

The construction methods of Bridge crane rail on Underground powerhouse

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Abstract. It is difficult to construct the underground powerhouse in technology, and which also faces other aspects such as higher construction requirement and shorter construction period. If the bridge crane rail can be come into service, the bridge machine will become promptly forces to be put into operation, that can help to take a big role in encouraging the transportation speeds of materials and equipment in underground powerhouse. Of course bridge machine, which can speed up the construction progress, occupies an important position in the transport construction of underground powerhouse. Taking the construction of bridge machine as a research object, it describes the construction procedure for bridge crane rail installation in this paper, provides certain reference for the organization of the underground powerhouse concrete construction.

1 Introduction

1.1 Project introduction

The rock bolt crane girder (hereinafter referred to as rock anchor beam) concrete of Xiangjiaba is located at the third layer of upstream and downstream walls in the main underground powerhouse, that is 255.0m long and 3.0m high. The structure of rock anchor beam is made up of first stage concrete, second-stage concrete, permanence expansion joint, construction joint key-way, drain, drainpipe and crane beam orbit.

These 50/20t bridge crane rails of the main underground are respectively arranged on both sides of the top surface of the rock anchor beam. The rail which top elevation is 287.740m and its strided distance is 30.5m, is 255*2=510m total length. These bridge crane rails whose type is QU120, are composed of 43 rails, embedded joint bar, bottom plate, laminate, embedded bolt and ram. It uses bottom plate, laminate and bolt to connect between tracks. It's used to weld between the first embedded joint bar and the second phase anchor bolts in the support bottom of the track, and then it's connect by track pad and platen through phase anchor bolts.

1.2 Main work volumes

See Table 1 for the main works volume of second-stage concrete in the main underground.

Table 1 The main works volume of second-stage concrete in the main underground powerhouse

Item	Region or Type	Unit	Quantities
second-stage concrete (C35, stair match)	CZ0-90.2~CZ0+165.2	m ³	97.155
steel	Φ6.5	Kg	7.3

2 General arrangement and Preparing work

Construction channel is made up from traffic entrance to concrete pouring work surface of the

main underground rock anchor beam. The water and electricity which is used to construct are arranged along traffic channel. It uses wired telephone and intercom to contact between inside and outside the cavity in construction of communication, and uses mobile phone to contact outside the cavity. It uses the 310 elevation mixing system to stir concrete and uses 6m³ concrete truck whose haul distance is 1.5km to transport concrete.

It should dismantle various plumbing components of the main underground rock anchor beam before construction. And it just need to retain a ride water pipe in the gutter, that is easy to wash pouring bins. Then it need to fill grouting in the rock anchor beam cooling water pipe, and completely clean stuff in the second-stage concrete slot.

3 The installation program of Bridge crane rail

3.1 Construction preparations

3.1.1 Preparation of materials

The business owner should provide track, bottom plate, laminate, phase anchor bolts and so on. They should also provide welding consumable. welding consumable welding consumable welding consumable

3.1.2 Technical preparations

It should provide construction drawings, construction scheme for workers. And it should also organize designer to tell their intentions of craft, technical design to design institute.

3.1.3 Construction equipment preparations

It should provide measuring instruments, welding machine, lorry-mounted crane, safe protective gadgets

3.1.4 Track embedded parts and concrete inspections

The construction quality of fist stage civil engineering should be check up before track installation. These inspections mainly include concrete inspection, embedded joint bar inspection and track center inspection. The concrete top elevation deviation is situated between -30mm and 0mm. The joint bar top elevation is situated between -10mm and 10mm. The deviation of relative track center is situated between -8mm and 8mm. The deviation of relative plant axis center is situated between -5mm and 5mm.

3.2 Installation scheme

3.2.1 Installation process

The installation and construction process of bridge crane rail is: Civil engineering interface(embedded joint bar and dimensions inspection) → Surveying and setting out → Anchor bolts installation solders → Rail pad and base plate installation → Track installation and adjustment → Track plate installation, tighten nuts → Acceptance check, transferred to the two phase of the back filled work → Reinspection.

Trail should be installed from south to north. The civil engineering interface of the bridge crane rail should be back filled every 50m for deformation control. Then conduct the next installation after finishing back filling.

3.2.2.1 Surveying and setting out

According to the benchmark of rate center, survey and staking-out these track elevational point, mileage point and rail central line. And then mark should be marked by red marker pen in installation site.

3.2.2.2 Anchor bolts installation solders

At the time of surveying and setting out, it should make coil holder about every other 20m in the direction of the axis orbit. At the same time the red line should be made into the gearing center line of

the track rail. And the location of anchor bolts can be determined by the red line position and design drawing size. Then it would connect anchor bolt with joint bar and guarantee stagger and tack-weld, and then adjust. Eventually all these items are intend to use double side weld connection. And double side welding should be operated by artificial.

3.2.2.3 Scribble and foundation plate installation

After anchor bolts installation, first install one balance nut on every screw thread of the anchor bolts, then set up scribble or foundation plate on the balance nut. In the end, carry out leveling on the scribble and foundation plate. And the gradienter which is used to tinker up should pass the inspection.

3.2.2.4 Track installation

According to the mileage and track layout of the technical facilities design drawings, use 16t car hoist to lift single corresponding track onto the installation position of the foundation plate. Then use lifting jack to adjust the lateral bending of the track on the basis of red lines. At the same time make use of gradienter to adjust the horizontal flatness. After checking and passing the acceptance, tighten lock nut and setup is complete. By the time the next was lift to the installation position, workers should make adjustments to the track and reserve space between each of the tracks according to design requirements.

3.2.2.5 Acceptance check

If last procedure or last unit works are not accepted as unqualified, the next procedure or unit works are not allowed for construction company. After rail installation and alignment are complete, provide written notification to supervision organization and other relevant units so that alignment check can take place prior to installing the car or counterweight frames. After passing the inspection, coordinate civil construction to backfill two stage concrete. After finishing the backfill, engineer can conduct the reinspection of tracks' installation sizes.

4 Construction schedule

The installation time of the 50t/20t bridge crane rail is in 2008, October.

The poured concreted time of rock anchor beam two stage concrete: 2008, October ~ 2008, early November.

5 Construction resources

According to the requirement of the construction schedule and the strength, see Table 2 and Table 3 for construction personnel, main construction equipment and machinery and main material of the 50t/20t bridge crane rail and rock anchor beam two stage concrete.

Table 2 Construction personnel of the 50t/20t bridge crane rail

Job	Management	Technician	Inspector	Measure man	Riveter
Num	3	3	2	2	5
Job	Welder	Rigger	Crane driver	Safety officer	Total
Num	2	3	1	1	22

Table 3 Main construction equipment and machinery

Serial	1	2	3	4	5	6	7	8
Device name	Truck crane	heavy vehicles	gradienter	total station	welde	Electrode	Angle grinder	wirerop
type	16t	20t			ZX7-400	CHE507	φ100	φ19
Unit						Kg		m
Number	1	1	1	1	2	50	1	100
Serial	9	10	11	12	13	14	15	16
Device name	jack	Safety belt	Wire	Red line	grinding wheel	monkey wrench	box wrench	hammer
type	16t		10#					20 pounds
Unit		item	Kg	item	piece	handle	handle	handle
Number	4	15	5	1	50	3	2	2
Serial	17	18	19	20	21	22		
Device name	Steel plate ruler	merchant steel	Concrete mixing truck	Insertion type vibrator	electric welder	Crane		
type	50m		6m ³	20mm/2.2 KW	AX3-300-1	25t		
Unit	handle	t						
Number	1	0.5	4	2	1	1		

6 Conclusion

During bridge crane rail construction, problems often arise which require design changes. The contractor shall bear responsibility for these constructions, including the deficiencies revealed during construction, as well as in course of operation of facilities. Construction process should be in strict accordance with construction technology which can accelerate construction progress and reduce the engineering cost.

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