(In reply, please refer to)
Our File: 02-0629-0201

September 18, 2002

Department of Fisheries and Oceans
Eastern Arctic Area
P.O. Box 358
Iqaluit, Nunavut X0A 0H0

Attention: Mr. Jordan DeGroot

Proposed Char River Crossing Replacement Structure at the Hamlet of Rankin Inlet

Dear Mr. DeGroot:

This report and the attached drawings form our submission to the Department of Fisheries and Oceans on the Proposed Char River Crossing Replacement Structure at the Hamlet of Rankin Inlet.

1.0 Background:

In June 2002, Dillon Consulting Limited (Dillon) was retained by the Department of Community Government and Transportation (CG & T), Government of Nunavut, to design a new crossing structure for the Char River at Rankin Inlet. Background Information was provided to Dillon with respect to the existing crossings history of **yearly** washouts and the corresponding fish habitat damage downstream. Further, Dillon was informed that the Department of Fisheries and Oceans (DFO) had demanded a permanent solution to this problem.

2.0 Understanding of the Project:

To gain a thorough understanding of all the problems associated with this site, Dillon had several conversations with the following stakeholders:

Mr. Jean Corbeil, P.Eng.
Municipal Planning Engineer
C & GS, Rankin Inlet

Mr. Keith Pelley
Fisheries Superintendent
DFO, Rankin Inlet

030129CHA Replace Structure Drwgs-ILAE

Mr. Dennis Althouse
Former Senior Administrative Officer
Hamlet of Rankin Inlet

Mr. Randy Wedel
Water Survey of Canada, Environment Canada
Yellowknife

Based upon these conversations, the following were identified as important design requirements:

- The spring runoff (freshet) is extremely flashy and is exacerbated by the bursting of snowdams in the upper reaches of the Char River.
- Anchor ice develops in the channel bottom up to 1.8 m thick in the early winter and blocks culverts.
- The Char River at this site contains excellent habitat for Arctic Grayling.
- Fish passage is mandatory through the new crossing.
- Hard packed snow accumulates in the river channel throughout the winter.
- Large snow/ice flows are common in the spring freshet and have to be passed by the new crossing structure.
- The soils in the vicinity of the crossing are highly erodible and require stabilization with riprap.

Mr. Keith Pelley, (DFO) supplied a video filmed by his office on the spring 2002 runoff and crossing washout at this site. This video proved invaluable in understanding the severity of the runoff both in terms of its magnitude and its velocity of flow. The ability of the new structure to withstand the runoff shown in this video became **the primary** design requirement.

From this video, Dillon was able to estimate the peak flow at approximately 33 m^3 per second (cms)

In July 2002, Dillon conducted a habitat assessment and topographic site survey at the crossing. The topographic information collected has served as the base plan for the attached drawings. The habitat information collected is described below.

3.0 Fish Habitat:

On July 4, 2002, Dillon conducted a qualitative fish habitat assessment at this site. The habitat downstream of the crossing was found to be excellent spawning, rearing and nursery habitat for Arctic Grayling. This area was characterized as predominantly riffle-run habitat with gravel/cobble substrates. The need to preserve this habitat by preventing future road washouts became a design requirement.

Upstream of the crossing some deposition (of the highly erodible bank material) had occurred due to ponding behind the existing undersized culverts. The ability of the new structure to pass the runoff without ponding became a design requirement.
A structure meeting this requirement should allow the river to return to its natural conditions.

4.0 Proposed Structure:

Dillon assessed several crossing structure alternatives against all the requirements listed in sections Understanding of the Project and Fish Habitat. After discussions with the Department of Community Government and Transportation, Dillon has determined that a bridge with a clear span of 12.6 m is the appropriate structure to replace the existing 1.2 m diameter culvert.

Drawing Number E-7 shows a plan view and elevation of the proposed bridge. The bridge is supported on steel cribs (bin walls) that are filled with granular material for stability. The bin walls are recessed 1.0 m below stream bed on firm foundation soils. To prevent scour around and between the bin walls, riprap underlain by geotextile is proposed. The geotextile is used to prevent the leaching of fine streambed materials through the riprap, thus maintaining its integrity.

The riprap is continued for 15 m upstream and downstream from the respective bin wall ends. The transition back to the natural streambed shape will be made over these 15 m.

The road on either side of the bridge has been raised to accommodate the higher structure. Roadside ditches with interceptor arms have been designed to prevent any downslope erosion from occurring in the vicinity of the crossing. The riprap in the ditches will be of a lighter grade than planned for the channel, but will still be underlain by geotextile.

5.0 Effects on Habitat:

5.1 Habitat Gained/Lost

For the purpose of determining Habitat Gained and Lost, the water level corresponding to the spring freshet was used. This level of 27.5 m was achieved approximately 3 to 4 days after the peak flow (33 cms.) occurred on the DFO video. Further, it corresponds to flow metered by Water Survey of Canada in 2000. It represents the earliest time that the Grayling would begin to move into the area.

Drawing E-1 delineates the habitat within the boundary of the work area that is below the freshet water level of 27.5 m for the **existing** crossing. The existing habitat area was found to be 721 m^2.

Drawing E-2 delineates the habitat within the boundary of the work area below the freshet water level of 27.5 m **after completion** of the bridge crossing and related works. The future habitat area will be 865 m^2. This represents a net habitat gain of 144 m^2 (865-721) from this project.

Drawing E-3 represents a combination of Drawings E-1 and E-2. It delineates 202 m^2 of habitat gained and 58 m^2 of habitat lost. As above, the project results in a **net habitat gain of 144 m^2.**

5.2 Improved Crossing:

The proposed 12.6 m clear span bridge has been designed to pass the peak flow shown in the DFO video without detrimental effects to the channel or roadway. Drawing E-7 displays the substantial gain in flow area that the bridge will provide over that of the existing culvert.

The riprap placed around the bin walls and on the channel bottom, will prevent erosion and maintain the integrity of the crossing.

The roadway ditches and interceptor arms will collect runoff in the vicinity of the roadway and convey it to the river in a controlled and non-erosive manner. This is designed to preserve the integrity of both the crossing and the aquatic habitat within the Char River.

5.3 Fish Passage:

The estimated area of flow through the proposed bridge during the spring freshet is 9 m^2. This is in contrast to the existing area of flow in the 1.2 m diameter culvert at 1.1 m^2.

The previously mentioned anchor ice was shown (in the DFO video) to have completely plugged the existing culvert and rendered it completely impassable until the ice thawed.

6.0 Conclusion:

The proposed bridge crossing project of the Char River at Rankin Inlet will have a positive influence on the aquatic habitat. The history of road washouts and the subsequent deposition of material on the downstream channel will be resolved.

The following are the benefits of this project:

- A stable, non-erodible river crossing.
- Erosion protection for the road embankments and channel.
- A 144 m^2 net gain in fish habitat area.
- A crossing that will allow for unrestricted fish passage.

If you have any questions, please call Ron Richardson at 204-453-2301.

Yours truly,

Dillon Consulting Limited

ORIGINAL SIGNED BY RON RICHARDSON

Ron Richardson, P.Eng.
Senior Water Resources Engineer
Water Resources & Natural Environment Management
North/West Region

RGR:kse

Attachment

C:\WINDOWS\TEMP\Depart of Fisheries and Oceans - Char River Crossing.doc

Application No./N° de la demande

APPLICATION FOR AUTHORIZATION FOR WORKS OR UNDERTAKINGS AFFECTING FISH HABITAT{PRIVATE }
DEMANDE D'AUTORISATION POUR DES OUVRAGES OU ENTREPRISES MODIFIANT L'HABITAT DU POISSON

I, the undersigned, hereby request authorization to carry out the works or undertakings described on this application form. I understand that the approval of this application, if granted, is from the Minister of Fisheries and Oceans standpoint only and does not release me from my obligation to obtain permission from other concerned regulatory agencies.

If an authorization is granted as a result of this application, I hereby agree to carry out all activities relating to the project within the designated time frames and conditions specified in the authorization.

Je soussigné, demande par les présentes l'autorisation d'exploiter les ouvrages ou entreprises décrits dans la formule. Je comprends que l'approbation de cette demande, le cas échéant, porte sur ce qui relève du ministre des Pêches et des Océans et ne me dispense pas d'obtenir la permission d'autres organismes réglementaires concernés.

Si la demande est approuvée, je consens par les présentes à exécuter tous les travaux relatifs à ce projet selon les modalités et dans le laps de temps prescrits dans l'autorisation.

Applicant's Name (Please Print) Bryan Purdy

Applicant's Business Address Community Government and Transportation; Government of Nunavut

PO Box 490

Rankin Inlet, NU X0C 0G0

Applicant's Telephone No./ N° de téléphone du requérant (867) 645-8114 Date January 17, 2003

I solemnly declare that the information provided and facts set out in this application are true, complete and correct, and I make this solemn declaration conscientiously believing it to be true and knowing that it is of the same force and effect as if made under oath. This declaration applies to all material submitted as part of this application.

Je déclare solennellement que les renseignements fournis et les faits énoncés dans cette demande sont véridiques, complets et exacts, et je fais cette déclaration solennelle, la croyant consciencieusement vraie et sachant qu'elle a la même force et le même effet que si elle était faite sous serment. Cette déclaration s'applique à tout document qui est présenté dans le cadre de cette demande.

Applicant's Signature (and corporate seal)

Signature du requérant (et sceau de la société)

Name of watercourse or waterbody (give coordinates)
Cours d'eau ou plan d'eau (donner les coordonnées) Char River; N 6970201.0000 E 543566.0000

This watercourse is a tributary of (where applicable)
Cours d'eau tributaire de (le cas échéant) Rankin Inlet, Hudson Bay

Nearest community Localité la plus proche	County Comté	Province Province
Rankin Inlet	N/A	Nunavut

APPLICATION FOR AUTHORIZATION FOR WORKS OR UNDERTAKINGS AFFECTING FISH HABITAT
DEMANDE D'AUTORISATION POUR DES OUVRAGES OU ENTREPRISES MODIFIANT L'HABITAT DU POISSON

Type of Activity/Genre d'activité

[X] Bridge Pont	[ ] Stream Realignment Alignement de cours d'eau	[ ] Gravel Removal Enlèvement du gravier	[ ] Stream Traverse Traversée de cours d'eau
[ ] Culvert Ponceau	[ ] Channelization Canalisation	[ ] Obstruction Removal - Bypass Enlèvement ou contournement d'obstacle	[ ] Seismic Survey Levé sismique
[ ] Dam Barrage	[ ] Wharf - Break water Quai - Brise-lames	[ ] Stream Utilization - Recreation Utilisation récréative du cours d'eau	[ ] Agriculture
[ ] Stream Diversion Dérivation de cours d'eau	[ ] Dewatering Assèchement	[ ] Erosion Control Lutte contre l'érosion	[ ] Other (specify) Autres (préciser)
[ ] Mining Activité minière	[ ] Aquaculture	[ ] Flood Protection Protection contre les inondations	

List of Agencies (Federal, Provincial or Municipal) contacted or notified, or who have initiated contact with the applicant.
Liste des organismes (fédéraux, provinciaux ou municipaux) contactés ou qui ont pris contact avec le requérant.

Hamlet of Rankin Inlet

Fisheries and Oceans Canada

Government of Nunavut, Community Government and Transportation (Rankin Inlet)

PROVIDE DETAILS OF PROPOSED ACTIVITY INCLUDING REASONS FOR THE PROJECT AND TYPES OF EQUIPMENT TO BE USED
DONNER DES PRÉCISIONS SUR LES TRAVAUX PROJETÉS, Y COMPRIS LA JUSTIFICATION DU PROJET ET LE TYPE D'ÉQUIPEMENT À UTILISER

Under the direction of the Department of Fisheries and Oceans (DFO), the Government of Nunavut (GN) proposes to replace the existing culvert and road crossing at the Char River with a single span bridge. In previous years, this area has been a significant concern to the people of Rankin Inlet and DFO due to its history of yearly wash-outs and corresponding downstream impacts to fish habitat.

The proposed crossing is designed to eliminate these concerns and to improve erosion prone soil conditions at this site, resulting in the enhancement and overall Net Gain of 184 m2 of fish habitat (See drawing E3 attached).

Equipment that will be used for this project will include:

Western Star Low Bed Trailer
Mack Tractor w/ 22 ft end dump trailer
Mack Tractor w/ 15 ft gravel box
55 Clark Loader w/ bucket
930 CAT Loader w/ bucket and forks
955 CAT Loader with bucket
D6D CAT Dozer w/ blade
CAT Challenger w/Tow trailer
Joy portable compactors

Application No./N° de la demande

APPLICATION FOR AUTHORIZATION FOR WORKS OR UNDERTAKINGS AFFECTING FISH HABITAT
DEMANDE D'AUTORISATION POUR DES OUVRAGES OR ENTREPRISES MODIFIANT L'HABITAT DU POISSON

SCHEDULE/CALENDRIER

	D/J	M/M	Y/A
Proposed Starting Date Date prévue du début des travaux	01	08	2003
Proposed Completion Date Date prévue de l'achèvement des travaux	15	10	2003

Approximate Timing of Work in shoreline, foreshore, tidal zone, or underwater areas.
Période approximative des travaux sur le rivage et les estrans ainsi que dans les zones à marées et les zones sous-marines.

	D/J	M/M	Y/A		D/J	M/M	Y/A
From/De	01	08	2003	To/À	15	10	2003

The following documents will assist in assessing your application and help expedite its approval. Please check which documents you have attached.		Les documents suivants faciliteront l'évaluation de votre demande et permettront d'accélérer son approbation. Veuillez cochez les documents vous avez joints à votre demande.
Map indicating location of project	[X]	Carte indiquant l'emplacement du projet
Engineering Specifications	[X]	Spécifications techniques
Scale Drawings	[X]	Dessins à l'échelle
Dimensional Drawings	[X]	Plans cotés
Assessment of Existing Fish Habitat Characteristics	[X]	Évaluation des caractéristiques existantes de l'habitat du poisson
Assessment of Potential Effects of Project on Fish Habitat	[X]	Évaluation des répercussions possibles sur l'habitat du poisson
Measures Proposed to Offset Potential Damage to Fish Habitat	[X]	Mesures proposees pour compenser les éventuels dommages à l'habitat du poisson
Other	[ ]	Atres

ENVIRONMENTAL ASSESSMENT AND REVIEW PROCESS CONSIDERATIONS

NOTE: All applications pursuant to section 35 of the Fisheries Act will be assessed in acordance with applicable federal environmental assessment requirements.

CONSIDÉRATIONS CONCERNANT LE PROCESSUS D'ÉVALUATION ET D'EXAMEN EN MATIÈRE D'ENVIRONNEMENT

REMARQUE : Toute demande en vertu l'article 35 de la Loi sur les pêches sera soumise aux exigences fédérales applicables à l'évaluation environnementale.

Application No./N° de la demande

APPLICATION FOR AUTHORIZATION FOR WORKS OR UNDERTAKINGS AFFECTING FISH HABITAT
DEMANDE D'AUTORISATION POUR DES OUVRAGES OU ENTRIPRISES MODIFIANT L'HABITAT DU POISSON

COMPLETE ONLY IF USE OF EXPLOSIVES IS INTENDED
À REMPLIR SEULEMENT EN CAS D'UTILISATION D'EXPLOSIFS

EXPLOSIVES CONTRACTOR (IF DIFFERENT FROM APPLICANT)/RESPONSABLE DES EXPLOSIFS (SI AUTRE QUE LE REQUÉRANT)

Name/Nom : _____

Address/Adresse : _____

_____

Telephone No./N° de téléphone : _____

	D/J	M/M	Y/A		D/J	M/M	Y/Y
Anticipated Starting Date Date prévue du début des travaux	_____	_____	_____	Completion Date Date d'achèvement	_____	_____	_____

DETAILS OF EXPLOSIVES/PRÉCISIONS SUR LES EXPLOSIFS

Type (including trade name)
Genre (y compris la marque)

_____

_____

Weight and configuration (where applicable)
Poids et forme (le cas échéant)

_____

_____

Weight of individual shots and shot pattern where multiple charges are used
Poids des coups individuels et déploiement des coups, en cas de charges multiples

_____

_____

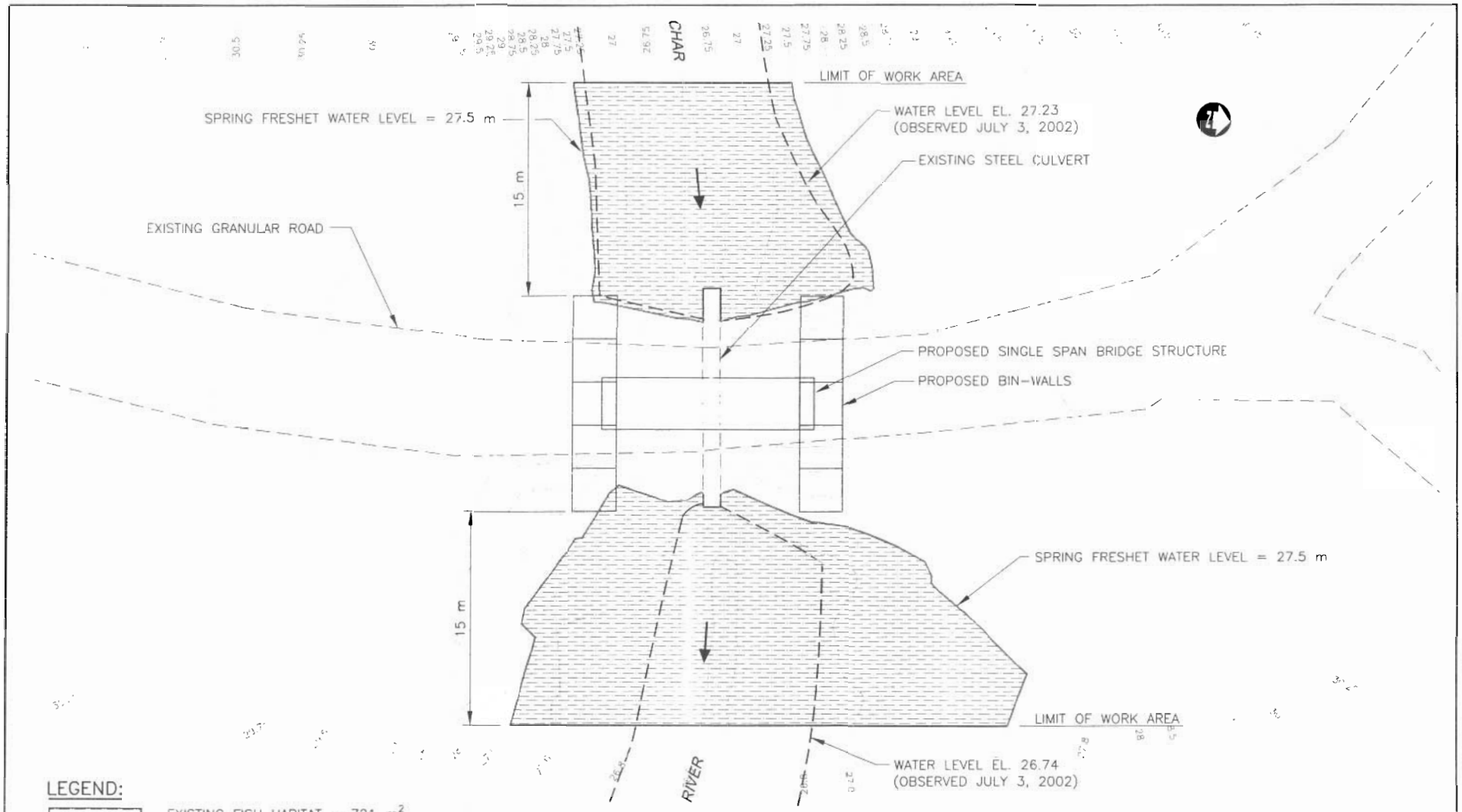
Detonation depth (in the rock; note also the depth of water, if applicable)
Profondeur de détonation (dans le roc; indiquer aussi la profondeur de l'eau, s'il y a lieu)

_____

_____

Method of detonation
Méthode de détonation

_____



LEGEND:

EXISTING FISH HABITAT = 721 m^2
PRIOR TO BRIDGE CONSTRUCTION

FOR HABITAT GAIN/LOSS CALCULATIONS

EDGE OF WATER AT SPRING FRESHET WATER LEVEL = 27.5 m FOR THE EXISTING CONDITIONS (IE. PRIOR TO BRIDGE CONSTRUCTION)

0 10 20

SCALE IN METRES

DILLON CONSULTING

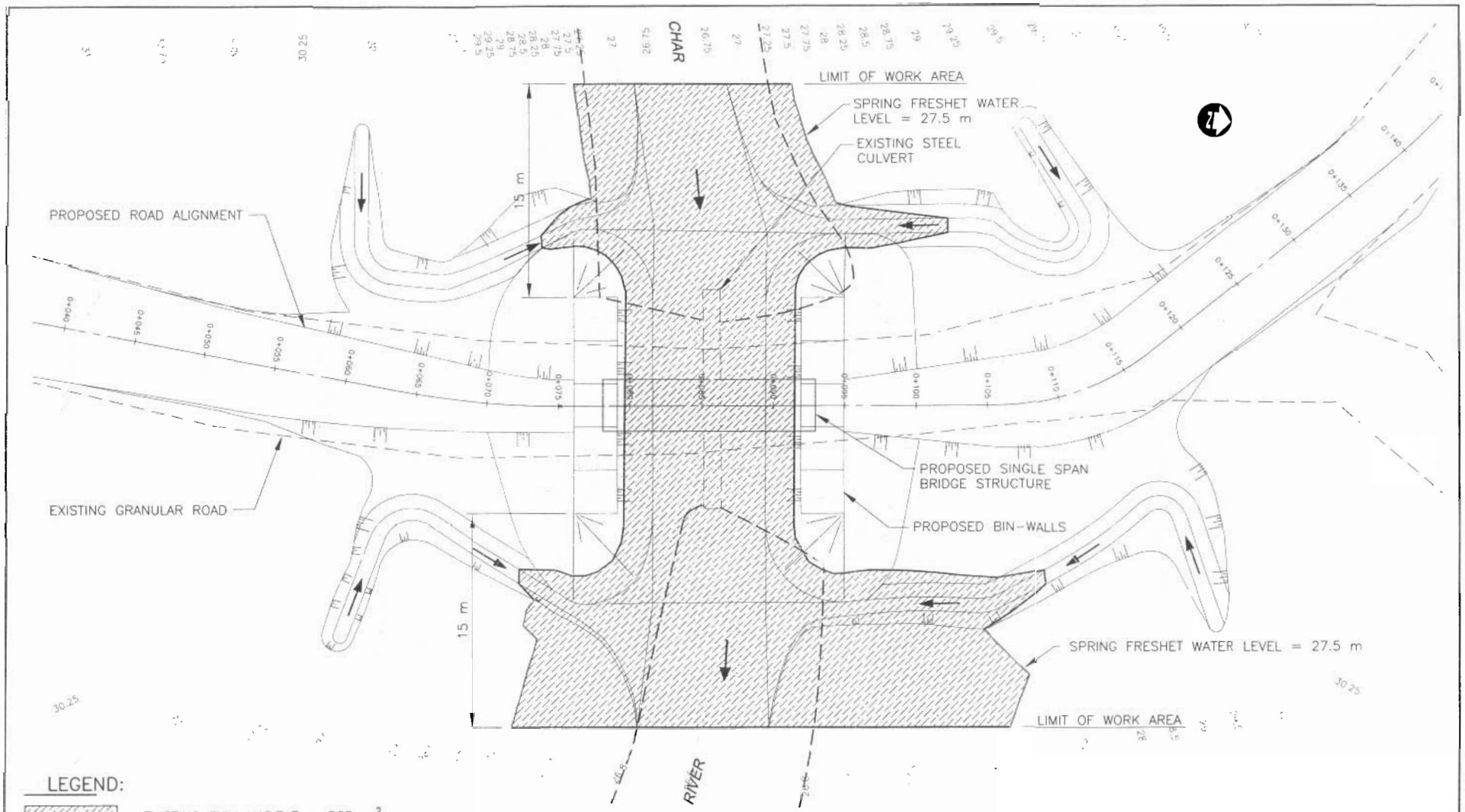
SEPT., 2002

CHAR RIVER CROSSING
RANKIN INLET

PROJ. NO. 02-0629-0201

EXISTING FISH HABITAT BELOW WATER LEVEL 27.5 m
(PRIOR TO PROJECT CONSTRUCTION)

FIG. NO. E-1



LEGEND:

EXISTING FISH HABITAT = 865 m^2
PRIOR TO BRIDGE CONSTRUCTION

FOR HABITAT GAIN/LOSS CALCULATIONS

EDGE OF WATER AT SPRING FRESHET WATER LEVEL = 27.5 m AFTER COMPLETION OF BRIDGE CROSSING.

0 10 20

SCALE IN METRES

DILLON CONSULTING

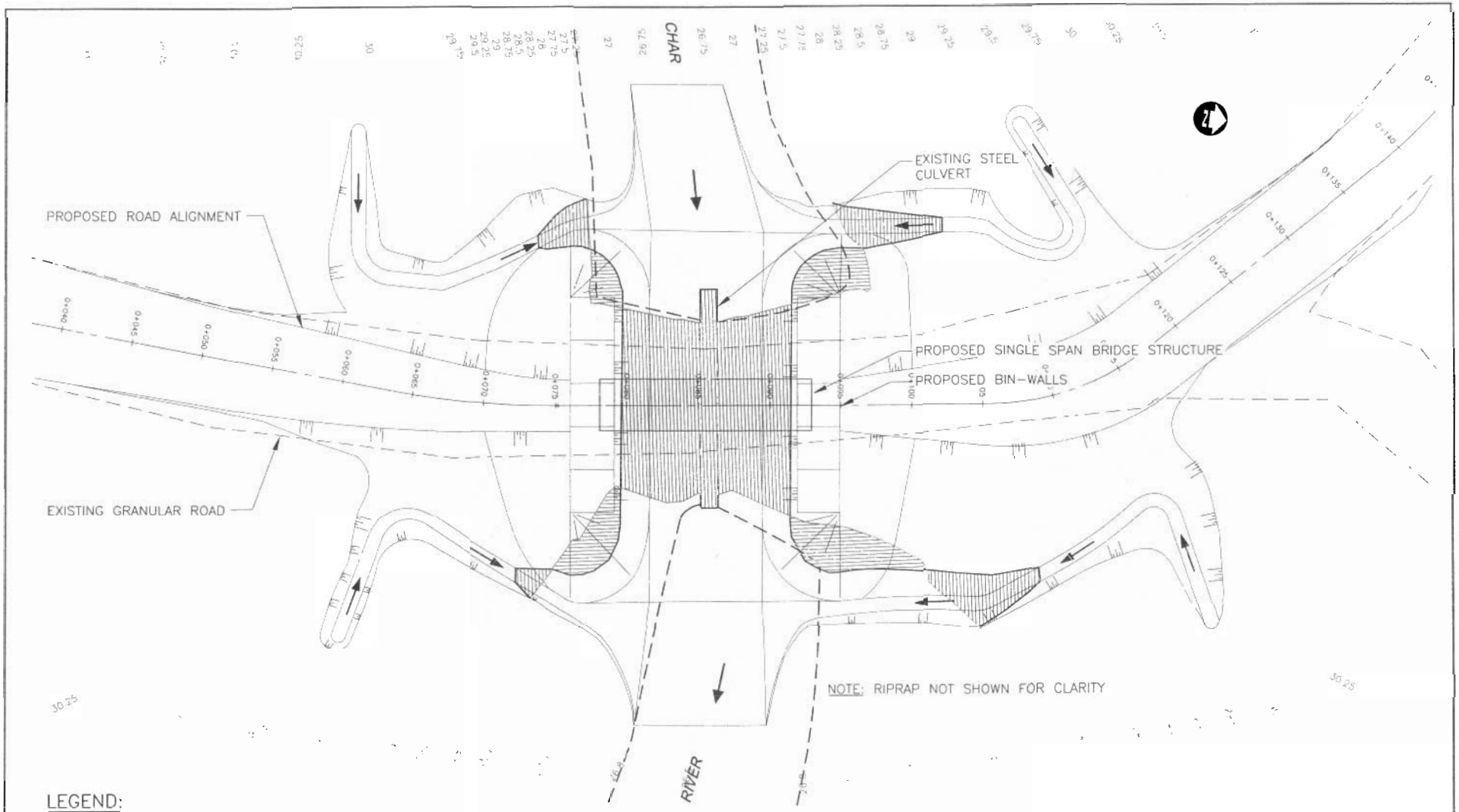
SEPT., 2002

CHAR RIVER CROSSING
RANKIN INLET

PROJ. NO. 02-0629-0201

PROPOSED FISH HABITAT BELOW WATER LEVEL 27.5 m
(FOLLOWING PROJECT COMPLETION)

FIG. NO. E-2



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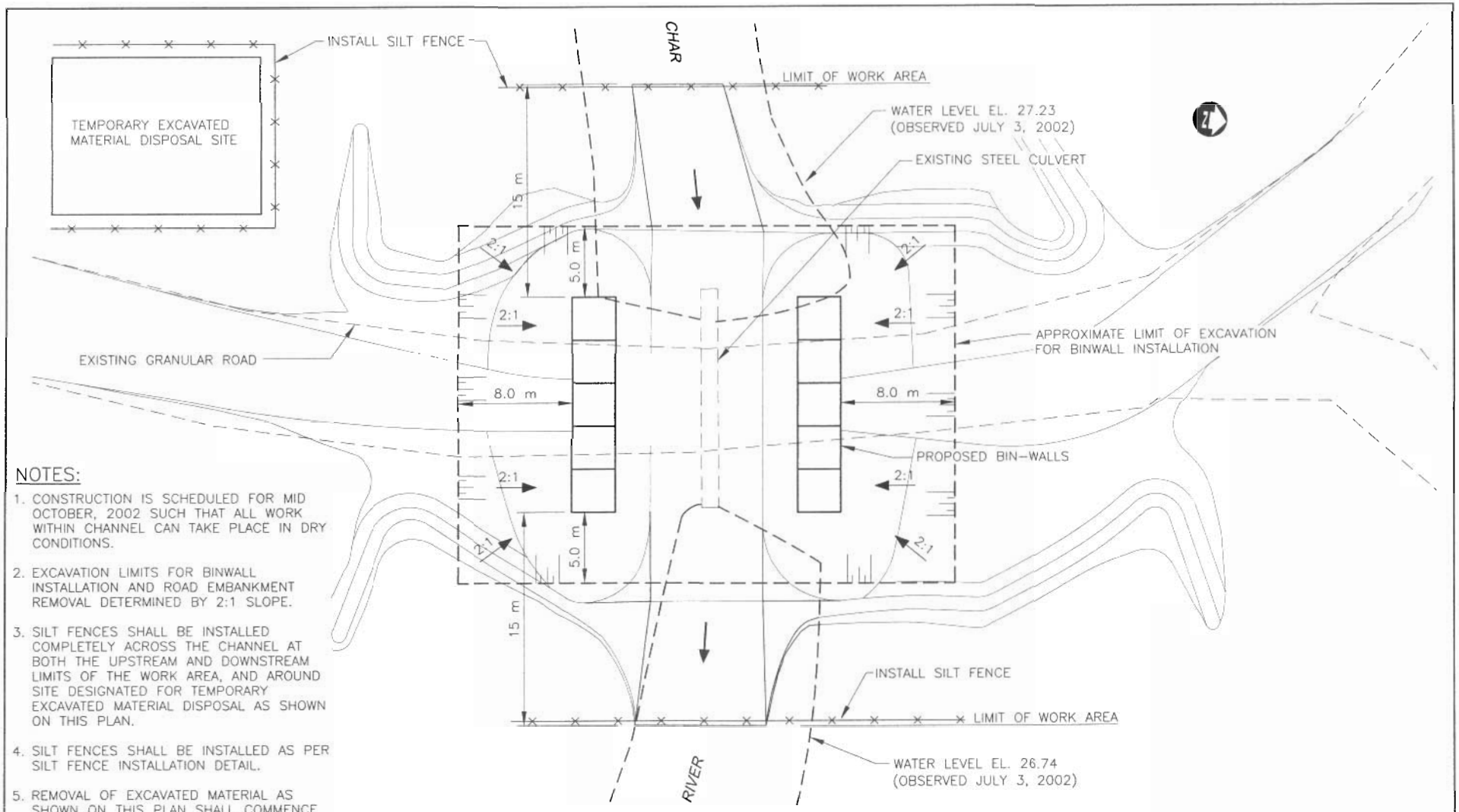
CHAR RIVER CROSSING
RANKIN INLET

HABITAT AREAS GAINED/LOST BELOW WATER LEVEL 27.5 m
(FOLLOWING PROJECT COMPLETION)

PROJ. NO. 02-0629-0201

FIG. NO. E-3



NOTES:

1. CONSTRUCTION IS SCHEDULED FOR MID OCTOBER, 2002 SUCH THAT ALL WORK WITHIN CHANNEL CAN TAKE PLACE IN DRY CONDITIONS.
2. EXCAVATION LIMITS FOR BINWALL INSTALLATION AND ROAD EMBANKMENT REMOVAL DETERMINED BY 2:1 SLOPE.
3. SILT FENCES SHALL BE INSTALLED COMPLETELY ACROSS THE CHANNEL AT BOTH THE UPSTREAM AND DOWNSTREAM LIMITS OF THE WORK AREA, AND AROUND SITE DESIGNATED FOR TEMPORARY EXCAVATED MATERIAL DISPOSAL AS SHOWN ON THIS PLAN.
4. SILT FENCES SHALL BE INSTALLED AS PER SILT FENCE INSTALLATION DETAIL.
5. REMOVAL OF EXCAVATED MATERIAL AS SHOWN ON THIS PLAN SHALL COMMENCE ONLY AFTER INSTALLATION OF THE SILT FENCES. ALL MATERIAL THAT CAN BE USED AS ROAD FILL AND/OR RIPRAP SHALL BE SALAVAGED.
6. SALVAGED RIPRAP SHALL BE SEPARATED AND KEPT CLEAN.

0 10 20
SCALE IN METRES

DILLON CONSULTING

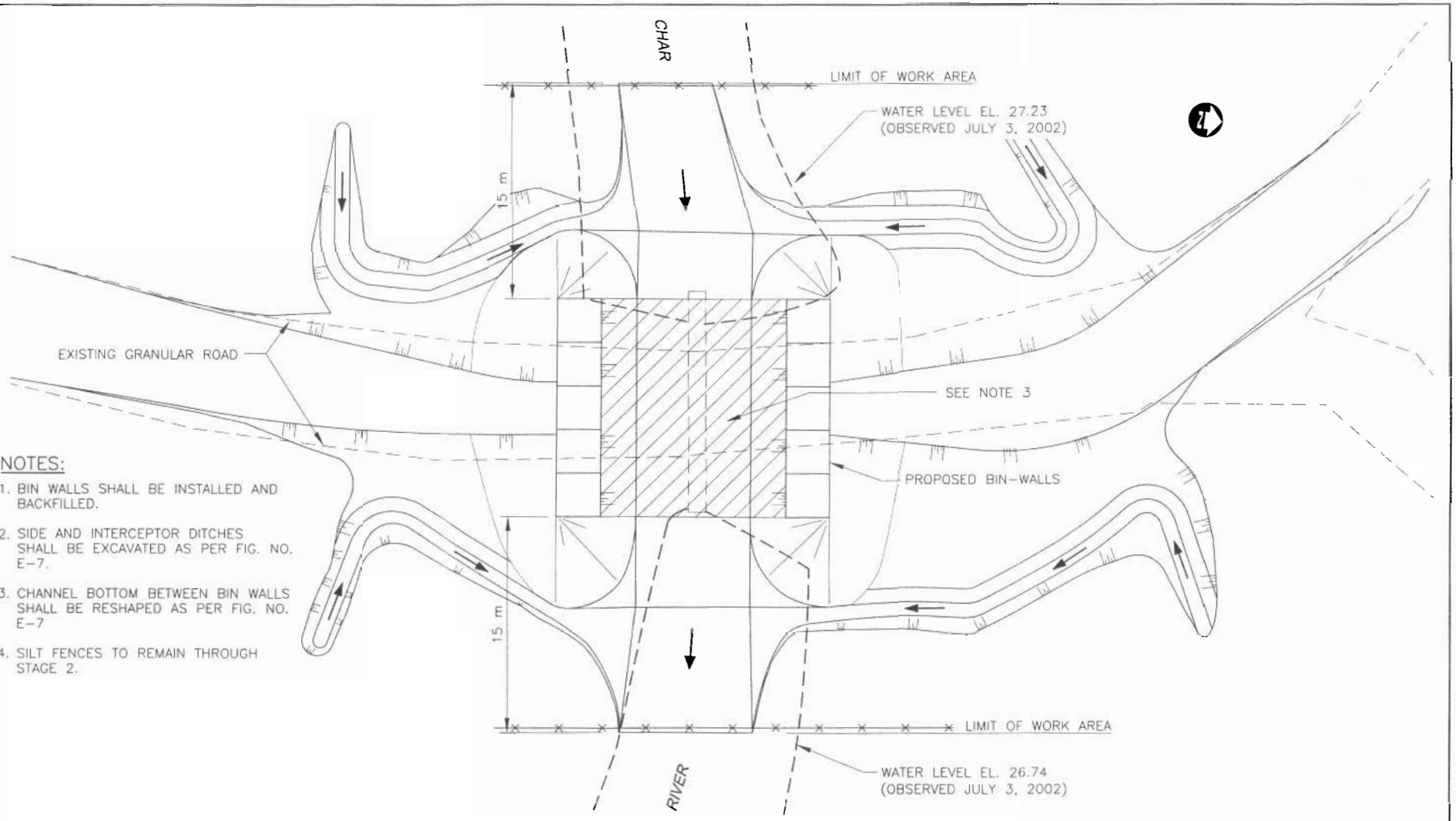
SEPT., 2002

CHAR RIVER CROSSING
RANKIN INLET

SEDIMENTATION/EROSION CONTROL PLAN
STAGE 1 - EMBANKMENT EXCAVATION

PROJ. NO. 02-0629-0201

FIG. NO. E-4



NOTES:

1. BIN WALLS SHALL BE INSTALLED AND BACKFILLED.
2. SIDE AND INTERCEPTOR DITCHES SHALL BE EXCAVATED AS PER FIG. NO. E-7.
3. CHANNEL BOTTOM BETWEEN BIN WALLS SHALL BE RESHAPED AS PER FIG. NO. E-7
4. SILT FENCES TO REMAIN THROUGH STAGE 2.

0 10 20

SCALE IN METRES

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CHAR RIVER CROSSING
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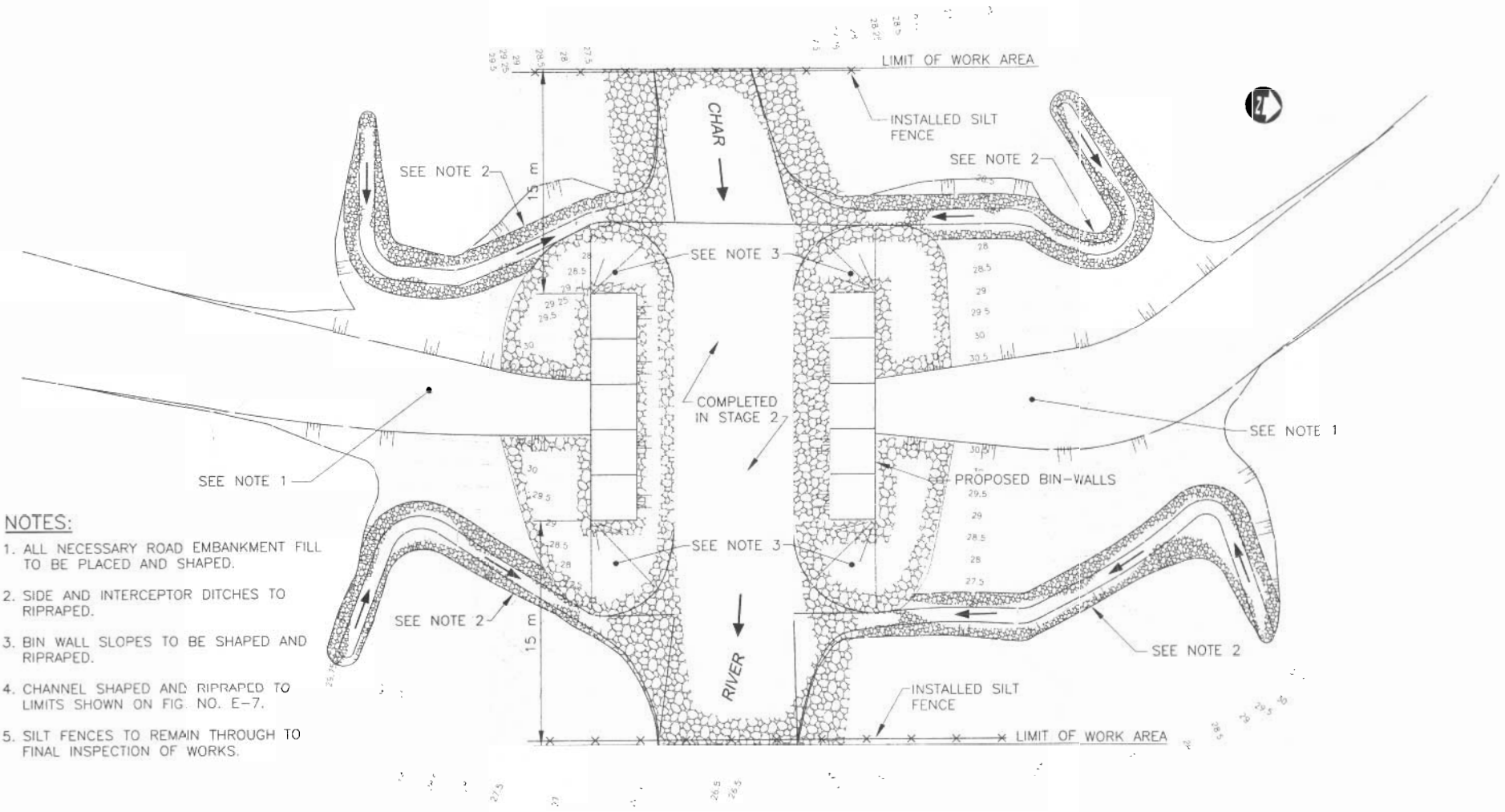
PROJ. NO. 02-0629-0201

SEDIMENTATION/EROSION CONTROL PLAN
STAGE 2 - BIN WALL INSTALLATION AND CHANNEL SHAPING

FIG. NO. E-5



NOTES:

1. ALL NECESSARY ROAD EMBANKMENT FILL TO BE PLACED AND SHAPED.
2. SIDE AND INTERCEPTOR DITCHES TO RIPRAPED.
3. BIN WALL SLOPES TO BE SHAPED AND RIPRAPED.
4. CHANNEL SHAPED AND RIPRAPED TO LIMITS SHOWN ON FIG. NO. E-7.
5. SILT FENCES TO REMAIN THROUGH TO FINAL INSPECTION OF WORKS.

0 10 20

SCALE IN METRES

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CHAR RIVER CROSSING
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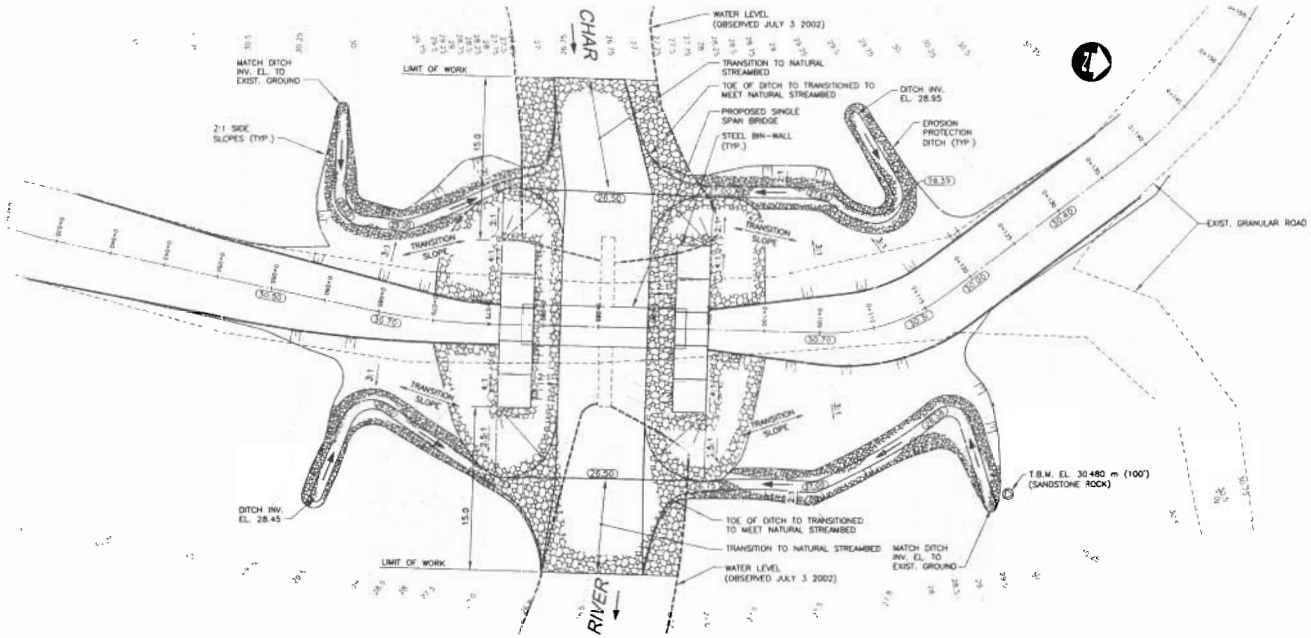
SEDIMENTATION/EROSION CONTROL PLAN
STAGE 3 - ROAD EMBANKMENT EXCAVATION

PROJ. NO. 02-0629-0201

FIG. NO. E-6

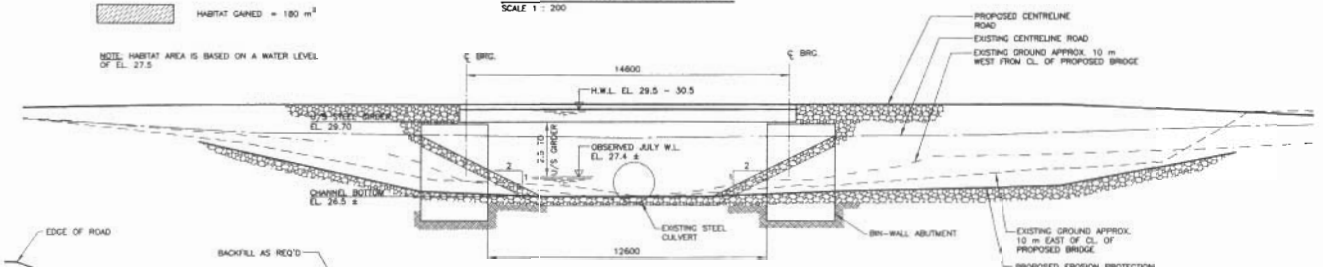


PLAN OF PROPOSED WORKS
SCALE 1 : 200

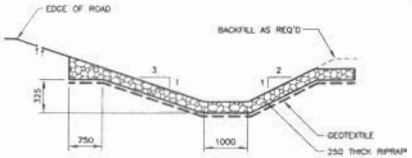
FISH HABITAT

HABITAT GAINED = 180 m²

NOTE: HABITAT AREA IS BASED ON A WATER LEVEL OF EL. 27.5



EAST ELEVATION
SCALE 1 : 100



EROSION PROTECTION DITCH DETAIL
N.T.S.

NOTE:

1. GEOTEXTILE TO BE PLACED UNDER ALL RIPRAP

LOOKING UPSTREAM

LOOKING DOWNSTREAM

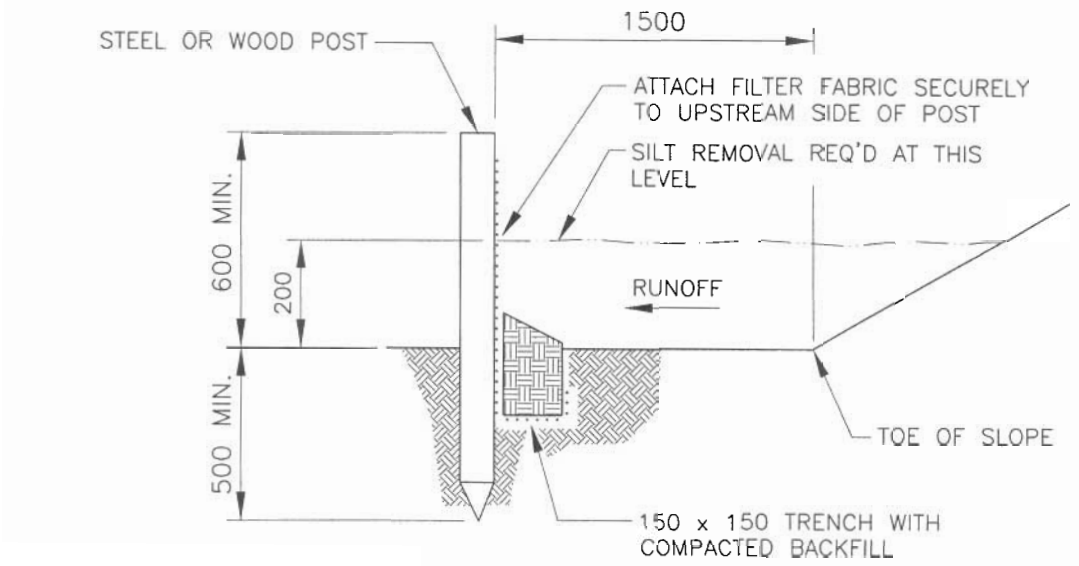
LOOKING EAST FROM UPSTREAM

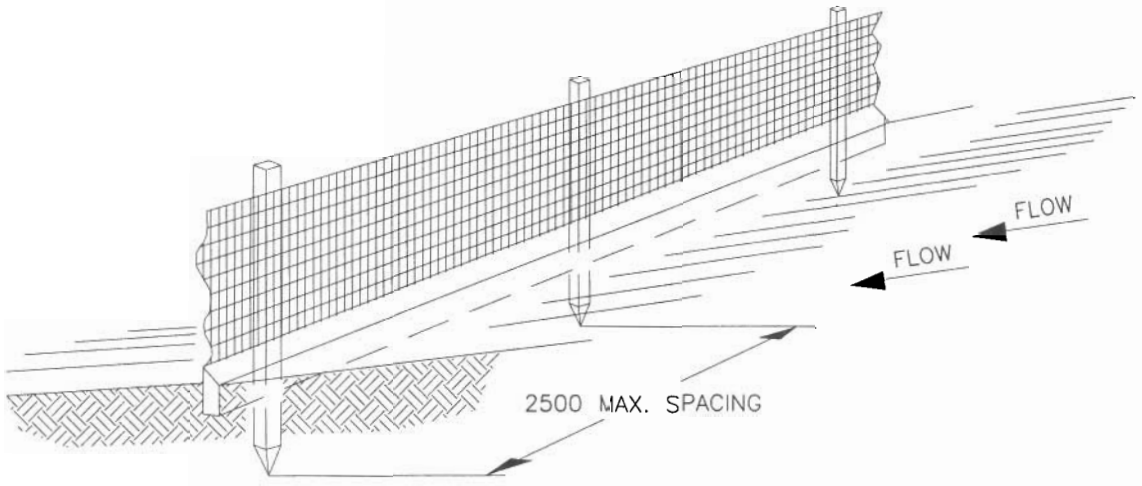
DRAFT

METRIC
WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

DRAWING REDUCED NOT TO SCALE

DILLON CONSULTING LTD.			DILLON CONSULTING	DESIGN R.G.R.	CHAR RIVER CROSSING RANKIN INLET
DATE				DRAWN S.K.B.	FILE NO. 02-0629-0201
				CHECKED R.G.R.	
				APPROVED	EROSION PROTECTION
				DATE SEPT. 6, 2002	DRAWING NO. E-7
	NO.	REVISIONS	DATE	BY	SCALE AS NOTED





NOTE: SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY

N.T.S.

40DILLON ACAD FILE: G:\EAGLE\020629\BRIDGE STRUCTURE\DWGS\DFO\E-8.DWG 09/17/02

DILLON CONSULTING

SEPT., 2002

CHAR RIVER CROSSING
RANKIN INLET

PROJ. NO.
02-0629-0201

SILT FENCE DETAIL

FIG. NO.
E-8