LETTER OF TRANSMITTAL

TRANSMITTAL # 16

J.P. CARRARA & SONS, INC.
2464 CASE ST
MIDDLEBURY, VT 05753
T: 802.388.6363
F: 802.388.9010

DATE:	7.23.15	**JOB #**	23456-015
ATTN:	Kevin Ture/Mike Garn		
RE:	Castleton Bridge/BRF015-2(10)		

We are sending you:

Shop Drawings		Change Order		Copy of Letter	
Plans		Attached	x	Separate Cover	
Prints		Specifications		(Via)	
Samples		Other:			

Copies	*Date*	*Qty.*	*Description*
1	7.23.15	1	NB2 NCR Rev 5

These are transmitted as checked below:

For approval	x	Approved as submitted		Submit	x
For your use		Approved as noted		Resubmit	
As requested	x	Returned /Notation		Return	
For review		Loaned Prints/Returned		Other	

Remarks:

Please see attached NB2 NCR Rev 5.

Copy to:

Signed:

Joe Gallese-PM

If enclosures are not as noted, please notify us immediately.

J.P. CARRARA & SONS INC.
Precast & Prestress Manufacturer
2464 CASE STR., MIDDLEBURY, VERMONT 05753
Phone:(802)388-6361
Fax:(802)388-9010
Double-Tees Hollow-Core Plank Flat Panels
NEBT Girders Box Girders NEXT Girders
ABC Components Stadium Components Total Precast Components

Non-Conformance Report Rev. 5

Date Submitted:	Thursday, July 23, 2015
Job Name/No.:	Castleton / #23456
Piece Mark #'s:	CT-NB2 (1)
Production Date:	6/15/2015
QA Inspector, Co.:	R. Hamilton, KTA & B Girouard, HRV

In response to VTAOT email of 7/7/15 rejecting our non-conformance report submitted 7/2/15 we herein offer the following additional comments to address the concerns outlined in the email. Comments are offered in **green font**. In response to VTAOT email on 7/13/15, we offer the following additional comments identified by **blue font**. In response to our jobsite meeting with VTAOT on 7/20/15, we offer the following additional comments identified by **red font**. Additional comments are added to this NCR in response to the VTAOT email items 1 - 6 received 7/20/15 at 11:54AM and identified by **purple** font. In response to VTAOT email of 7/22/15 we offer the following additional responses identified by ***italic font*** along with supporting photos and sketches.

After placement of the final load of concrete in unit NB2 foaming was observed at the top of the finished surface. Most of the foam was floated off of the unit during the finishing of the surface. The portion of the surface that received a rake finish has small (1/16th - 1/8th inch diameter) hemispherical indentations where the foaming occurred - see attached photo.

1 The dosage of HRWR (identified as "6100" on the batch ticket) was inadvertently increased on the final load that exhibited the surface foaming - see attached tickets. The increase in water-reducer dosage reduced the viscosity of the cement paste causing a corresponding decrease in the static stablity of the coarse aggregate in the concrete. As the larger coarse aggregate sinks within the depth of the placement an air pocket is created in the location that the aggregate originally was and the air pocket floats up to the surface. This is observed as foaming when a high volume of the air pockets reach the surface in a short period of time.

2 The batch of concrete was checked visually before placement **by QC personnel** but was not sampled because the previous load had been tested and test cylinders for that load were made. Static stability can be difficult to intertpret as concrete is flowing up through the fins of the mixer and the change in dosage of the HRWR on the batch ticket was not identified by QC or QA prior to placement. JPC QC shall verify the correct dosage rates of all loads prior to placement and changes to any admixture dosage shall be verified by sampling & testing. **Further, there shall be adequate QC personnel present at future pours to ensure that the sampling, testing, and all other qc procedures can be accomplished as required.**

3 Cores from the surface of the unit were taken and evaluated for hardened air content at two locations where the subject load of concrete was placed and a third location outside of the placement of that load for comparison. **Any damage to the epoxy coating on the rebar as a result of the coring shall be touched up with two-part epoxy as provided by the rebar supplier.** Hardened air content (ASTM 457) and petrographic analysis will be performed on the cores to verify acceptability of the water-cement ratio and durability properties of the placed concrete.

4 All laitance and loose material shall be removed prior to placement of the secondary poured curb. **To**

accomplish this action JPC proposes to abrasive blast the entire top surface of the NEXT beam with two passes of coarse grit sand at maximum pressure to remove all unsound material. Curb reinforcement shall be shielded from the sand during blasting and any damage to the epoxy coating shall be touched up prior to placement of the curb. Further, underneath the curb areas where the surface grooves will have been blasted smoother we will apply Sikadur 32 Hi Mod epoxy bonding agent prior to pouring the curb. Bonding agent shall be mixed and applied per the manufacturers' instuctions - see attached data sheet. Following sandblasting of the top surface of the beam, there are additional hairline shrinkage cracks observed which JPC proposes to seal with Protectosil Degadeck CSS low viscosity reactive methylmethacrylate. John LaRosa with NICOM Coatings confirmed that there are no compatability issues with the waterproofing membrane system used on the project. The presence of less aggregate and more cementitious material in the top of the beam can result in the observance of more shrinkage cracks. JPC QC shall verify and correct dosage rates of all loads prior to placement and changes to any admixture dosage shall be verified by sampling and testing.

5 To address VTAOT's concerns relative to the unknown compressive strength of the concrete in the subject flange, JPC has evaluated the beam based on a concrete strength of 7,000 psi, less than the design strength of 10,000 psi. JPC finds that the top tension in the beam at release of 477 psi is less than the limit of 627 psi, and the longitudinal reinforcement in the top mat of steel in the flange is sufficient. In service the top flange is in compression and the stress is less than the limit. The evaluation of the beam in service is conservative as the effect of integral abutments is neglected. Please see attached beam stress analysis calculations dated 7/20/15. Based on test cylinders, the concrete strength of concrete placed in the stems of the subject beam is 10,776 psi. JPC believes that the actual concrete strength of the flange is 10,000 psi, as the camber of the subject beam matches the camber of the other fascia beam with known compressive strength, indicating uniform performance between the two beams.

6 Surface treatments shall be performed at the precast plant prior to placement of the curb and delivery of the unit. They shall be supervised by JPC QC and witnessed by the QA Inspector.

7 1. As noted in paragraph one of the NCR, over dosing of HRWR results in instability of the concrete mix creating a layer of mortar at the top of the beam. As drying shrinkage occurs within the cementitious paste of concrete, the lack of coarse aggregate in this layer increases the tendency of shrinkage cracks at this location.

8 2. Within the industry, a hairline crack is characterized as a crack having a width less than 0.013" as per the attached PCI Northeast Bridge Member Repair Guideline #14. As per the attached JPC crack map diagram of the subject beam all cracks are measured as less than 0.006" prior to the sand-blasting of the top surface of the beam. Following sandblasting of the top surface of the beam, it was observed that the sandblasting enlarged the width of the cracks at the surface. The crack map was generated by JPC QC personnel in the presence of the VTAOT QA. As per the design calculations, the top tension at the end of the beams is 477 psi which exceeds the limit of 200 psi, above which supplemental reinforcement is required to control tension cracks. Tension cracking is observed in all beams. Micro shrinkage cracks may exist throughout the beam, especially in areas of higher cementitious content, and the presence of tension exacerbates the likelihood and frequency of these cracks. Locations of discontinuity, such as lifter recesses, also tend to be areas where increased shrinkage cracking is likely.

9 3. A crack map from JPC QC records for beam CT-NB2 is attached to this NCR.

10 **4. JPC contacted Sterling Lloyd, the manufacturer of the deck membrane system, The Eliminator. JPC spoke with company representative David Lite (508-942-2704) regarding the compatibility of our proposed MMA sealer with their system. Mr. Lite confirmed that The Eliminator is an MMA technology-based system, therefore the sealer is fully compatible. Mr. Lite recommends that JPC apply our MMA sealer prior to the shot-blasting procedure.**

11 **5. As per JPC Quality System Manual, final inspection of the unit was performed by Mr. Ben Cota and witnessed by the VTAOT QA. Upon completion of top flange sand-blasting operations, shrinkage cracks were better defined and were recorded on the crack map. The maximum width of cracks observed was 0.007" and in accordance with the JPC standard repair for sealing cracks submitted 7/13/15, which is in accordance with VTAOT subsection 510.08(l), the cracks were sealed with MasterProtect H 1000, a 100% penetrating silane sealer. JPC verified compatibility of the application of the MMA sealer over the silane sealer with the proposed MMA manufacturer with Mr. Peter Denicola of Evonik Corporation (732-981-5462).**

12 **6. JPC's QC Manager, Mr. Ben Cota will apply the sealer in the field in accordance with manufacturer's recommendations, refer to previously submitted product literature.**

13 ***JPC QC performed an onsite inspection of the cracks on 7/22/15; an updated crack map is attached. The updated map has more detail than the map generated prior to delivery but there are no additional cracks and the widths have not increased as stated in the response to NCR Rev.4 .***

14 ***JPC does not find any cracks in the beam having a width of 0.04". The process of sandblasting the top surface of the beam rounds the edges of the cracks making them appear wider at the top surface, refer to attached Photos & SK1. Rounded edges of the cracks extend down approximately 1/16" to 3/32". Observed crack depths at flange edges and at lifter blockouts terminate at the top mat of reinforcing. The new crack map generated 7/22/15 records the length and width of each individual crack. JPC did not observe additional cracks or increase in widths resulting from shipping and handling. All cracks in the flange generated by shrinkage or tension have occurred and have been successfully restrained by the mild reinforcement.***

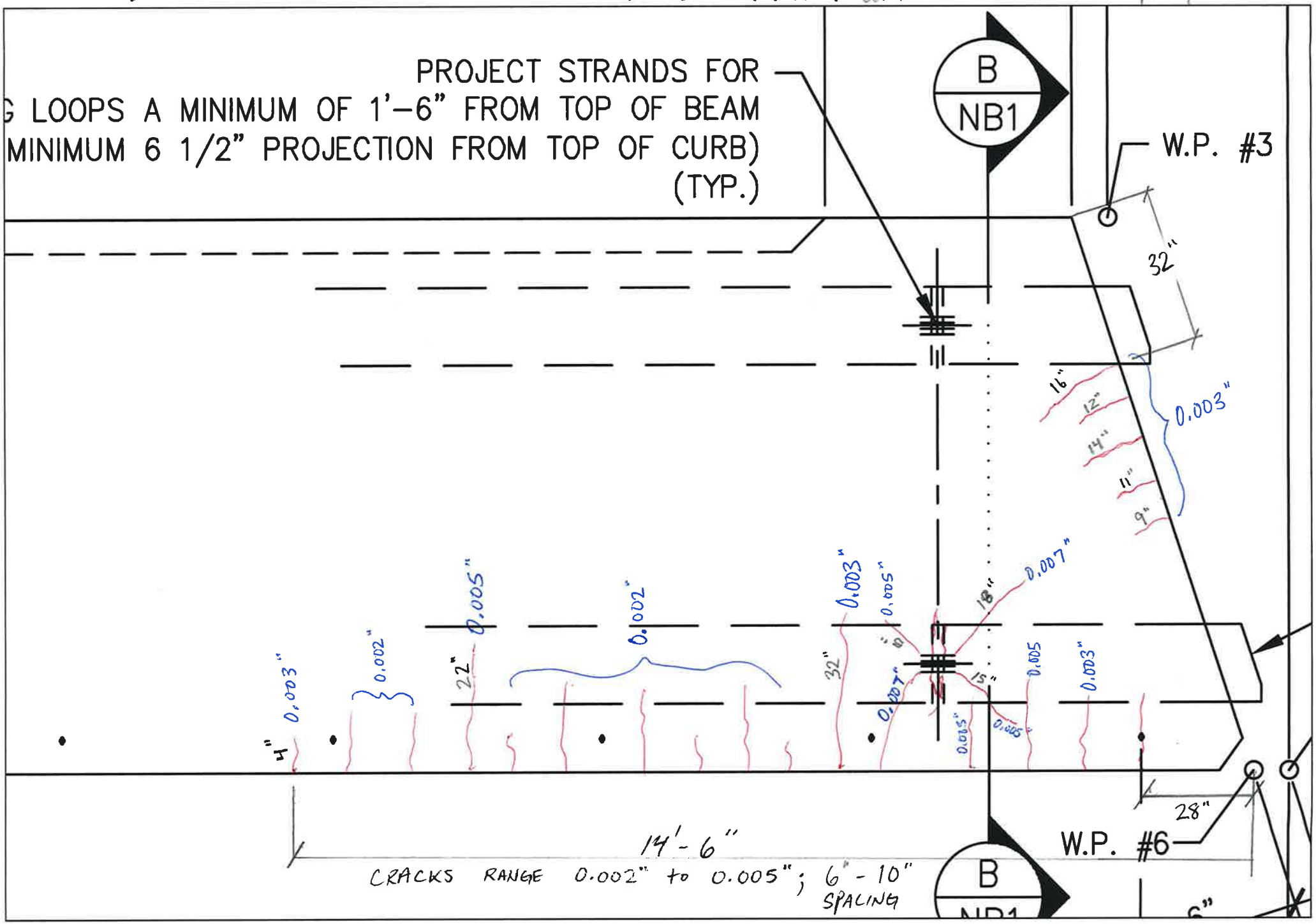
15 ***The proposed MMA product is suitable to seal cracks as wide as 1/8" (3 mm) to hairline. The cured MMA creates a barrier which prevents the ingress of water, water borne contaminates and chloride ions from entering the substrate. The excellent adhesion and strength of the MMA resin ensures a long service life. Please refer to the attached product literature.***

Date: 7/23/15

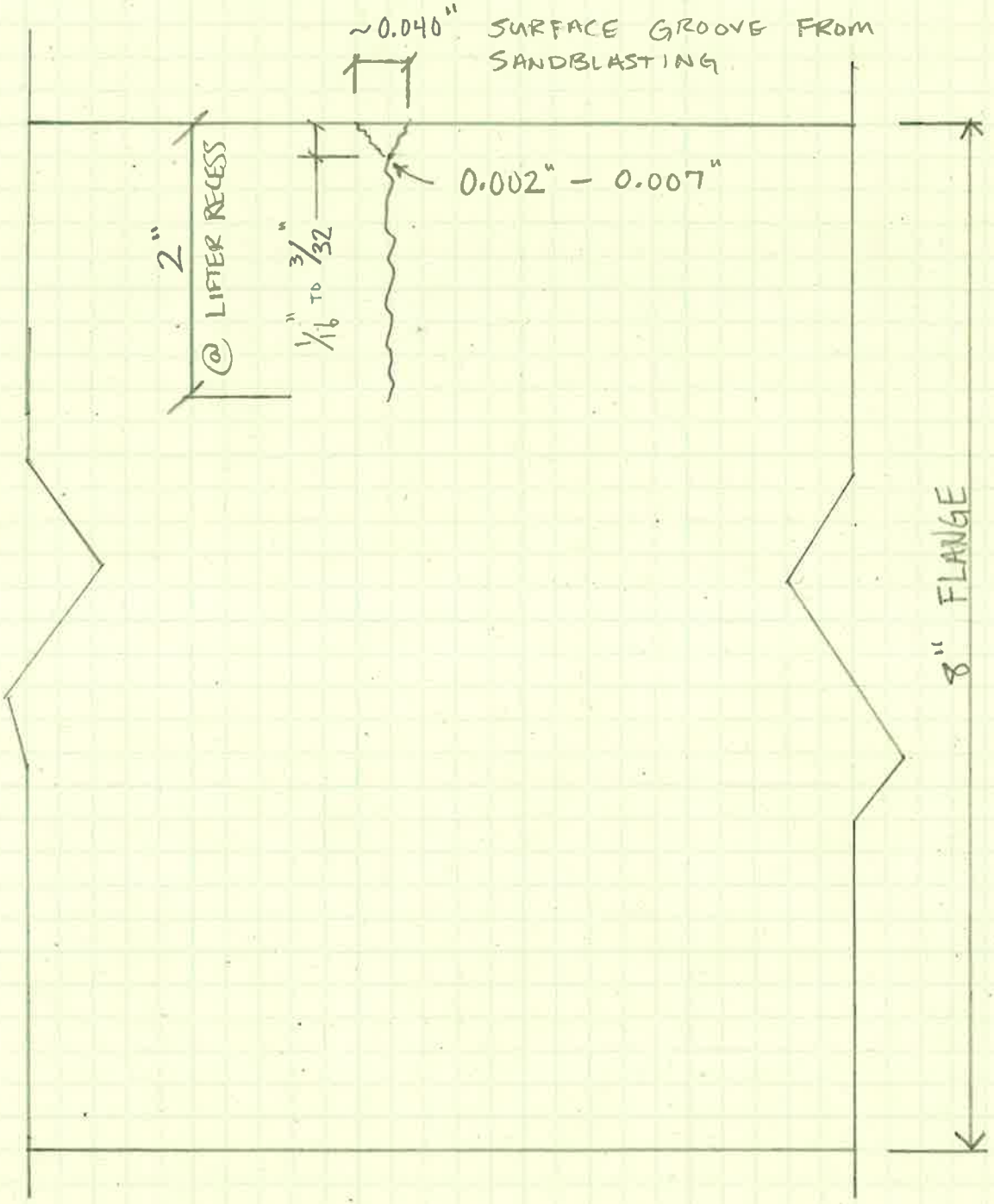
Prepared By:
Benjamin L. Cota, Production Engineer
Michael Weigand, P.E.

Enclosures: Concrete Batch Tickets
Photo of raked concrete surface at curb
Sikadur 31 data sheet
Protectosil Degadeck CSS
JPC Beam Stress Analysis
PCINE - BMRG SRP#14
JPC NB2 Crack Map (7-22-15)
Elevation detail of crack profile, SK1
Photos of crack measurements (7-22-15)

DETAILED CRACK MAP: CT-NB2 Non-marked End 7/22/15 BC



ELEVATION DETAIL OF TYPICAL CRACK POST BLAST



SK-1 NOT TO SCALE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Consulting, & Materials Technology
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