.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 5200

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

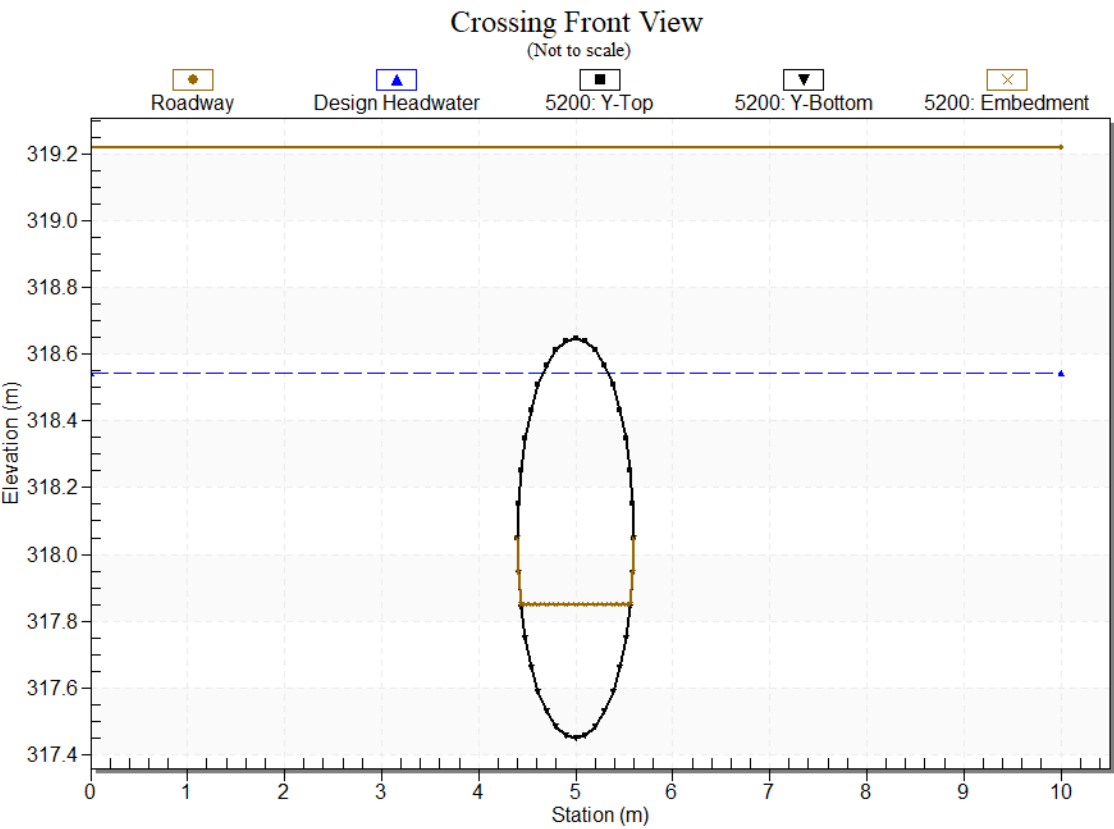
Inlet Elevation: 317.45 m

Outlet Station: 36.13 m

Outlet Elevation: 314.46 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 5200



Roadway Data for Crossing: 5200

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 319.22 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Tailwater Data for Crossing: 5200

Table 15 - Downstream Channel Rating Curve (Crossing: 5200)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	314.51	0.05	0.97	96.72	1.42
0.29	314.55	0.09	1.43	181.97	1.56
0.48	314.58	0.12	1.71	244.78	1.63
0.67	314.61	0.15	1.92	297.44	1.67
0.86	314.64	0.18	2.09	343.83	1.70
0.98	314.65	0.19	2.18	370.77	1.72
1.24	314.68	0.22	2.35	424.44	1.75
1.43	314.69	0.23	2.46	460.49	1.77
1.62	314.71	0.25	2.57	494.36	1.79
1.81	314.73	0.27	2.66	526.40	1.80
2.00	314.74	0.28	2.74	556.85	1.81

Tailwater Channel Data - 5200

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.2000

Channel Manning's n: 0.0600

Channel Invert Elevation: 314.46 m

Culvert Data: 3601

Water Surface Profile Plot for Culvert: 3601

Crossing - 3601, Design Discharge - 0.70 cms

Culvert - 3601, Culvert Discharge - 0.70 cms

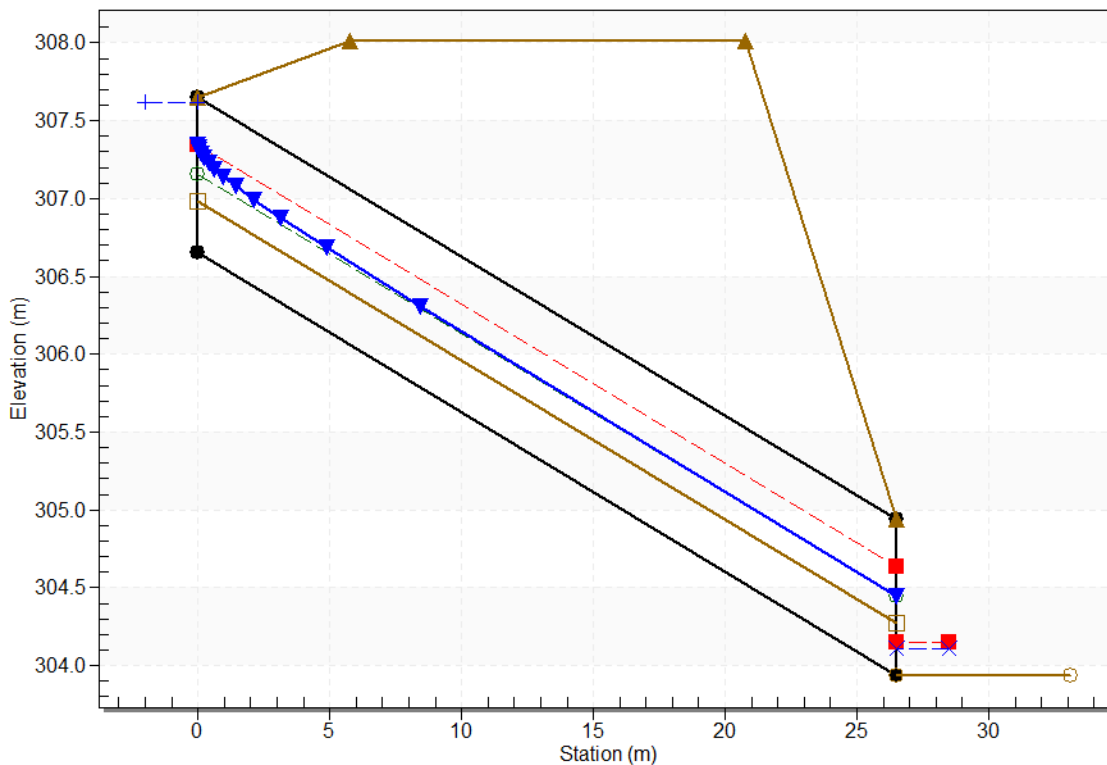


Table 16 - Culvert Summary Table: 3601

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	307.13	0.15	0.0*	1-S2n	0.05	0.10	0.05	0.05	2.07	0.88
0.29 cms	0.29 cms	307.31	0.33	0.0*	1-S2n	0.10	0.21	0.10	0.10	3.06	1.30
0.48 cms	0.48 cms	307.45	0.47	0.0*	1-S2n	0.14	0.29	0.14	0.14	3.64	1.56
0.70 cms	0.70 cms	307.61	0.63	0.0*	1-S2n	0.17	0.37	0.17	0.17	4.12	1.77
0.86 cms	0.86 cms	307.75	0.77	0.0*	5-S2n	0.20	0.42	0.20	0.19	4.47	1.90
1.05 cms	1.05 cms	307.93	0.95	0.0*	5-S2n	0.22	0.47	0.22	0.21	4.80	2.02
1.24 cms	1.15 cms	308.04	1.06	0.0*	5-S2n	0.24	0.50	0.24	0.24	4.97	2.14
1.43 cms	1.18 cms	308.07	1.09	0.0*	5-S2n	0.24	0.50	0.24	0.25	5.01	2.24
1.62 cms	1.20 cms	308.10	1.11	0.0*	5-S2n	0.24	0.51	0.24	0.27	5.04	2.33
1.81 cms	1.22 cms	308.12	1.14	0.0*	5-S2n	0.24	0.51	0.24	0.29	5.07	2.41
2.00 cms	1.23 cms	308.14	1.16	0.0*	5-S2n	0.25	0.52	0.25	0.31	4.93	2.48

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 306.98 m,

Outlet Elevation (invert): 304.27 m

Culvert Length: 26.64 m,

Culvert Slope: 0.1023

Culvert Data Summary - 3601

Barrel Shape: Circular

Barrel Diameter: 1000.00 mm

Barrel Material: Concrete

Embedment: 333.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 3601

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

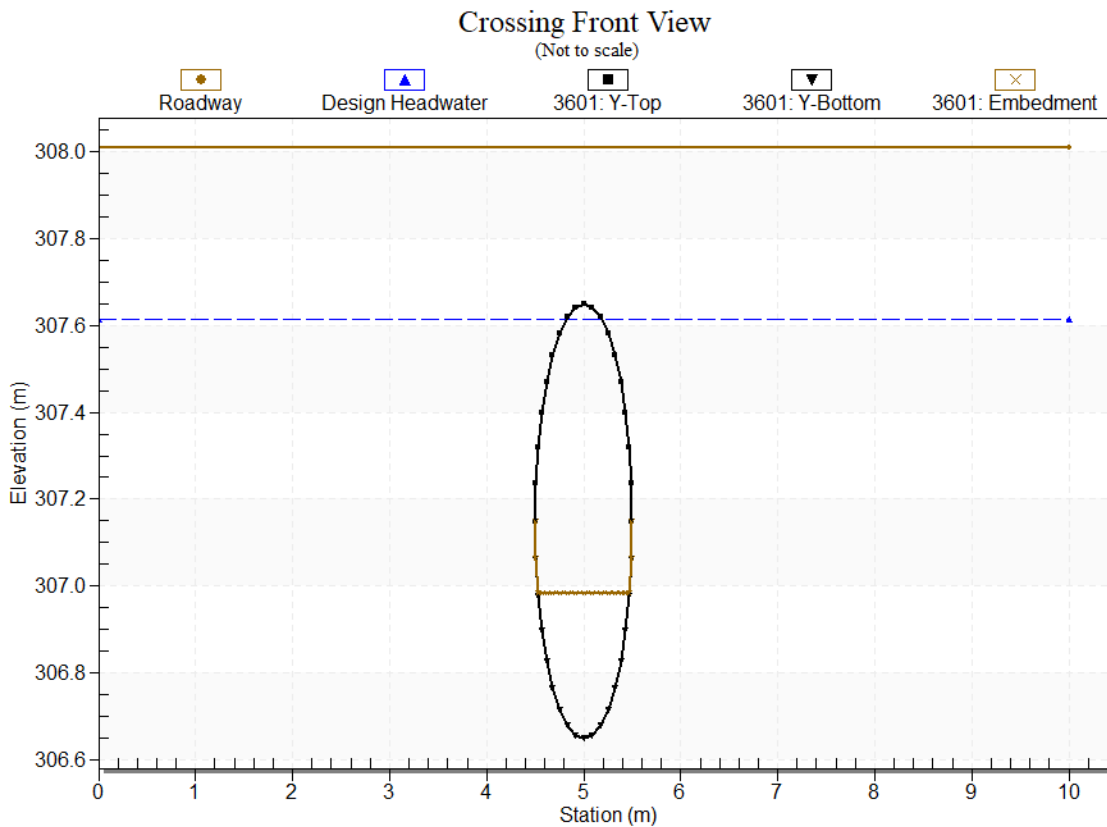
Inlet Elevation: 306.65 m

Outlet Station: 26.50 m

Outlet Elevation: 303.94 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 3601



Roadway Data for Crossing: 3601

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 308.01 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Tailwater Data for Crossing: 3601

Table 16 - Downstream Channel Rating Curve (Crossing: 3601)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	303.99	0.05	0.88	79.06	1.25
0.29	304.04	0.10	1.30	148.52	1.37
0.48	304.07	0.14	1.56	199.70	1.43
0.70	304.11	0.17	1.77	248.75	1.47
0.86	304.13	0.19	1.90	280.21	1.49
1.05	304.15	0.21	2.02	314.29	1.52
1.24	304.17	0.24	2.14	345.59	1.53
1.43	304.19	0.25	2.24	374.81	1.55
1.62	304.21	0.27	2.33	402.19	1.56
1.81	304.23	0.29	2.41	428.14	1.58
2.00	304.24	0.31	2.48	452.79	1.59

Tailwater Channel Data - 3601

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.1500

Channel Manning's n: 0.0600

Channel Invert Elevation: 303.94 m

Culvert Data: 3600

Water Surface Profile Plot for Culvert: 3600

Crossing - 3600, Design Discharge - 0.35 cms

Culvert - 3600, Culvert Discharge - 0.35 cms

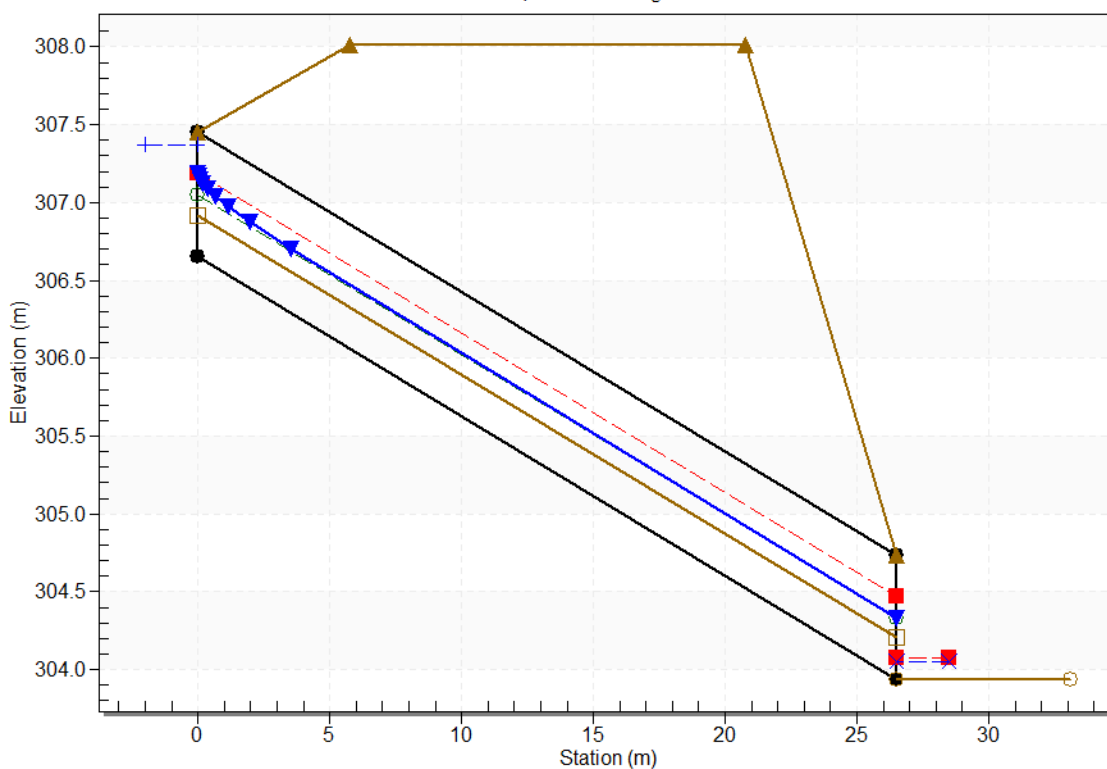


Table 17 - Culvert Summary Table: 3600

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	307.10	0.18	0.0*	1-S2n	0.06	0.12	0.06	0.05	2.23	0.88
0.35 cms	0.35 cms	307.37	0.45	0.0*	1-S2n	0.13	0.27	0.13	0.11	3.45	1.39
0.48 cms	0.48 cms	307.51	0.60	0.0*	5-S2n	0.16	0.33	0.16	0.14	3.87	1.56
0.67 cms	0.67 cms	307.78	0.87	0.0*	5-S2n	0.20	0.40	0.20	0.16	4.36	1.74
0.86 cms	0.81 cms	308.03	1.11	0.0*	5-S2n	0.22	0.44	0.22	0.19	4.67	1.90
1.05 cms	0.83 cms	308.07	1.15	0.0*	5-S2n	0.22	0.45	0.23	0.21	4.55	2.02
1.24 cms	0.84 cms	308.09	1.18	0.0*	5-S2n	0.23	0.45	0.23	0.24	4.60	2.14
1.43 cms	0.86 cms	308.12	1.20	0.0*	5-S2n	0.23	0.45	0.24	0.25	4.63	2.24
1.62 cms	0.87 cms	308.14	1.22	0.0*	5-S2n	0.23	0.46	0.24	0.27	4.66	2.33
1.81 cms	0.87 cms	308.16	1.24	0.0*	5-S2n	0.23	0.46	0.24	0.29	4.69	2.41
2.00 cms	0.88 cms	308.17	1.26	0.0*	5-S2n	0.23	0.46	0.24	0.31	4.72	2.48

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 306.92 m,

Outlet Elevation (invert): 304.20 m

Culvert Length: 26.64 m,

Culvert Slope: 0.1023

Culvert Data Summary - 3600

Barrel Shape: Circular

Barrel Diameter: 800.00 mm

Barrel Material: Concrete

Embedment: 267.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 3600

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

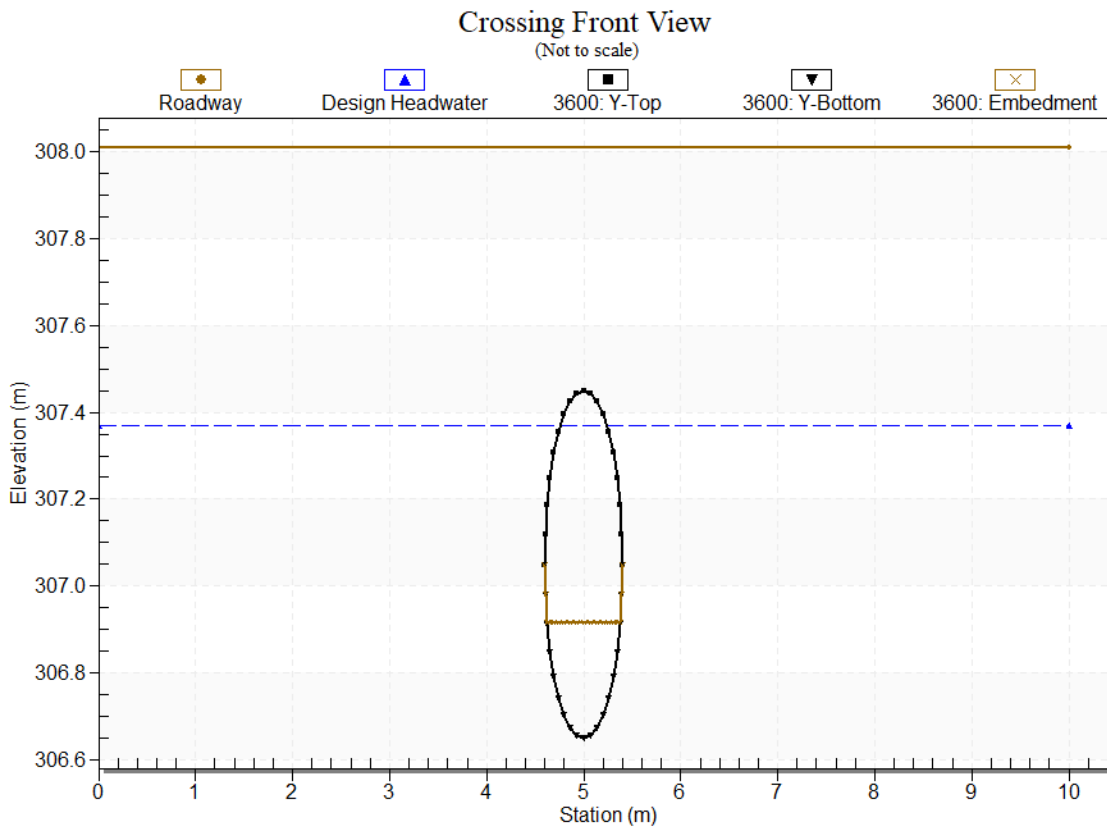
Inlet Elevation: 306.65 m

Outlet Station: 26.50 m

Outlet Elevation: 303.94 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 3600



Roadway Data for Crossing: 3600

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 308.01 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Tailwater Data for Crossing: 3600

Table 17 - Downstream Channel Rating Curve (Crossing: 3600)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	303.99	0.05	0.88	79.06	1.25
0.35	304.05	0.11	1.39	165.95	1.39
0.48	304.07	0.14	1.56	199.70	1.43
0.67	304.10	0.16	1.74	242.52	1.46
0.86	304.13	0.19	1.90	280.21	1.49
1.05	304.15	0.21	2.02	314.29	1.52
1.24	304.17	0.24	2.14	345.59	1.53
1.43	304.19	0.25	2.24	374.81	1.55
1.62	304.21	0.27	2.33	402.19	1.56
1.81	304.23	0.29	2.41	428.14	1.58
2.00	304.24	0.31	2.48	452.79	1.59

Tailwater Channel Data - 3600

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.1500

Channel Manning's n: 0.0600

Channel Invert Elevation: 303.94 m

Culvert Data: 3926

Water Surface Profile Plot for Culvert: 3926

Crossing - 3926, Design Discharge - 0.68 cms

Culvert - 3926, Culvert Discharge - 0.68 cms

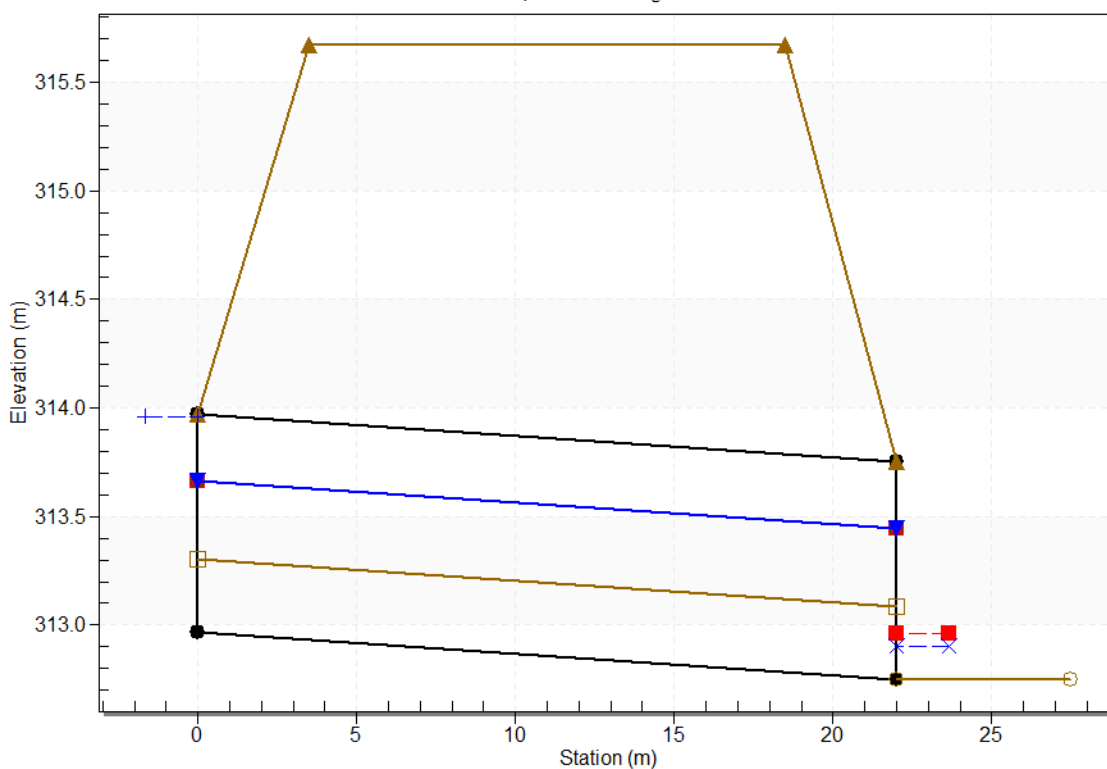


Table 18 - Culvert Summary Table: 3926

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	313.48	0.18	0.182	2-M2c	0.10	0.10	0.10	0.05	1.00	0.97
0.29 cms	0.29 cms	313.66	0.36	0.030	1-S2n	0.21	0.21	0.21	0.09	1.44	1.43
0.48 cms	0.48 cms	313.80	0.50	0.180	1-S2n	0.28	0.29	0.28	0.12	1.72	1.71
0.68 cms	0.68 cms	313.96	0.65	0.656	2-M2c	0.36	0.36	0.36	0.15	1.94	1.93
0.86 cms	0.86 cms	314.10	0.80	0.773	7-M2c	0.43	0.42	0.42	0.18	2.14	2.09
1.05 cms	1.05 cms	314.28	0.98	0.894	7-M2c	0.51	0.47	0.47	0.20	2.35	2.23
1.24 cms	1.24 cms	314.50	1.19	1.031	7-M2c	0.67	0.52	0.52	0.22	2.58	2.35
1.43 cms	1.43 cms	314.74	1.44	1.270	7-M2c	0.67	0.56	0.56	0.23	2.82	2.46
1.62 cms	1.62 cms	315.02	1.72	1.548	7-M2c	0.67	0.59	0.59	0.25	3.09	2.57
1.81 cms	1.81 cms	315.34	2.04	1.837	7-M2c	0.67	0.61	0.61	0.27	3.38	2.66
2.00 cms	1.98 cms	315.68	2.38	2.109	7-M2c	0.67	0.62	0.62	0.28	3.65	2.74

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 313.30 m,

Outlet Elevation (invert): 313.08 m

Culvert Length: 22.00 m,

Culvert Slope: 0.0100

Culvert Data Summary - 3926

Barrel Shape: Circular

Barrel Diameter: 1000.00 mm

Barrel Material: Concrete

Embedment: 333.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 3926

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

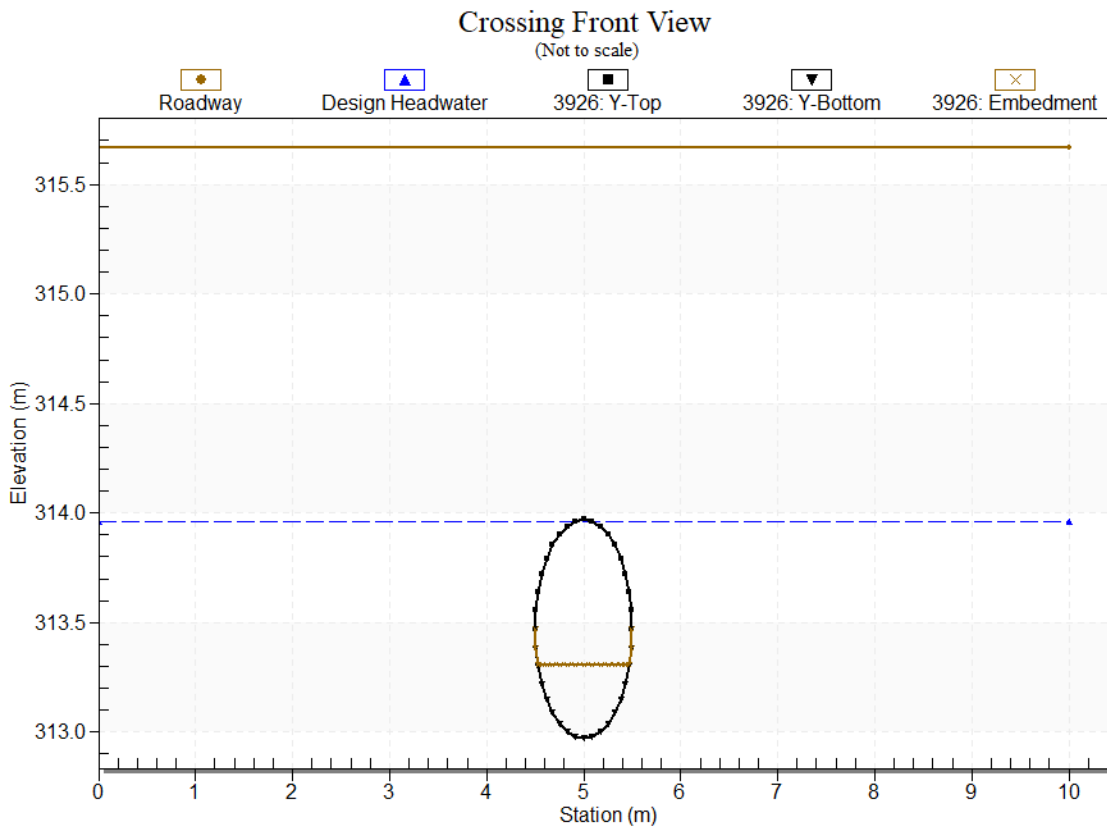
Inlet Elevation: 312.97 m

Outlet Station: 22.00 m

Outlet Elevation: 312.75 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 3926



Roadway Data for Crossing: 3926

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 315.67 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Tailwater Data for Crossing: 3926

Table 18 - Downstream Channel Rating Curve (Crossing: 3926)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	312.80	0.05	0.97	96.72	1.42
0.29	312.84	0.09	1.43	181.97	1.56
0.48	312.87	0.12	1.71	244.78	1.63
0.68	312.90	0.15	1.93	299.98	1.67
0.86	312.93	0.18	2.09	343.83	1.70
1.05	312.95	0.20	2.23	385.77	1.73
1.24	312.97	0.22	2.35	424.44	1.75
1.43	312.98	0.23	2.46	460.49	1.77
1.62	313.00	0.25	2.57	494.36	1.79
1.81	313.02	0.27	2.66	526.40	1.80
2.00	313.03	0.28	2.74	556.85	1.81

Tailwater Channel Data - 3926

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (.:1)

Channel Slope: 0.2000

Channel Manning's n: 0.0600

Channel Invert Elevation: 312.75 m

Culvert Data: 3925

Water Surface Profile Plot for Culvert: 3925

Crossing - 3925, Design Discharge - 0.35 cms

Culvert - 3925, Culvert Discharge - 0.35 cms

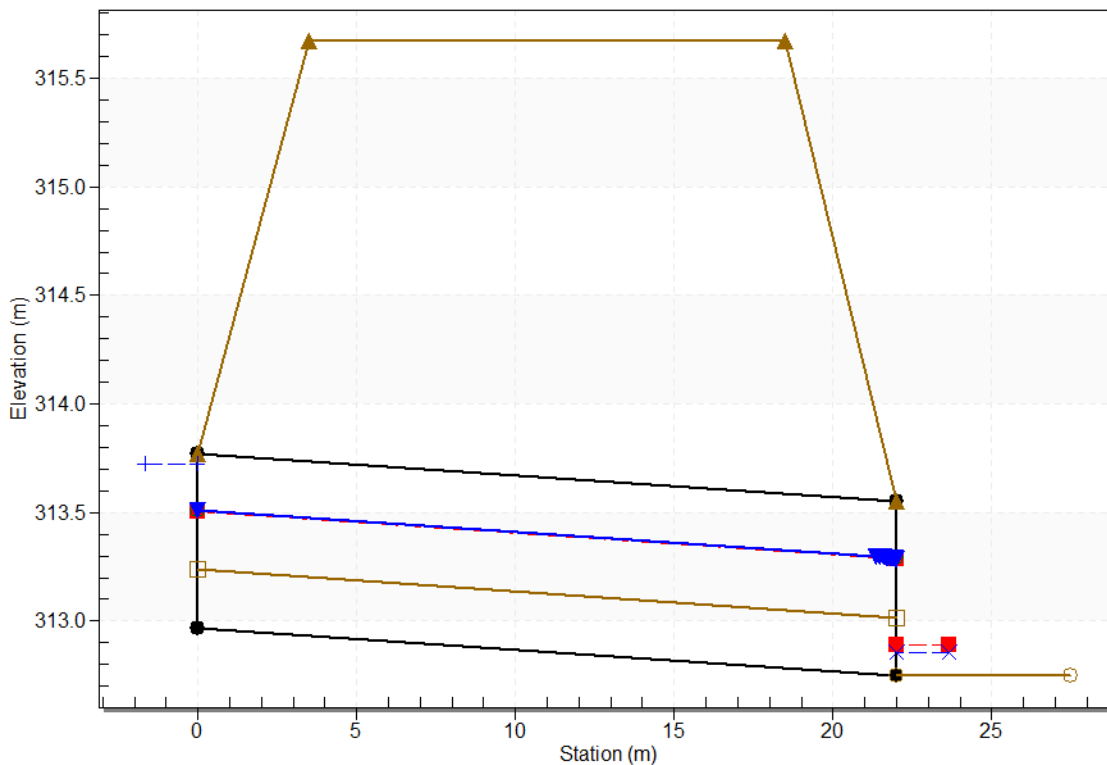


Table 19 - Culvert Summary Table: 3925

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	313.45	0.21	0.209	2-M2c	0.12	0.12	0.12	0.05	1.07	0.97
0.35 cms	0.35 cms	313.72	0.48	0.485	2-M2c	0.27	0.27	0.27	0.10	1.66	1.53
0.48 cms	0.48 cms	313.86	0.62	0.604	7-M2c	0.35	0.33	0.33	0.12	1.89	1.71
0.67 cms	0.67 cms	314.13	0.89	0.786	7-M2c	0.53	0.40	0.40	0.15	2.23	1.92
0.86 cms	0.86 cms	314.47	1.23	1.173	7-M2c	0.53	0.45	0.45	0.18	2.61	2.09
1.05 cms	1.05 cms	314.91	1.67	1.626	7-M2c	0.53	0.49	0.49	0.20	3.06	2.23
1.24 cms	1.24 cms	315.52	2.29	2.132	7-M2c	0.53	0.51	0.51	0.22	3.54	2.35
1.43 cms	1.28 cms	315.71	2.48	2.285	7-M2c	0.53	0.49	0.49	0.23	3.72	2.46
1.62 cms	1.29 cms	315.74	2.51	2.324	7-M2c	0.53	0.49	0.49	0.25	3.75	2.57
1.81 cms	1.30 cms	315.77	2.53	2.342	7-M2c	0.53	0.49	0.49	0.27	3.77	2.66
2.00 cms	1.30 cms	315.79	2.55	2.358	7-M2c	0.53	0.49	0.49	0.28	3.79	2.74

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 313.24 m,

Outlet Elevation (invert): 313.02 m

Culvert Length: 22.00 m,

Culvert Slope: 0.0100

Culvert Data Summary - 3925

Barrel Shape: Circular

Barrel Diameter: 800.00 mm

Barrel Material: Concrete

Embedment: 267.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 3925

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

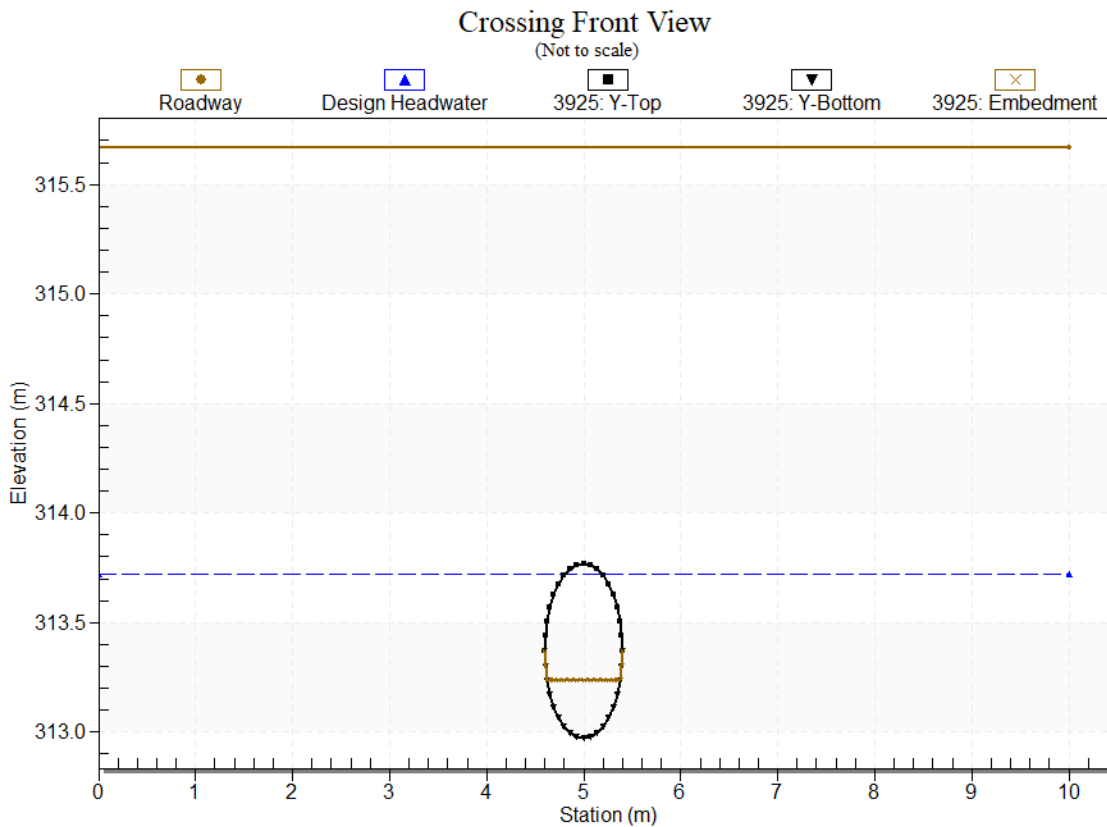
Inlet Elevation: 312.97 m

Outlet Station: 22.00 m

Outlet Elevation: 312.75 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 3925



Roadway Data for Crossing: 3925

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 315.67 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Tailwater Data for Crossing: 3925

Table 19 - Downstream Channel Rating Curve (Crossing: 3925)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	312.80	0.05	0.97	96.72	1.42
0.35	312.85	0.10	1.53	203.30	1.59
0.48	312.87	0.12	1.71	244.78	1.63
0.67	312.90	0.15	1.92	297.44	1.67
0.86	312.93	0.18	2.09	343.83	1.70
1.05	312.95	0.20	2.23	385.77	1.73
1.24	312.97	0.22	2.35	424.44	1.75
1.43	312.98	0.23	2.46	460.49	1.77
1.62	313.00	0.25	2.57	494.36	1.79
1.81	313.02	0.27	2.66	526.40	1.80
2.00	313.03	0.28	2.74	556.85	1.81

Tailwater Channel Data - 3925

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (.:1)

Channel Slope: 0.2000

Channel Manning's n: 0.0600

Channel Invert Elevation: 312.75 m

Culvert Data: 5440

Water Surface Profile Plot for Culvert: 5440

Crossing - 5440, Design Discharge - 0.57 cms

Culvert - 5440, Culvert Discharge - 0.57 cms

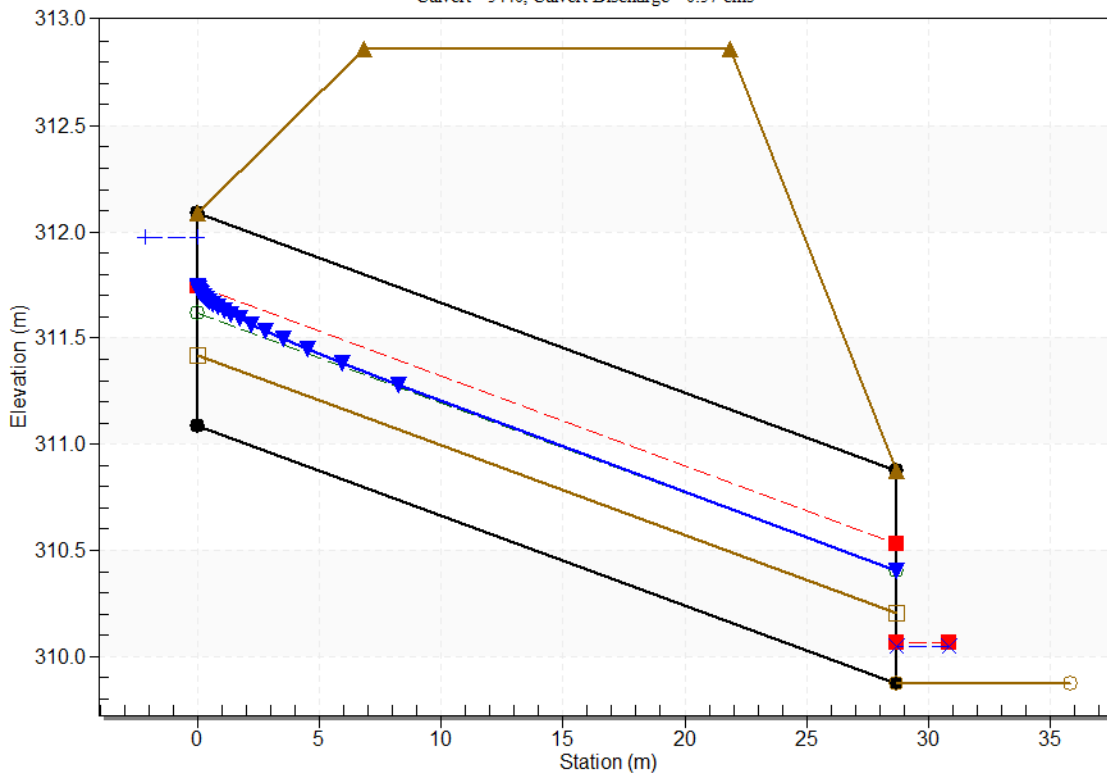


Table 20 - Culvert Summary Table: 5440

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	311.59	0.17	0.0*	1-S2n	0.07	0.10	0.07	0.06	1.57	0.75
0.19 cms	0.19 cms	311.68	0.26	0.0*	1-S2n	0.10	0.16	0.10	0.09	1.98	0.95
0.28 cms	0.28 cms	311.76	0.34	0.0*	1-S2n	0.13	0.20	0.13	0.12	2.27	1.09
0.37 cms	0.37 cms	311.83	0.41	0.0*	1-S2n	0.15	0.24	0.15	0.14	2.49	1.20
0.46 cms	0.46 cms	311.90	0.48	0.0*	1-S2n	0.17	0.28	0.17	0.15	2.69	1.30
0.57 cms	0.57 cms	311.98	0.56	0.0*	1-S2n	0.20	0.32	0.20	0.17	2.91	1.39
0.64 cms	0.64 cms	312.03	0.61	0.0*	1-S2n	0.22	0.35	0.22	0.19	2.96	1.45
0.73 cms	0.73 cms	312.10	0.68	0.0*	5-S2n	0.23	0.38	0.23	0.20	3.18	1.51
0.82 cms	0.82 cms	312.17	0.75	0.0*	5-S2n	0.25	0.41	0.25	0.21	3.31	1.57
0.91 cms	0.91 cms	312.25	0.83	0.0*	5-S2n	0.27	0.43	0.28	0.23	3.36	1.63
1.00 cms	1.00 cms	312.34	0.92	0.0*	5-S2n	0.29	0.46	0.29	0.24	3.55	1.68

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 311.42 m,

Outlet Elevation (invert): 310.21 m

Culvert Length: 28.73 m,

Culvert Slope: 0.0423

Culvert Data Summary - 5440

Barrel Shape: Circular

Barrel Diameter: 1000.00 mm

Barrel Material: Concrete

Embedment: 333.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 5440

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

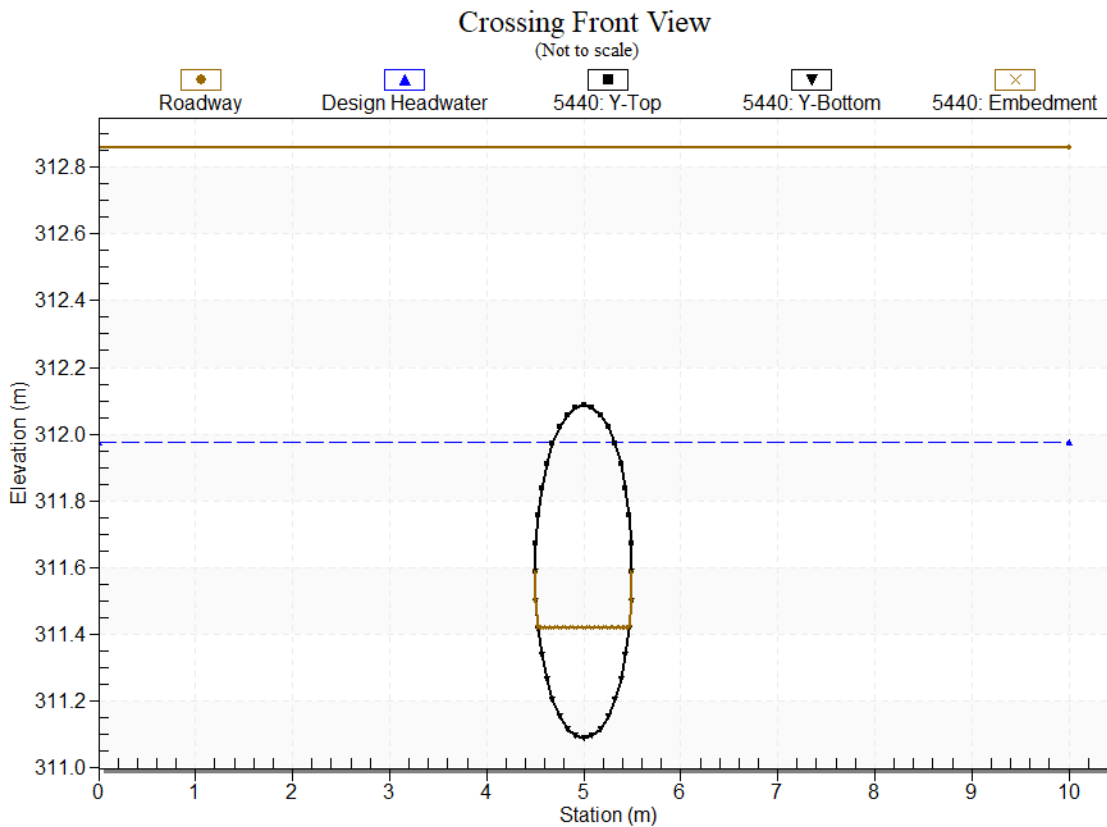
Inlet Elevation: 311.09 m

Outlet Station: 28.70 m

Outlet Elevation: 309.87 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 5440



Roadway Data for Crossing: 5440

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 312.86 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Tailwater Data for Crossing: 5440

Table 20 - Downstream Channel Rating Curve (Crossing: 5440)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	309.94	0.06	0.75	55.20	0.99
0.19	309.96	0.09	0.95	80.73	1.04
0.28	309.99	0.12	1.09	101.47	1.08
0.37	310.01	0.14	1.20	119.46	1.10
0.46	310.03	0.15	1.30	135.65	1.12
0.57	310.05	0.17	1.39	153.64	1.14
0.64	310.06	0.19	1.45	164.26	1.15
0.73	310.07	0.20	1.51	177.20	1.16
0.82	310.09	0.21	1.57	189.46	1.17
0.91	310.10	0.23	1.63	201.06	1.18
1.00	310.11	0.24	1.68	212.17	1.19

Tailwater Channel Data - 5440

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.0900

Channel Manning's n: 0.0600

Channel Invert Elevation: 309.87 m

Culvert Data: 3701

Water Surface Profile Plot for Culvert: 3701

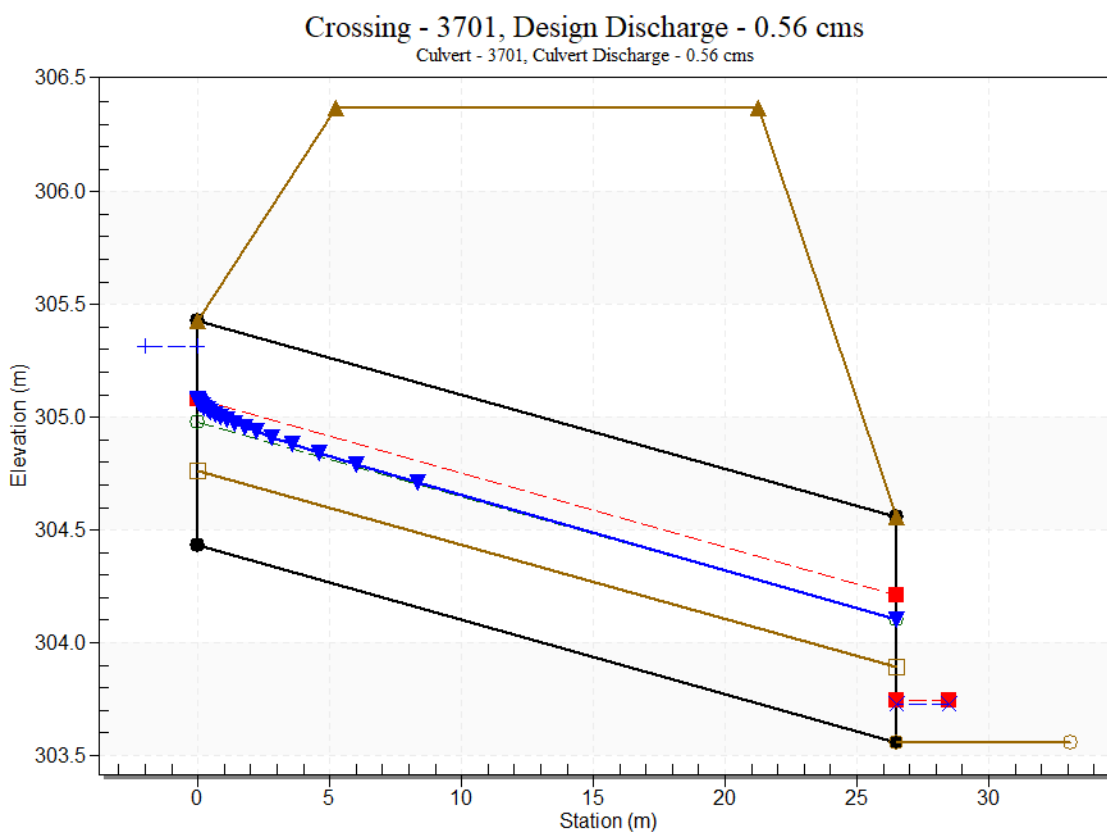


Table 21 - Culvert Summary Table: 3701

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	304.93	0.17	0.0*	1-S2n	0.07	0.10	0.07	0.06	1.45	0.78
0.19 cms	0.19 cms	305.03	0.26	0.0*	1-S2n	0.11	0.16	0.11	0.09	1.82	0.98
0.28 cms	0.28 cms	305.11	0.34	0.0*	1-S2n	0.14	0.20	0.14	0.11	2.09	1.13
0.37 cms	0.37 cms	305.18	0.41	0.0*	1-S2n	0.16	0.24	0.16	0.13	2.29	1.25
0.46 cms	0.46 cms	305.24	0.48	0.0*	1-S2n	0.19	0.28	0.19	0.15	2.48	1.34
0.56 cms	0.56 cms	305.31	0.55	0.0*	1-S2n	0.21	0.32	0.21	0.17	2.67	1.44
0.64 cms	0.64 cms	305.37	0.61	0.0*	1-S2n	0.23	0.35	0.23	0.18	2.80	1.50
0.73 cms	0.73 cms	305.44	0.68	0.0*	5-S2n	0.25	0.38	0.25	0.19	2.93	1.57
0.82 cms	0.82 cms	305.52	0.75	0.0*	5-S2n	0.27	0.41	0.28	0.21	2.99	1.63
0.91 cms	0.91 cms	305.60	0.83	0.0*	5-S2n	0.29	0.43	0.29	0.22	3.17	1.68
1.00 cms	1.00 cms	305.68	0.92	0.108	5-S2n	0.31	0.46	0.31	0.23	3.27	1.74

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 304.76 m,

Outlet Elevation (invert): 303.89 m

Culvert Length: 26.51 m,

Culvert Slope: 0.0329

Culvert Data Summary - 3701

Barrel Shape: Circular

Barrel Diameter: 1000.00 mm

Barrel Material: Concrete

Embedment: 333.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 3701

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

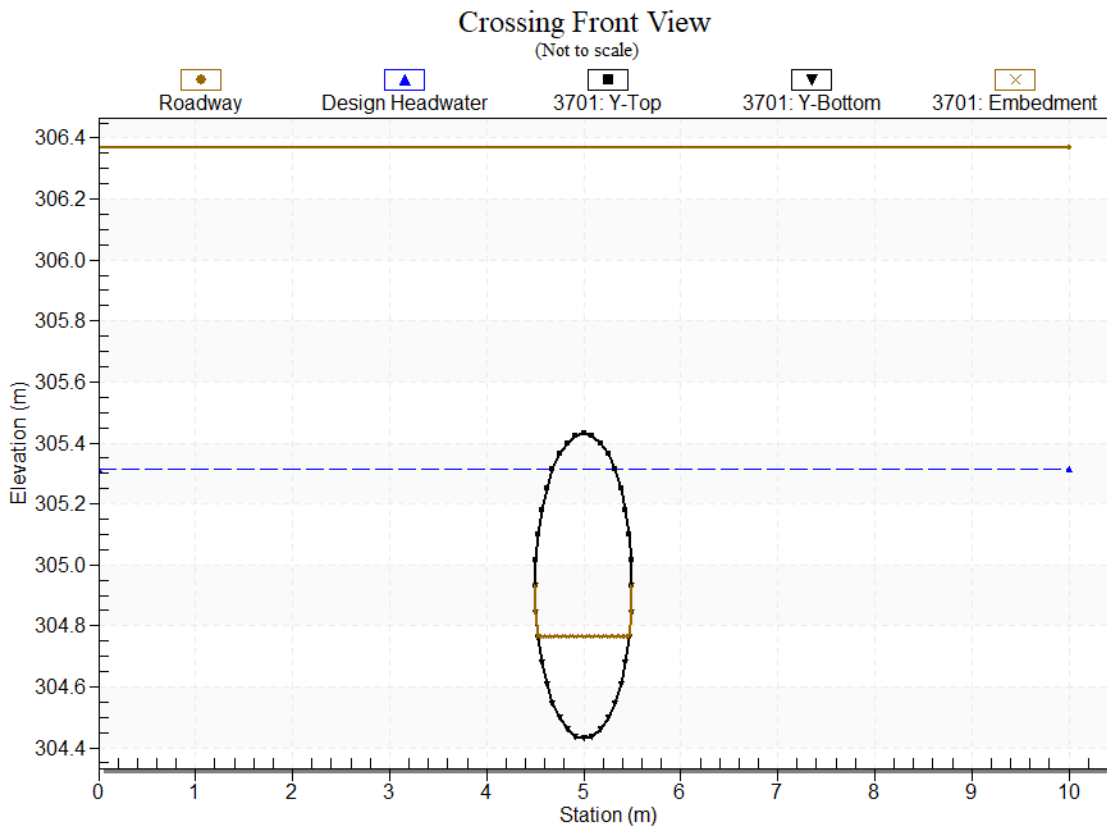
Inlet Elevation: 304.43 m

Outlet Station: 26.50 m

Outlet Elevation: 303.56 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 3701



Roadway Data for Crossing: 3701

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 306.37 m

Roadway Surface: Paved

Roadway Top Width: 16.00 m

Tailwater Data for Crossing: 3701

Table 21 - Downstream Channel Rating Curve (Crossing: 3701)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	303.62	0.06	0.78	59.45	1.04
0.19	303.65	0.09	0.98	86.97	1.10
0.28	303.67	0.11	1.13	109.32	1.13
0.37	303.69	0.13	1.25	128.73	1.16
0.46	303.71	0.15	1.34	146.17	1.18
0.56	303.73	0.17	1.44	163.87	1.20
0.64	303.74	0.18	1.50	177.05	1.21
0.73	303.75	0.19	1.57	191.03	1.22
0.82	303.77	0.21	1.63	204.21	1.23
0.91	303.78	0.22	1.68	216.77	1.24
1.00	303.79	0.23	1.74	228.79	1.25

Tailwater Channel Data - 3701

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.1000

Channel Manning's n: 0.0600

Channel Invert Elevation: 303.56 m

Culvert Data: 3700

Water Surface Profile Plot for Culvert: 3700

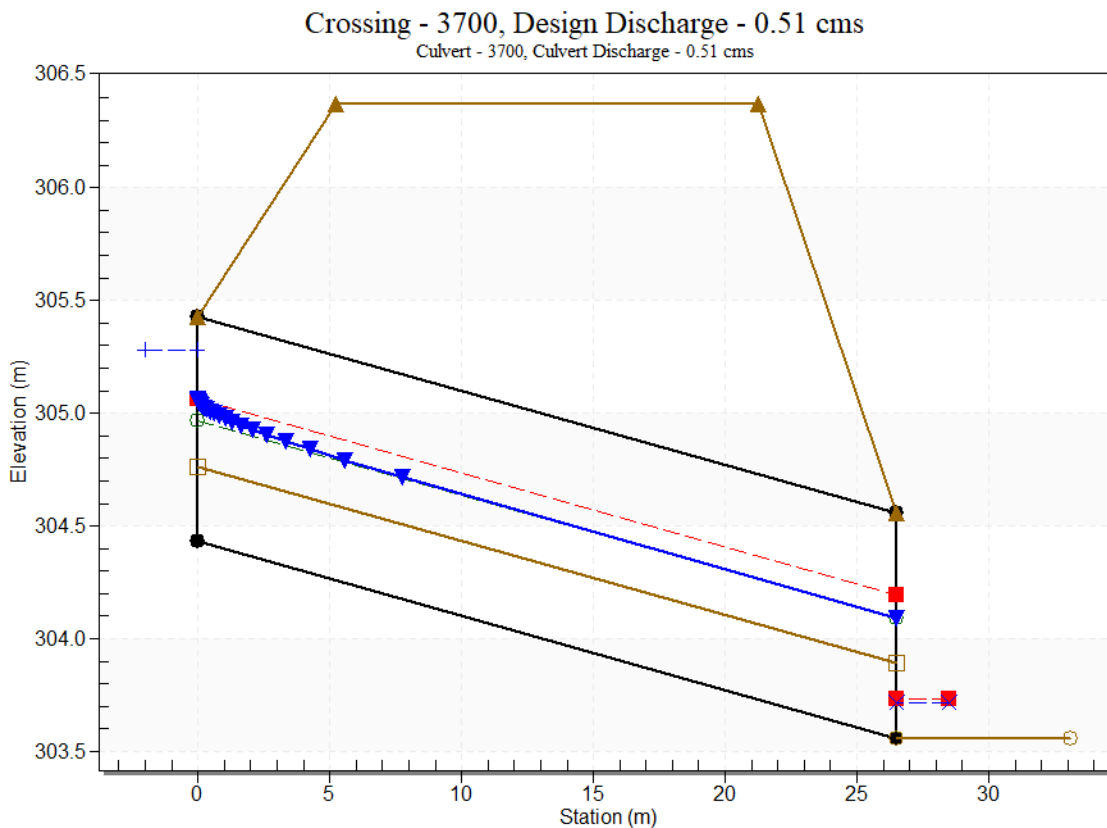


Table 22 - Culvert Summary Table: 3700

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	304.93	0.17	0.0*	1-S2n	0.07	0.10	0.07	0.06	1.45	0.78
0.19 cms	0.19 cms	305.03	0.26	0.0*	1-S2n	0.11	0.16	0.11	0.09	1.82	0.98
0.28 cms	0.28 cms	305.11	0.34	0.0*	1-S2n	0.14	0.20	0.14	0.11	2.09	1.13
0.37 cms	0.37 cms	305.18	0.41	0.0*	1-S2n	0.16	0.24	0.16	0.13	2.29	1.25
0.46 cms	0.46 cms	305.24	0.48	0.0*	1-S2n	0.19	0.28	0.19	0.15	2.48	1.34
0.51 cms	0.51 cms	305.28	0.52	0.0*	1-S2n	0.20	0.30	0.20	0.16	2.58	1.39
0.64 cms	0.64 cms	305.37	0.61	0.0*	1-S2n	0.23	0.35	0.23	0.18	2.80	1.50
0.73 cms	0.73 cms	305.44	0.68	0.0*	5-S2n	0.25	0.38	0.25	0.19	2.93	1.57
0.82 cms	0.82 cms	305.52	0.75	0.0*	5-S2n	0.27	0.41	0.28	0.21	2.99	1.63
0.91 cms	0.91 cms	305.60	0.83	0.0*	5-S2n	0.29	0.43	0.29	0.22	3.17	1.68
1.00 cms	1.00 cms	305.68	0.92	0.108	5-S2n	0.31	0.46	0.31	0.23	3.27	1.74

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 304.76 m,

Outlet Elevation (invert): 303.89 m

Culvert Length: 26.51 m,

Culvert Slope: 0.0329

Culvert Data Summary - 3700

Barrel Shape: Circular

Barrel Diameter: 1000.00 mm

Barrel Material: Concrete

Embedment: 333.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 3700

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

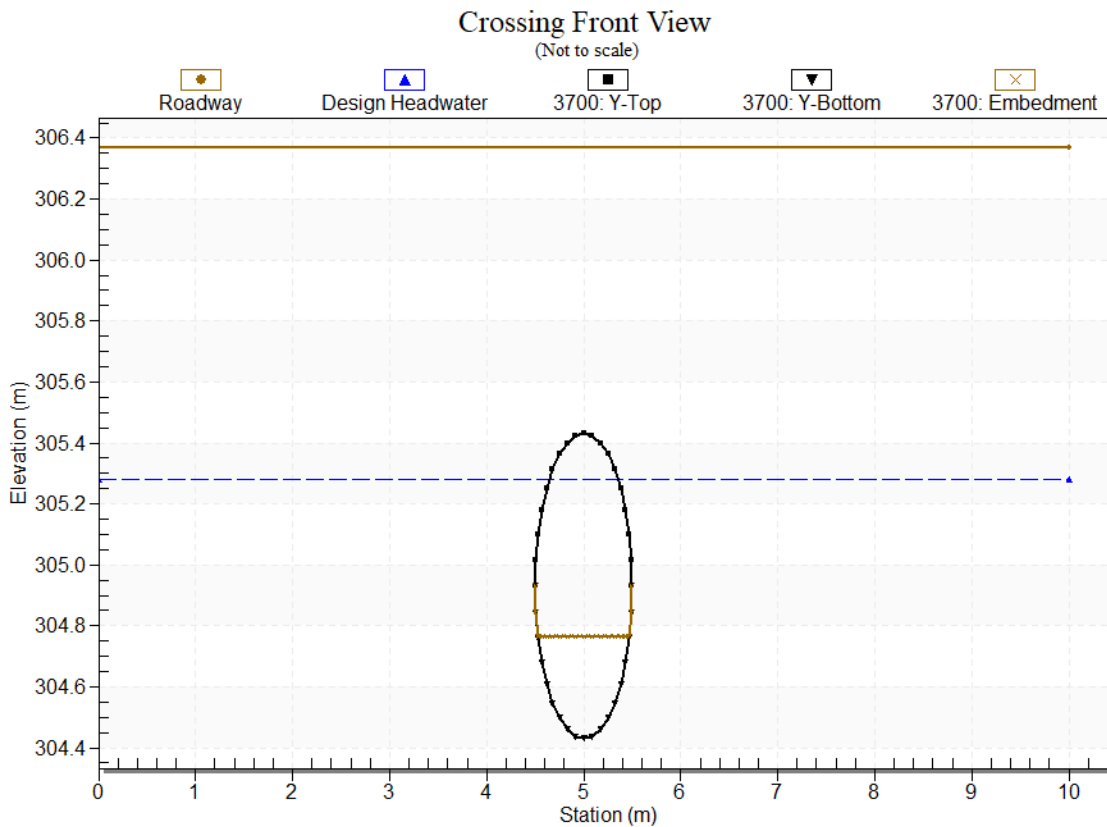
Inlet Elevation: 304.43 m

Outlet Station: 26.50 m

Outlet Elevation: 303.56 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 3700



Roadway Data for Crossing: 3700

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 306.37 m

Roadway Surface: Paved

Roadway Top Width: 16.00 m

Tailwater Data for Crossing: 3700

Table 22 - Downstream Channel Rating Curve (Crossing: 3700)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	303.62	0.06	0.78	59.45	1.04
0.19	303.65	0.09	0.98	86.97	1.10
0.28	303.67	0.11	1.13	109.32	1.13
0.37	303.69	0.13	1.25	128.73	1.16
0.46	303.71	0.15	1.34	146.17	1.18
0.51	303.72	0.16	1.39	155.24	1.19
0.64	303.74	0.18	1.50	177.05	1.21
0.73	303.75	0.19	1.57	191.03	1.22
0.82	303.77	0.21	1.63	204.21	1.23
0.91	303.78	0.22	1.68	216.77	1.24
1.00	303.79	0.23	1.74	228.79	1.25

Tailwater Channel Data - 3700

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (└:1)

Channel Slope: 0.1000

Channel Manning's n: 0.0600

Channel Invert Elevation: 303.56 m

Culvert Data: 6090

Water Surface Profile Plot for Culvert: 6090

Crossing - 6090, Design Discharge - 0.39 cms

Culvert - 6090, Culvert Discharge - 0.39 cms

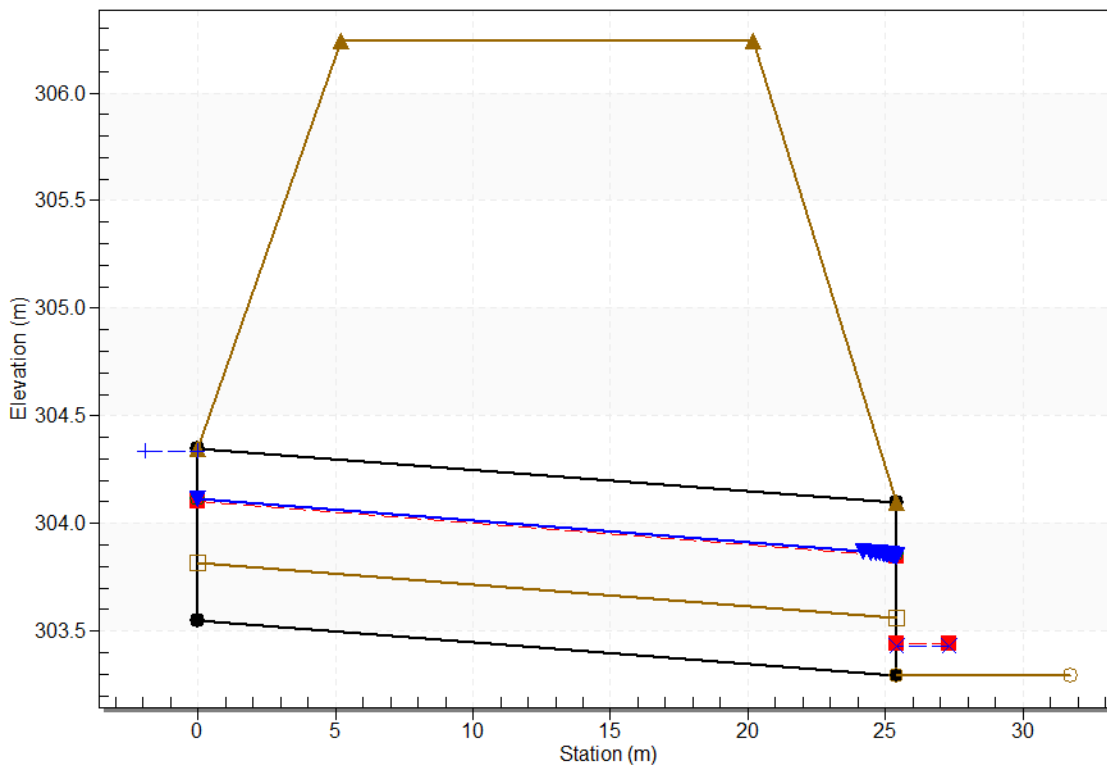


Table 23 - Culvert Summary Table: 6090

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	304.02	0.21	0.209	2-M2c	0.12	0.12	0.12	0.06	1.07	0.78
0.19 cms	0.19 cms	304.14	0.31	0.321	2-M2c	0.18	0.18	0.18	0.09	1.33	0.98
0.28 cms	0.28 cms	304.23	0.41	0.416	2-M2c	0.24	0.23	0.23	0.11	1.53	1.13
0.39 cms	0.39 cms	304.34	0.52	0.522	2-M2c	0.30	0.29	0.29	0.14	1.73	1.27
0.46 cms	0.46 cms	304.41	0.60	0.586	7-M2c	0.34	0.32	0.32	0.15	1.86	1.34
0.55 cms	0.55 cms	304.53	0.71	0.667	7-M2c	0.39	0.36	0.36	0.17	2.02	1.43
0.64 cms	0.64 cms	304.66	0.84	0.753	7-M2c	0.46	0.39	0.39	0.18	2.17	1.50
0.73 cms	0.73 cms	304.81	0.99	0.892	7-M2c	0.53	0.42	0.42	0.19	2.35	1.57
0.82 cms	0.82 cms	304.97	1.16	1.114	7-M2c	0.53	0.44	0.44	0.21	2.53	1.63
0.91 cms	0.91 cms	305.15	1.34	1.326	7-M2c	0.53	0.46	0.46	0.22	2.72	1.68
1.00 cms	1.00 cms	305.37	1.54	1.552	7-M2c	0.53	0.48	0.48	0.23	2.93	1.74

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 303.81 m,

Outlet Elevation (invert): 303.56 m

Culvert Length: 25.40 m,

Culvert Slope: 0.0100

Culvert Data Summary - 6090

Barrel Shape: Circular

Barrel Diameter: 800.00 mm

Barrel Material: Concrete

Embedment: 267.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 6090

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

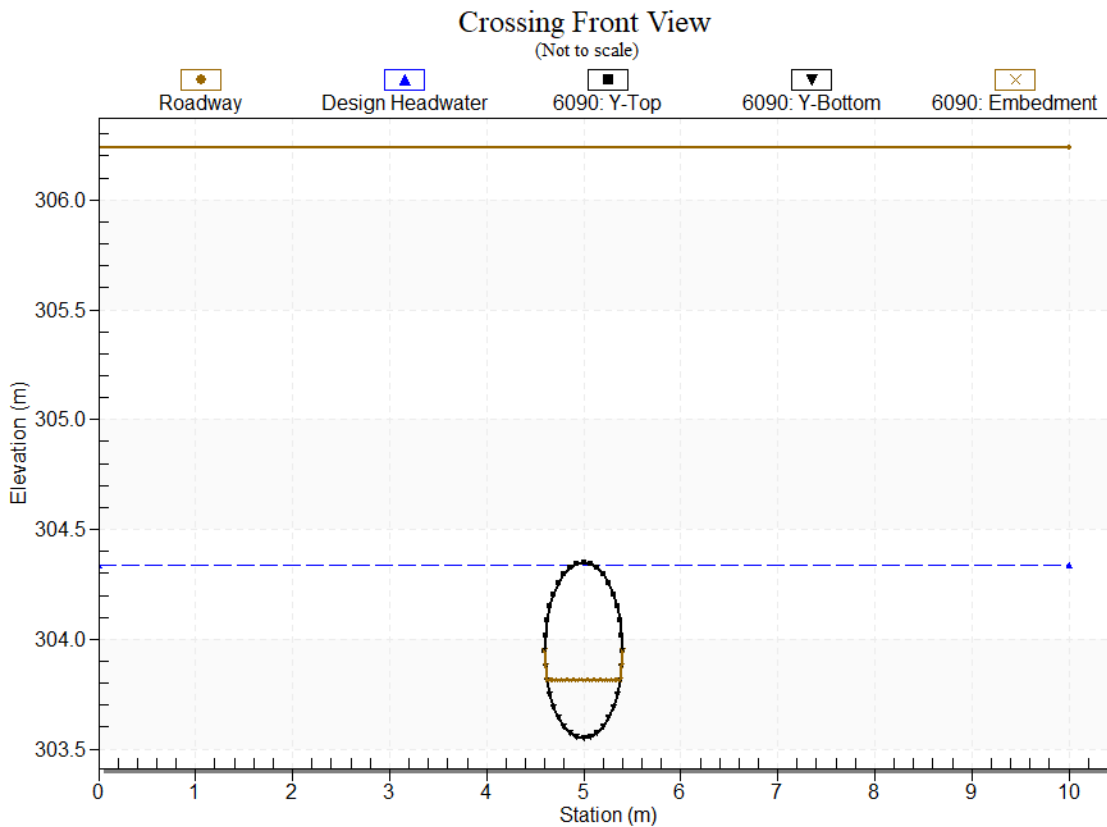
Inlet Elevation: 303.55 m

Outlet Station: 25.40 m

Outlet Elevation: 303.29 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 6090



Roadway Data for Crossing: 6090

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 306.24 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Tailwater Data for Crossing: 6090

Table 23 - Downstream Channel Rating Curve (Crossing: 6090)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	303.35	0.06	0.78	59.45	1.04
0.19	303.38	0.09	0.98	86.97	1.10
0.28	303.41	0.11	1.13	109.32	1.13
0.39	303.43	0.14	1.27	132.73	1.16
0.46	303.44	0.15	1.34	146.17	1.18
0.55	303.46	0.17	1.43	162.19	1.20
0.64	303.47	0.18	1.50	177.05	1.21
0.73	303.49	0.19	1.57	191.03	1.22
0.82	303.50	0.21	1.63	204.21	1.23
0.91	303.52	0.22	1.68	216.77	1.24
1.00	303.53	0.23	1.74	228.79	1.25

Tailwater Channel Data - 6090

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.1000

Channel Manning's n: 0.0600

Channel Invert Elevation: 303.29 m

Culvert Data: 5275

Water Surface Profile Plot for Culvert: 5275

Crossing - 5275, Design Discharge - 0.26 cms

Culvert - 5275, Culvert Discharge - 0.26 cms

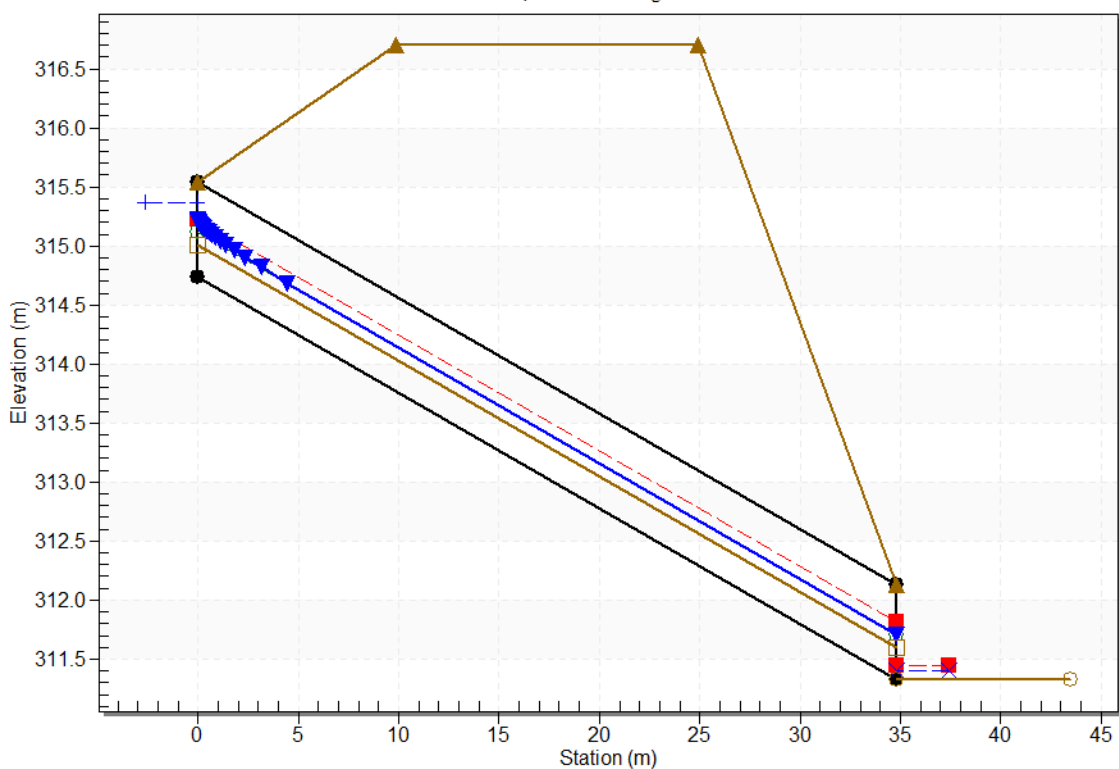


Table 24 - Culvert Summary Table: 5275

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.10 cms	0.10 cms	315.19	0.18	0.0*	1-S2n	0.06	0.12	0.06	0.04	2.20	1.10
0.19 cms	0.19 cms	315.29	0.29	0.0*	1-S2n	0.09	0.18	0.09	0.06	2.76	1.39
0.26 cms	0.26 cms	315.37	0.36	0.0*	1-S2n	0.11	0.22	0.11	0.08	3.07	1.56
0.37 cms	0.37 cms	315.48	0.47	0.0*	1-S2n	0.14	0.28	0.14	0.10	3.47	1.78
0.46 cms	0.46 cms	315.58	0.58	0.0*	5-S2n	0.16	0.32	0.16	0.11	3.76	1.92
0.55 cms	0.55 cms	315.69	0.69	0.0*	5-S2n	0.17	0.36	0.17	0.12	4.01	2.04
0.64 cms	0.64 cms	315.82	0.82	0.0*	5-S2n	0.19	0.39	0.19	0.13	4.23	2.16
0.73 cms	0.73 cms	315.97	0.97	0.0*	5-S2n	0.21	0.42	0.21	0.14	4.49	2.26
0.82 cms	0.82 cms	316.13	1.13	0.0*	5-S2n	0.23	0.44	0.23	0.15	4.62	2.35
0.91 cms	0.91 cms	316.32	1.32	0.0*	5-S2n	0.24	0.46	0.25	0.16	4.66	2.43
1.00 cms	1.00 cms	316.52	1.52	0.0*	5-S2n	0.26	0.48	0.26	0.17	4.85	2.51

* Full Flow Headwater elevation is below inlet invert.

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 315.00 m,

Outlet Elevation (invert): 311.60 m

Culvert Length: 34.97 m,

Culvert Slope: 0.0979

Culvert Data Summary - 5275

Barrel Shape: Circular

Barrel Diameter: 800.00 mm

Barrel Material: Concrete

Embedment: 267.00 mm

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0200 (bottom)

Culvert Type: Straight

Inlet Configuration: Grooved End in Headwall

Inlet Depression: None

Site Data - 5275

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

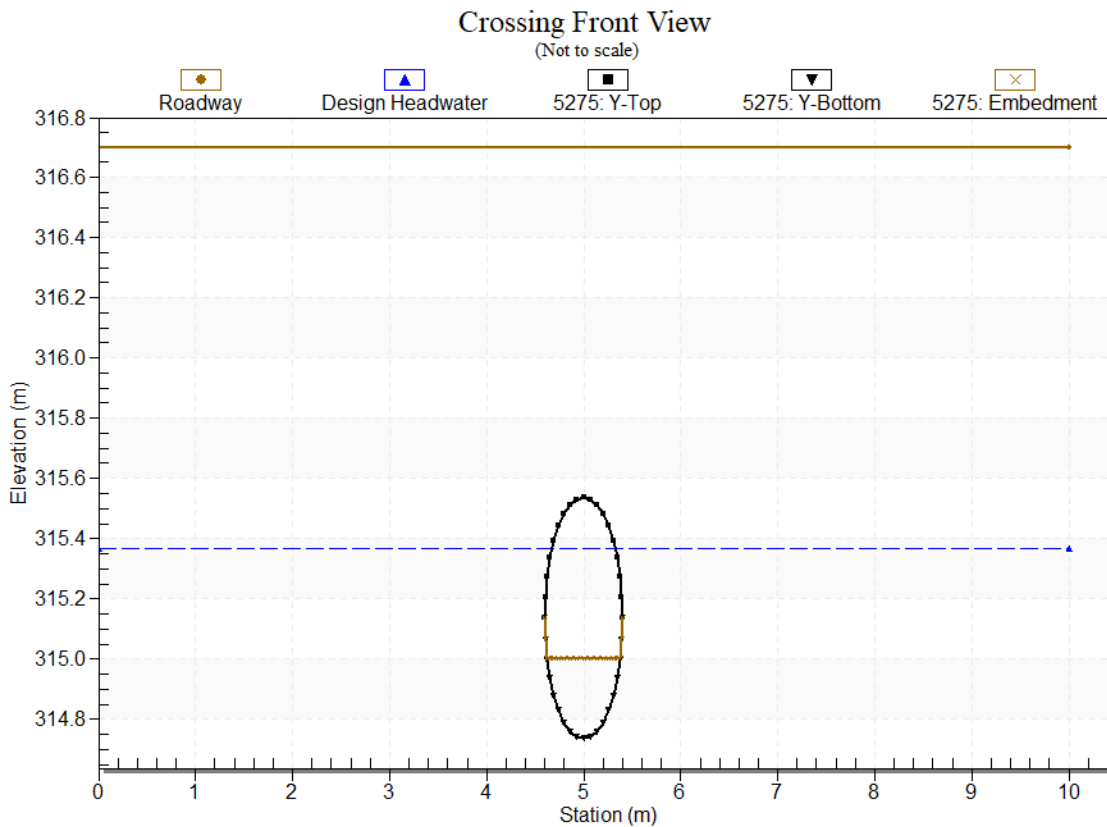
Inlet Elevation: 314.74 m

Outlet Station: 34.80 m

Outlet Elevation: 311.33 m

Number of Barrels: 1

Crossing Front View (Roadway Profile): 5275



Roadway Data for Crossing: 5275

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 316.70 m

Roadway Surface: Paved

Roadway Top Width: 15.00 m

Tailwater Data for Crossing: 5275

Table 24 - Downstream Channel Rating Curve (Crossing: 5275)

Flow (cms)	Water Surface Elev (m)	Velocity (m/s)	Depth (m)	Shear (Pa)	Froude Number
0.10	311.37	0.04	1.10	128.52	1.71
0.19	311.39	0.06	1.39	188.43	1.81
0.26	311.41	0.08	1.56	226.94	1.86
0.37	311.42	0.10	1.78	279.57	1.92
0.46	311.44	0.11	1.92	317.88	1.95
0.55	311.45	0.12	2.04	353.08	1.98
0.64	311.46	0.13	2.16	385.85	2.01
0.73	311.47	0.14	2.26	416.66	2.03
0.82	311.48	0.15	2.35	445.93	2.05
0.91	311.49	0.16	2.43	473.79	2.06
1.00	311.50	0.17	2.51	500.44	2.08

Tailwater Channel Data - 5275

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 m

Side Slope (H:V): 2.00 (1:1)

Channel Slope: 0.3000

Channel Manning's n: 0.0600

Channel Invert Elevation: 311.33 m