APPENDIX D. HISTORIC BRIDGE COMMISSION DOCUMENTS

- Resolution to Creating the Bellevue Bridge Commission
- Bellevue Bridge Toll Revenues
- Bellevue Bridge Annual Vehicle Counts
- Regional Historic ADT Traffic Volumes
- Creative Marketing Project for Bellevue Grand Army of the Republic Bridge (Bellevue West DECA, 2008)
- Bellevue Bridge Coating Condition Assessment (KTA, 2016)
- Conceptual Design for Future Bellevue Bridge (TranSystems, 2007)
- Future Bellevue Bridge Cost Estimate (HNTB, 2010)

EXTRACTS FROM THE MINUTES OF A
MEETING OF BELLEVUE BRIDGE COMMISSION
HELD October 20, 1950.

A special meeting of Bellevue Bridge Commission was held on the 20th day of October, 1950, at 8:00 o'clock P.M., at the Bellevue City Hall.

The following members were present:

L. L. Lawrence, Harold C. Ludwig and Ray N. Jungers,

and the following members were absent: None.

A resolution entitled "A RESOLUTION AUTHORIZING THE CONSTRUCTION OF A BRIDGE ACROSS THE MISSOURI RIVER AND AUTHORIZING THE ISSUANCE OF $2,800,000 BRIDGE REVENUE BONDS TO FINANCE THE COST THEREOF", was introduced by Mr. Jungers and seconded by Mr. Ludwig. The Secretary-Treasurer thereupon read said resolution in full. The Chairman thereupon announced that a public hearing was now open upon the question of the adoption of said resolution and invited any persons present to speak for or against such adoption.

No objections being presented it was moved by Mr. Jungers and seconded by Mr. Ludwig that said resolution be finally adopted.

The roll call upon adoption of said resolution was as follows:

AYES: Jungers, Ludwig, Lawrence.

NOES: None.

The Chairman declared said resolution finally passed and adopted and in full force and effect.

Bellevue, Nebraska,

May 12, 1950.

A Special meeting of the Mayor and Council of the City of Bellevue, Nebraska, was held at the City Hall in said City on the 12th day of May, 1950, at 8:00 o'clock P .M. pursuant to written Notice to Councilmen .

On roll call the following were present:

Mayor: R. N. Jungers ; City Clerk: M. G. Holmes ;

Councilmen: Ludwig, Lawrence and Roberts

. Absent: Morgan .

The Mayor presided and the City Clerk recorded the proceedings.

The Clerk read a communication received from the Kirkham Engineering Company of Omaha inquiring whether the City of Bellevue would be interested in sponsoring the construction of a bridge across the Missouri River between Bellevue and Pottawattamie County, Iowa, as provided by Sections 39-855 to 39-876, Revised Statutes of Nebraska, 1943, as amended.

The foregoing communication was discussed at length by the Council. The Mayor related to the Council that he had discussed the matter with J. J. Vinardi, attorney for the City, especially whether there would be any liability or obligations created by the City investigating the possibilities of such construction. Mr. Vinardi pointed out that sections of the Nebraska Statutes under which the City would proceed were such that there never could be any tax levied on any of the taxable property in the city for the payment of any bridge bonds. The matter of obtaining information with reference to the proper way to proceed was discussed at length.

Thereupon Councilman Ludwig offered the following resolution and moved its adoption:

A RESOLUTION CREATING THE CITY OF BELLEVUE, NEBRASKA, BELLEVUE BRIDGE COMMISSION

WHEREAS it appears that the construction of a bridge at or near Bellevue, Nebraska, could be of material benefit to the City and its residents; and

WHEREAS it appears desirable that a thorough investigation be made without the incurring of any debt which cannot be paid from the proceeds of a revenue bond issue; and

WHEREAS investigation should be started regarding construction of a bridge across the Missouri River from a point in or near the City of Bellevue,

Nebraska, to a point in Pottawattamie County, Iowa; and

WHEREAS the Mayor and Council of the City of Bellevue deem it advisable to create a Bridge Commission to handle the duties necessary in connection therewith;

NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND COUNCIL OF THE CITY OF BELLEVUE, NEBRASKA:

That a Bridge Commission is hereby created under the provisions of Sections 39-868 and 39-869, Revised Statutes of Nebraska, 1943, as amended, for the purpose of constructing a bridge across the Missouri River from a point in or near the City of Bellevue, Nebraska, to a point in Pottawattamie County, Iowa. Said Commission shall bear the name of City of Bellevue, Nebraska, Bellevue Bridge Commission and shall be empowered to do and carry out all things necessary in connection with the construction of said proposed bridge and consistent with the powers granted by Sections 39-855 to 39-876, Revised Statutes of Nebraska, 1943, as amended.

Councilman Lawrence seconded the motion for the adoption of the foregoing resolution. The roll call upon the passage and adoption of said resolution was as follows: Ayes: Roberts, Ludwig and Lawrence. Nays: None. The Mayor thereupon declared said resolution passed and adopted.

It was moved by Councilman Roberts and seconded by Councilman Lawrence that the following named persons be appointed members of the City of Bellevue, Nebraska, Bellevue Bridge Commission for the terms shown:

L. L. Lawrence	Six years
H. Ludwig	Four years
R. N. Jungers	Two years

Said named persons shall be notified of their appointment and shall take, subscribe and file an oath of office as required by law.

The roll call upon the passage and adoption of said motion was as as follows: Ayes: Roberts, Ludwig and Lawrence. Nays: None. The Mayor thereupon declared said motion passed and adopted.

Motion for adjournment. Adjourned.

ATTEST:

M. P. Holmes
City Clerk.

R. N. Jungers
Mayor.

(SEAL)

CALL FOR SPECIAL MEETING OF THE MAYOR AND COUNCIL OF THE CITY OF BELLEVUE, NEBRASKA:

You are hereby notified that a special meeting of the Mayor and Council of the City of Bellevue, Nebraska, will be held at the City Hall in said City on the 12th day of May, 1950, at 8: o'clock P .M. for the purpose of considering and acting on a resolution creating a Bridge Commission and taking any action necessary in connection therewith.

R. V. Young
Mayor

M. E. Holmes
City Clerk

CONSENT TO MEETING

We, the undersigned, members of said Council, accept service of the foregoing notice and consent that the meeting of the Council shall be held at the time and place and for the purpose stated therein.

Edward C. Ludwig

[illegible]

H. W. Talbert

Joseph M. Magen

Dated 5-12-, 1950.

STATE OF NEBRASKA)
) SS.
COUNTY OF SARPY)
)
CITY OF BELLEVUE)

I, the undersigned, duly elected, qualified and acting Clerk of the City of Bellevue, Sarpy County, Nebraska, do hereby certify that the foregoing is a true and correctcopy of the minutes of the meeting of the Mayor and Council of the City of Bellevue, Nebraska, held on the 12th day of May, 1950, and the same are on file and on record in my office and that said minutes are true and compared copies of all of the minutes of the Mayor and Council at said meeting as far as the same relate to the passage of a resolution creating the City of Bellevue, Nebraska, Bellevue Bridge Commission and appointment of the Commissioners.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said City this 12 day of May, 1950.

M. J. Holmes
City Clerk.

(SEAL)

Affidavit of Publication

STATE OF NEBRASKA, County of Sarpy } ss.

J. B. Gebbie, Jr., being first duly sworn, upon oath, deposes and says that he is manager of **The Bellevue Press** a legal weekly newspaper of general circulation in Sarpy County, Nebraska, and published therein; that said newspaper has been established for more than one year last past; that it has a bona-fide paid subscription list of more than three hundred; that to his personal knowledge the advertisement, a copy of which is hereto attached, was printed in the said newspaper one consecutive weeks prior to the 10 th day of June, 1950, the dates of said publication being as follows:

First publication, Friday June 9, 1950
Second publication, Friday ....., 194....
Third publication, Friday ....., 194....
Fourth publication, Friday ....., 194....
Fifth publication, Friday ....., 194....

J B Gebbie Jr.

Subscribed in my presence and sworn to before me this 10th day of June 1950 Printer's fee $ 7.45

Clarence E Otte

My commission expires April 6th, 1952

Bellevue, Nebr.
May 12, 1950.

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On roll call the following were present:

Mayor: R. N. Jungers; City Clerk: M. G. Holmes; Councilmen: Ludwig, Lawrence and Roberts. Absent: Morgan.

The Mayor presided and the City Clerk recorded the proceedings.

The Clerk read a communication received from the Kirkham Engineering Company of Omaha inquiring whether the City of Bellevue would be interested in sponsoring the construction of a bridge across the Missouri River between Bellevue and Pottawattamie County, Iowa, as provided by Sections 39-855 to 39-876, Revised Statutes of Nebraska, 1943, as amended.

The foregoing communication was discussed at length by the Council. The Mayor related to the Council that he had discussed the matter with J. J. Vinardi, attorney for the City, especially whether there would be any liability or obligations created by the City investigating the possibilities of such construction. Mr. Vinardi pointed out that sections of the Nebraska Statutes under which the City would proceed were such that there never could be any tax levied on any of the taxable property in the city for the payment of any bridge bonds. The matter of obtaining information with reference to the proper way to proceed was discussed at length.

Thereupon Councilman Ludwig offered the following resolution and moved its adoption.

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WHEREAS th
Council of the C
deem it advisab
Bridge Commissi
the duties necessa
ion therewith;

NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND COUNCIL OF THE CITY OF BELLEVUE, NEBRASKA:

That a Bridge Commission is hereby created under the provisions of Sections 39-863 and 39-869, Revised Statutes of Nebraska, 1943, as amended, for the purpose of constructing a bridge across the Missouri River from a point in or near the City of Bellevue, Nebraska, to a point in Pottawattamie County, Iowa. Said Commission shall bear the name of City of Bellevue, Nebraska, Bellevue Bridge Commission and shall be empowered to do and carry out all things necessary in connection with the construction of said proposed bridge and consistent with the powers granted by Sections 39-855 to 39-876, Revised Statutes of Nebraska, 1943, as amended.

Councilman Lawrence seconded the motion for adoption. The roll call was as follows: Ayes: Ludwig, Lawrence and Roberts. Nays: None. Absent: Morgan. The Mayor declared said motion carried and adopted.

Motion for adjournment. Adjourned.

R. N. Jungers
Mayor

ATTEST:
M. G. Holmes
City Clerk
(SEAL)

A resolution creating The City of Bellevue Neb Bridge commission

	2014
POS QUANTITY	1,351,828
POS SALES	$1,508,022.92

2014	Qty Sold	Total Sales
Overall	1,351,828	$1,508,022.92
CarSpecial	28	$33.42
Car2axCSH	950,835	$950,802.00
Car2axChg	308,124	$225,242.25
Car3axCSH	5,888	$8,829.00
Car3axChg	797	$903.75
Car4axCSH	7,253	$14,504.00
Car4axChg	685	$1,111.25
Car5axCSH	240	$600.00
Car5axChg	26	$54.00
Car6axCSH	46	$138.00
Car6axChg	1	$2.75
MtrcyCash	10,374	$5,177.00
MtrcyChrg	793	$351.50
No Sale	476	$0.00
TollPassCrd	551	$2,755.00
Trk2axCSH	10,324	$20,648.00
Trk2axChg	1,995	$2,536.00
Trk3axCSH	1,928	$5,784.00
Trk3axChg	3,844	$10,818.00
Trk4axCSH	2,031	$8,124.00
Trk4axChg	542	$2,064.00
Trk5axCSH	12,773	$63,865.00
Trk5axChg	12,683	$60,590.00
Trk6axCSH	3,935	$23,610.00
Trk6axChg	8,713	$51,012.00
Trk7axCSH	1,513	$10,584.00
Trk7axChg	5,430	$37,884.00

Trucks 65,711

Cars 1,285,090

	2015
POS QUANTITY	707,416
POS SALES	$766,459.14

2015	Qty Sold	Total Sales
Overall	707,416	$766,459.14
CarSpecial	10	$5.64
Car2axCSH	504,868	$504,848.00
Car2axChg	159,932	$116,286.75
Car3axCSH	2,789	$4,183.50
Car3axChg	342	$392.50
Car4axCSH	3,240	$6,480.00
Car4axChg	269	$416.50
Car5axCSH	112	$280.00
Car5axChg	20	$42.75
Car6axCSH	15	$44.50
Car6axChg	1	$3.00
MtrcyCash	4,500	$2,248.00
MtrcyChrg	400	$144.00
No Sale	741	$0.00
TollPassCrd	259	$1,295.00
Trk2axCSH	6,326	$12,650.00
Trk2axChg	1,128	$1,350.00
Trk3axCSH	841	$2,523.00
Trk3axChg	1,836	$5,328.00
Trk4axCSH	1,107	$4,428.00
Trk4axChg	345	$1,364.00
Trk5axCSH	6,635	$33,175.00
Trk5axChg	3,227	$16,065.00
Trk6axCSH	2,844	$17,064.00
Trk6axChg	3,461	$20,694.00
Trk7axCSH	823	$5,761.00
Trk7axChg	1,345	$9,387.00

Trucks 29,918

Cars 671,598

	2016
POS QUANTITY	557,918
POS SALES	$624,920.00

2016	Qty Sold	Total Sales
Overall	557,918	$624,920.10
CarSpecial	10	$2.85
Car2axCSH	393,268	$393,256.00
Car2axChg	126,337	$91,358.25
Car3axCSH	2,311	$3,465.00
Car3axChg	341	$368.75
Car4axCSH	3,030	$6,060.00
Car4axChg	236	$337.75
Car5axCSH	105	$262.50
Car5axChg	15	$33.75
Car6axCSH	26	$78.00
Car6axChg	1	$2.75
MtrcyCash	3,686	$1,835.00
MtrcyChrg	389	$156.50
No Sale	727	$0.00
TollPassCrd	177	$885.00
Trk2axCSH	4,833	$9,662.00
Trk2axChg	817	$658.00
Trk3axCSH	852	$2,556.00
Trk3axChg	632	$1,743.00
Trk4axCSH	1,016	$4,064.00
Trk4axChg	123	$476.00
Trk5axCSH	5,742	$28,710.00
Trk5axChg	3,025	$15,115.00
Trk6axCSH	3,364	$20,184.00
Trk6axChg	4,302	$25,800.00
Trk7axCSH	1,029	$7,196.00
Trk7axChg	1,524	$10,654.00

Trucks 27,259

Cars&Mtrcy 529,755

	2017
POS QUANTITY	568,328
POS SALES	$631,528.10

2017	Qty Sold	Total Sales
Overall	568,328	$631,528.10
CarSpecial	11	$1.60
Car2axCSH	395,370	$395,352.00
Car2axChg	135,469	$98,193.00
Car3axCSH	2,399	$3,598.50
Car3axChg	286	$323.75
Car4axCSH	3,020	$6,038.00
Car4axChg	352	$537.25
Car5axCSH	67	$167.50
Car5axChg	14	$31.50
Car6axCSH	35	$101.50
Car6axChg	14	$42.00
MtrcyCash	3,491	$1,735.50
MtrcyChrg	447	$218.00
No Sale	678	$0.00
TollPassCrd	224	$1,120.00
Trk2axCSH	4,317	$8,634.00
Trk2axChg	803	$630.00
Trk3axCSH	623	$1,869.00
Trk3axChg	1,021	$2,823.00
Trk4axCSH	964	$3,856.00
Trk4axChg	181	$688.00
Trk5axCSH	4,618	$23,090.00
Trk5axChg	3,405	$16,990.00
Trk6axCSH	2,878	$17,268.00
Trk6axChg	5,254	$31,518.00
Trk7axCSH	965	$6,748.00
Trk7axChg	1,422	$9,954.00

Trucks 26,451

Cars&Mtrcy 540,975

	2018
POS QUANTITY	666,523
POS SALES	$735,749.75

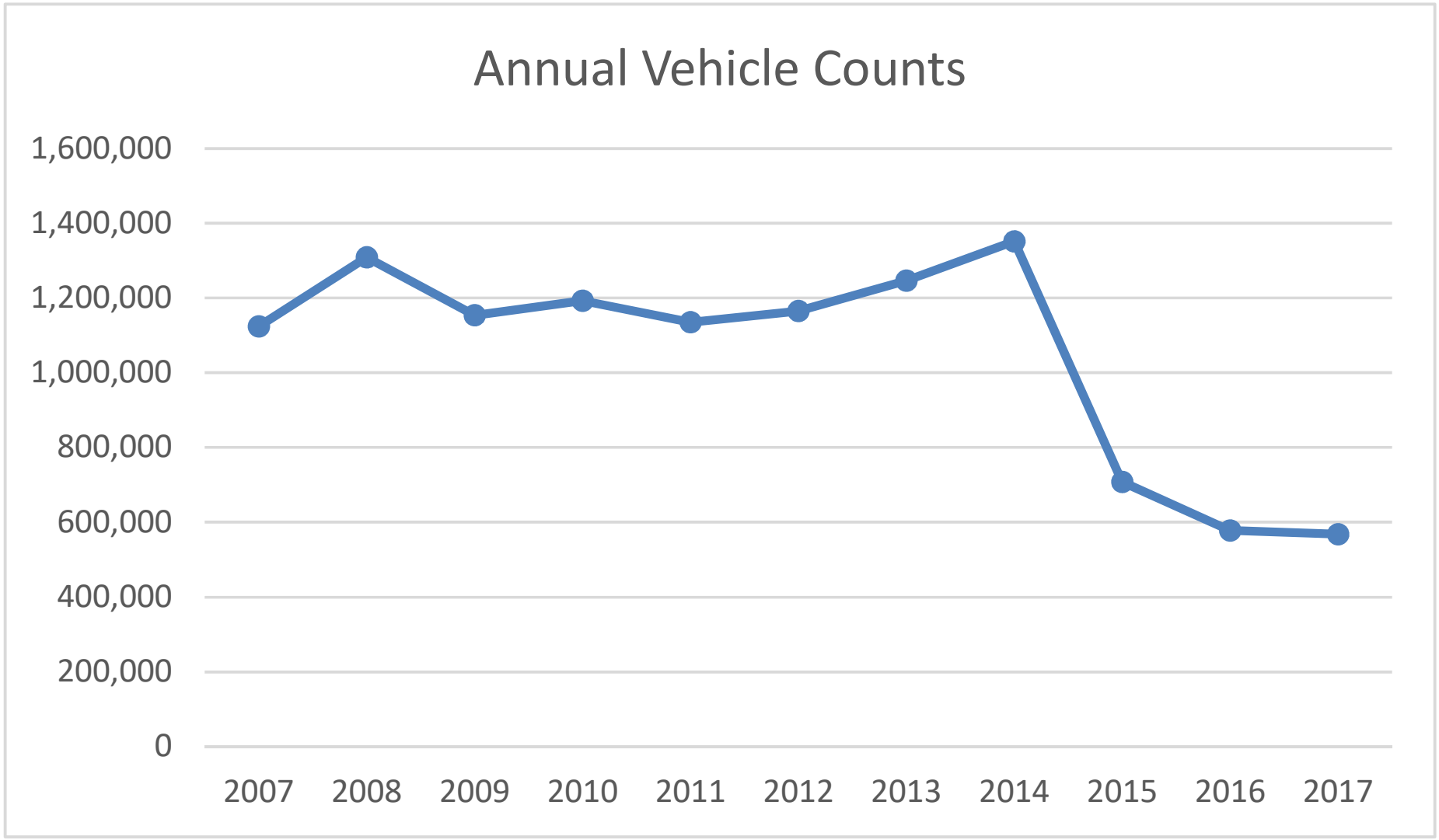
2018	Qty Sold	Total Sales
Overall	666,523	$735,749.75
CarSpecial	12	$2.75
Car2axCSH	454,847	$454,833.00
Car2axChg	169,275	$122,752.50
Car3axCSH	1,922	$2,883.00
Car3axChg	334	$398.75
Car4axCSH	2,322	$4,644.00
Car4axChg	253	$348.25
Car5axCSH	73	$175.00
Car5axChg	20	$40.50
Car6axCSH	72	$213.00
Car6axChg	11	$22.00
MtrcyCash	3,752	$1,855.00
MtrcyChrg	526	$257.00
No Sale	1,461	$0.00
TollPassCrd	392	$1,960.00
Trk2axCSH	4,691	$9,382.00
Trk2axChg	965	$1,158.00
Trk3axCSH	785	$2,355.00
Trk3axChg	2,909	$8,481.00
Trk4axCSH	695	$2,780.00
Trk4axChg	388	$1,528.00
Trk5axCSH	4,532	$22,650.00
Trk5axChg	5,195	$25,950.00
Trk6axCSH	1,924	$11,544.00
Trk6axChg	4,571	$27,414.00
Trk7axCSH	1,584	$11,060.00
Trk7axChg	3,012	$21,063.00

Trucks 31,251

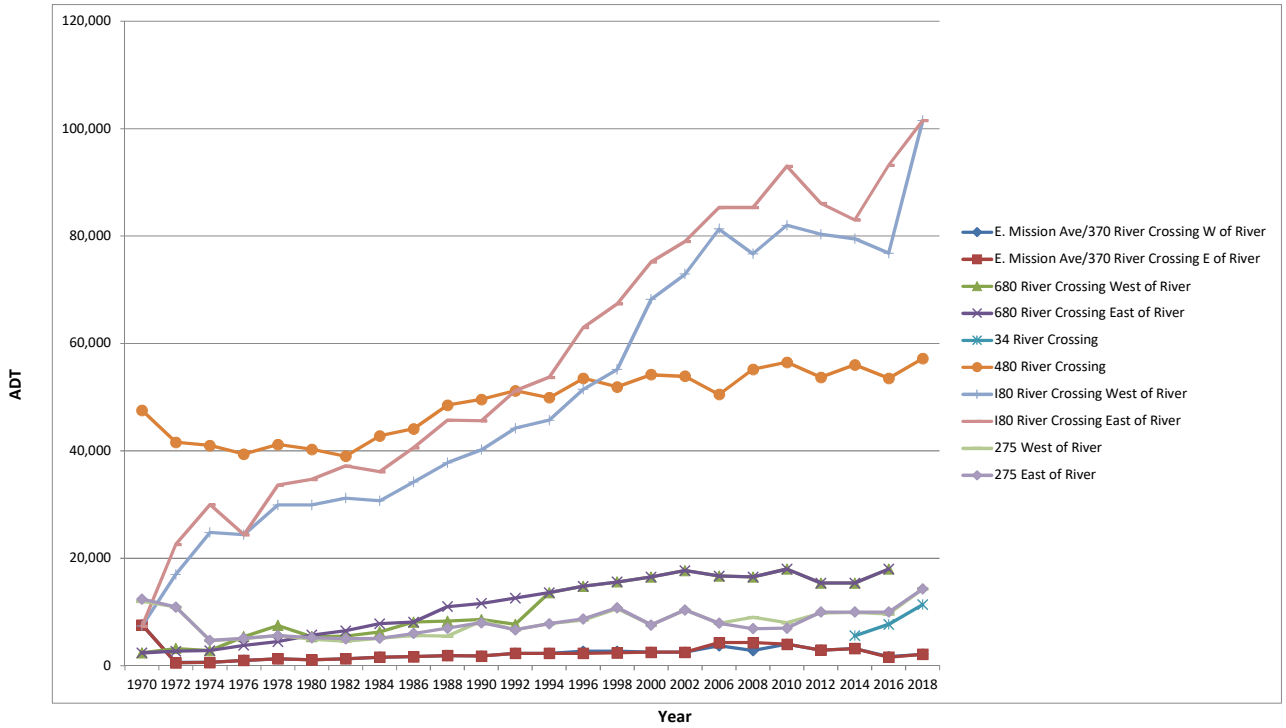
Cars&Mtrcy 633,419

Bellevue Bridge Toll Revenues

Bellevue Bridge



Regional Historic ADT Traffic Volumes



CREATIVE MARKETING PROJECT

"Bellevue Grand Army of the Republic Bridge"

Bellevue West DECA
Bellevue West High School
1501 Thurston Ave.
Bellevue, Nebraska 68123

Kristi Wiebelhaus, Megan Wessling, Aaron Langford

March 2008

TABLE OF CONTENTS

I. Executive Summary

II. Introduction

A. Significance of the Problem Studied

The Bellevue Bridge is a pillar in the Bellevue community. It is 1,964 feet long connecting Bellevue, Nebraska with ~~Pottawattamie~~ County, Iowa.

The importance of the bridge is the people it serves. Everyday 3,000+ cars use it to cross into Iowa or Nebraska. There are three bridges that could serve this purpose, but the Bellevue Bridge is the most important because it doesn't have a weight limit. This is important because of all the large trucks and construction equipment that need to cross to the other side.

People use this on a daily basis to go to and from work, or for recreation. People choose to use this bridge over the others out of convenience and necessity. Businesses also use it frequently. Construction and trucking companies especially use it because of the lack of weight limit and the convenience of travel. The bridge is not only useful to the people in the surrounding communities, but it is also a convenient route for travelers, especially those going to or coming from Kansas City.

Picture 1.0 The Bellevue Bridge from Haworth Park

In addition to people and businesses using it, the bridge also serves the local fire department and police stations. The main reason they use the bridge is because of a mutual aide agreement with Iowa. If there is a

fire or an emergency, it is sometimes faster for the Bellevue side to respond.

B. Statement of Problem

The Bellevue Bridge was built based on bonds. In the original charter for the bridge it states that after the bonds have been paid off, tolls can no longer be charged. If there are no tolls, there is no way to pay for bridge inspections and general maintenance.

In order to keep it open, the bridge must become a historical place in the Nebraska Historical Registry. For this to happen we need to find out the economic impact that would occur should the bridge be closed. There needs to be feed back from the community because they are the ones that will be the most impacted if the bridge was closed. Businesses in the community depend on the traffic the bridge brings in.

C. Background Information

The Bellevue Bridge Commission was created in May 1950 to sell bonds for the privately owned toll bridge in order to begin construction. The company of Kirkham Michael and Associates was contracted to design it. By the end of construction, the total cost of the bridge was $3,000,000. It is nearly half a mile long with 5,500 cubic yards of concrete superstructer and 3,670,000 pounds of steel. The bridge is supported by three pairs of piers. The piers are 20 feet in diameter and 144 feet tall, 80 of which are under ground. The length from the river to the top of the bridge is 115 feet, but the bridge roadway is only 65 feet above the water. Construction ended in November 1952, and the bridge was opened to the public on December 10 of that year. The Official name for it is the Bellevue Grand Army of the Republic Bridge.

Highway 6 runs over the bridge and through Old Town Bellevue bringing through much needed traffic to the businesses in and around the community.

III. Procedures and Research Methods Used

A. Description of secondary (library) research conducted: books, articles and other sources on market research, local descriptive data, etc.

Secondary research is used in many different ways to review data such as facts, figures, and other information that has previously been published. We used the survey method to conduct our research. This form of research was very important to find demographic, geographic, and psychographic information that would benefit our project the greatest. We used many different sources including the internet, books, newspapers, Herb Barrelman, who is a member of the Bellevue Bridge Commission, and the Commission itself. Mr. Barrelman was a huge asset to our project. He provided us with information about the bridge, its current facts and updates, and even a research study done in 2001 which included a survey similar to ours. He discussed with us the background of the bridge and what we should be expecting with the results of our surveys so that we would be able to understand how and where the problems developed.

Picture 2.0 Meeting with John Adler of Kirkham and Michael

Secondly we contacted the company that designed the bridge,

Kirkham Michael and Associates. We met with John Adler, who is the current Senior Vice President of the company. From him we learned about the history of the bridge and the basic design set. He gave us other informants to get in contact with and a painting created for the bridge which was donated to them in honor of 50 years of excellence.

Through our contacts, we have become familiar with the bridge design, its history, and its present state. From here, we will use surveys to gather the rest of the information needed to help make the Bellevue Bridge a historical place in Nebraska.

B. Description of primary research conducted

Primary information can be accumulated in three main ways. There is the survey method, the observational method, and the experimental method. In order to find out what the people of Nebraska and Iowa thought about the bridge and what they use it for we used the survey method.

The first step in this process was to brainstorm possible questions that would tell us the type of people who use the bridge, what they use it for and what they know about it. The second step was to create several drafts of the survey in order to accurately accumulate the information we need. The third step was the distribution of the surveys. We took 2000 surveys down to the toll booth to have handed out to bridge users. The surveys would be

Picture 3.0 Sign at the Bridge Promoting the Survey

handed out and collected from this location because it was the most convenient way to reach the people who use the bridge. We also met the workers of the toll booth to explain how the handing out process should work. The workers of the toll booth were very helpful in this step because they were the main distributors of the survey In addition to having them hand out our surveys, we went down there a few days a week after school to hand them out ourselves and pick up the completed ones.

From there, we transferred the information gathered onto scantrons, which would be then sent to Frank, the chief analyst at the University of Nebraska at Omaha. The open ended questions were put on separate sheets of paper to be analyzed separately. We then analyze the information gathered to find out who our primary target market is.

NAME

Table 1.0

Started on October 10	**Surveys picked up**
October 16	54
October 17	31
October 23	67
October 24	16
October 30	73
November 11	62
November 14	39
November 20	52
Last Day November 25	47
TOTAL Amount	**441**

This survey would not have been possible without the help of out DECA advisor, Mr. David Shillinglaw and the Bridge Commission. We showed the survey to the Bridge Commission and Kirkham Micheal and Associates to get their input and advice.

Exhibit 1.0
The Survey

1. What is your Gender?
   Male Female

2. Marital Status:
   Married Single

3. What is your Age? **(SELECT ONE ONLY)**
   18-24 __ 25-29 __ 30-34
   35-39 __ 40-44 __ 45-49
   50-54 __ 55-59 __ 60+

4. What is your Nationality/Ethnic Background?
   (SELECT ONE ONLY)
   -African American -Asian/Pacific Islander
   -Caucasian -Hispanic
   -American Indian/Alaskan Native
   -Other_____

5. What is the occupation of the chief wage earner in your household? **(SELECET ONE ONLY)**
   -Laborer -Armed Forces -Self Employed
   -Managerial -Business Owner -Professional
   -Technical -Sales -Retired
   -Education -Other_____

6. How many members are in your immediate family? (Including Yourself)

   1 2 3 4 5 6 7 8 or more

7. What is your Zip Code?
   _____

8. What is your yearly household income?
   __ Under $20,000 __ $20,000 to $34,999
   __ $35,000 to $49,999 __ $50,000 to$74,999
   __ $75,999 to $99,999 __ $100,000 to 125,000
   __ $125,001+

9. What type of things do you like to do in your spare time?
   _____
   _____
   _____

10. What is the main reason you used the **Bellevue Bridge today**?
    (SELECT ONLY ONE)

    __ Work __ Recreation __ Other_____
    (Please Explain)

11. How many times a week do you cross the Bridge going either way?
    (CIRCLE ONLY ONE)

    1 – 2 - 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 – More then 10

12. Who do you believe owns the Bellevue Bridge?
    (SELECT ONE ONLY)
    __ City of Bellevue __ Sarpy County
    __ Bellevue Bridge Commission __ The State
    __ I have no idea
    __ Other_____

13. If you had a choice between closing the bridge or increasing the tolls $1.00 per trip to keep the bridge open, which would you choose?

    A. Pay the higher toll
    B. Close the Bridge

14. What would you do if they closed the Bellevue Bridge down? **(PLEASE EXPLAIN)**
    _____
    _____
    _____

15. Are you aware that the Bellevue Bridge is trying to be named a historical place/ landmark?

    Yes **No**

16. Do you make purchases in Bellevue or across the river because of the convenience the bridge provides?

    Yes **No**

    If yes, please check which types of products or services you purchase in Bellevue. **(Check ALL that Apply)**

    __ Gas __ Sports Complexes
    __ Convenience Marts __ Wal-Mart
    __ Fast food/Restaurants __ Hair Salons
    __ Nail Salons __ Dentists
    __Doctors Offices
    __ Business Supplies
    What type of business?

17. How badly would it affect you if the Bellevue Bridge closed down? (Please Explain)
    _____
    _____
    _____

18. What route would you choose if you could not use the Bellevue Bridge?
    _____
    _____
    _____

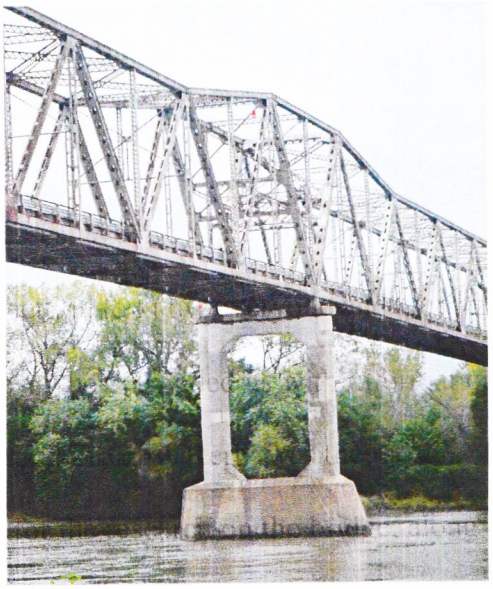
C. Descrition of involvement of chapter members and business people in the Project

For this project to be a success, we needed to use our resources. We needed to involve the bridge commission and the local businesses. We had the cooperation of all parties involved to make this a success. It was fun getting to know everyone and working with them, not only did they help us with our surveys; they provided us with information about the bridge from personal experience. Our main go-to guy, Herb, was the most helpful in getting us all the information we needed for the research on the bridge, along with a survey that was done a few years ago.

After initially talking to Herb about this project, we did some research and made presentations to all of the marketing classes. We told them what we were doing and what the project was about. Our chapter members were behind us one hundred percent. Although they couldn't help distribute surveys, their continued moral support and belief in us kept us going in order to reach our goal.

The business people involved in our project we local businesses located near bridge. Since the bridge is located in Old Town Bellevue, many of the businesses have been around since the bridge was built and some even before. Their information was important because we needed to know how their businesses would be affected if the bridge was to close down. They would know this because the bridge was closed down at one point to redo

Picture 2.0 Basic structure of the bridge.



the decks, and comparing their income rates from when the bridge was opened to the period of when it was closed gave us a good idea of how much the bridge affects the local businesses.

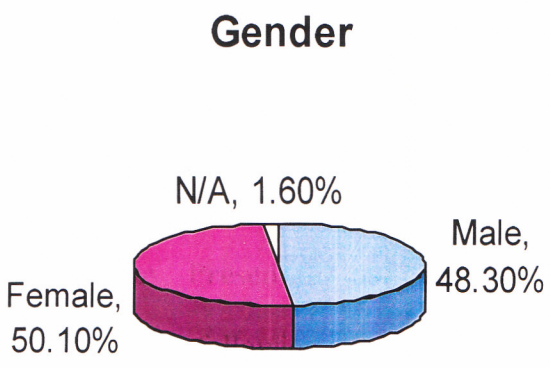
IV. Findings and Conclusions

A. Presentation of Findings, data to support findings

The following section describes the information we found through the distribution and analysis of surveys completed. The surveys were distributed from the toll booth on the bridge to people passing over it into Iowa and Nebraska. Distribution of surveys started on October 10, 2007 and went until November 25, 2007.

Over this period of time we collected a total of 441 surveys. After we had collected the completed surveys we individually transferred all of the information on each survey onto its own scantron. The answers to the free response questions were transferred onto a separate sheet of paper to be analyzed separately. The scantrons were then sent to Frank at UNO to be analyzed. From there we put the information gathered from the analysis into graphs.

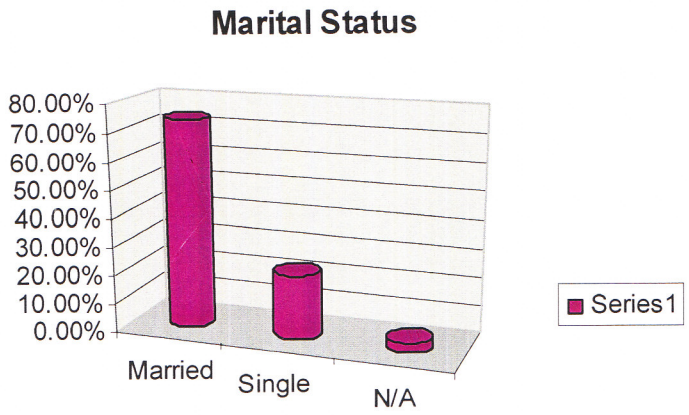
Graph 1.0



Of the 441 people surveyed, 50.1% were male and about 48.3% were female. 1.6% of people did not respond.

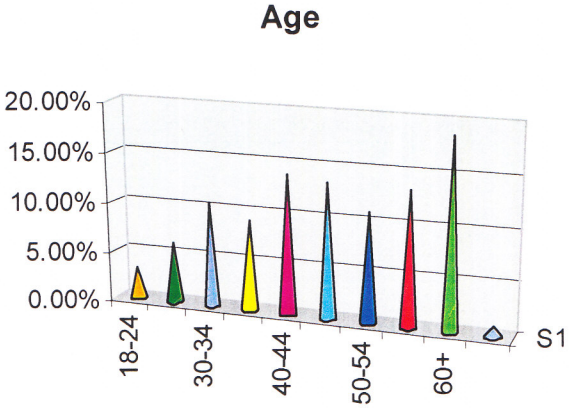
Graph 2.0

Roughly 74.1% of the 441 people surveyed were married while 22.7% were single and 3.2% had no response.



	Married	Single	N/A
Series1	74.10%	22.70%	3.20%

Graph 3.0

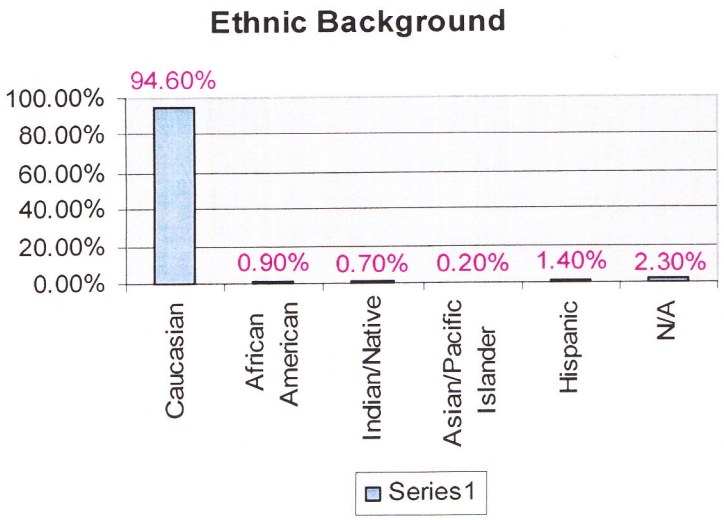


We found that the main age group surveyed was the ages 60+. This is mainly due to the amount of work and traveling they do. The next largest group was ages 40-44 mainly because they cross the bridge to get to either work or leisure and sports activities.

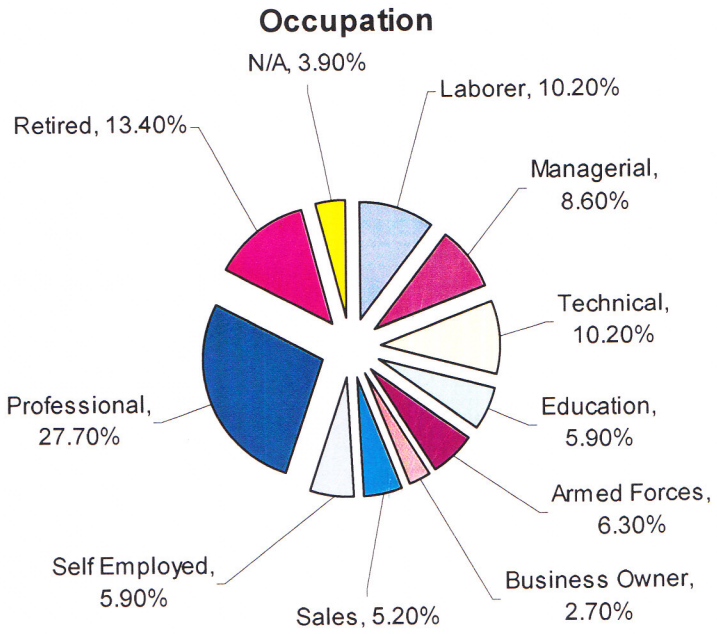
	18-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60+	N/A
Series1	3.20%	6.10%	10.40	9.10%	13.80	13.40	10.90	13.40	18.60	1.10%

Graph 5.0

Of the 441 people surveyed, 94.6% of people were Caucasian followed by 1.4% of Hispanics and 0.9% African American. Indian/Native people were 0.7% and Asian/Pacific Islander was 0.2%. 2.3% of people had no response.



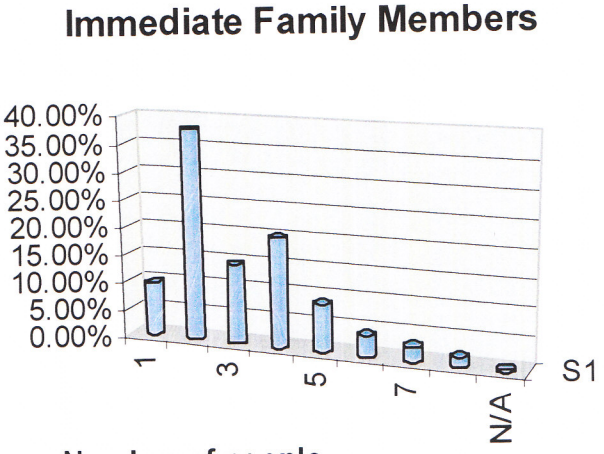
Graph 6.0



The majority of those surveyed, about 27.7%, worked in a professional setting followed by the second largest go, retired residents with 13.4%. People of many different occupations use the bridge in order to get to their place of employment.

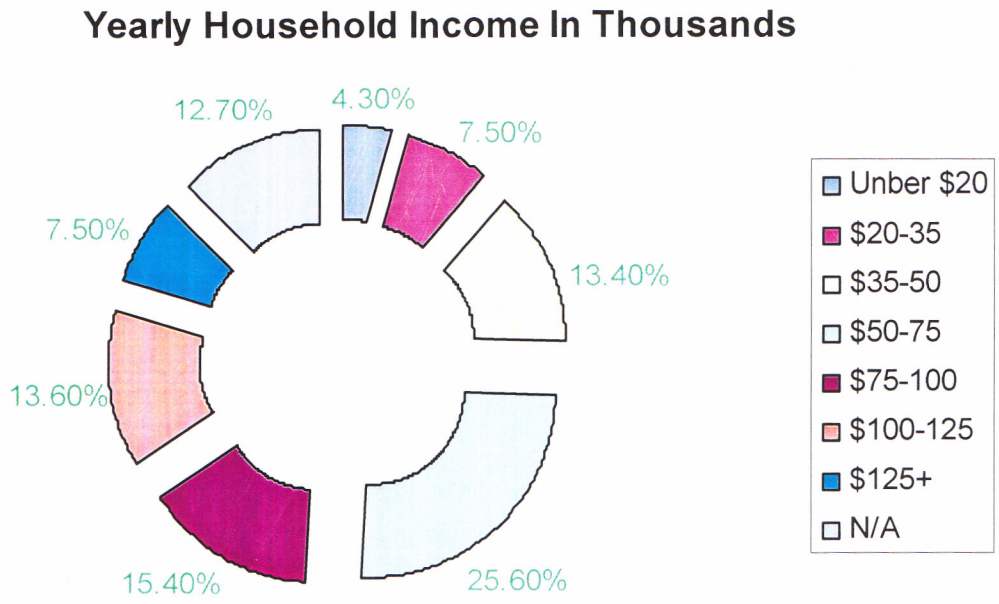
Graph 7.0

Of the tallied surveys, 38.1% of families have 2 people, and 20% have 4 people. The people surveyed were mainly couples or families with children.



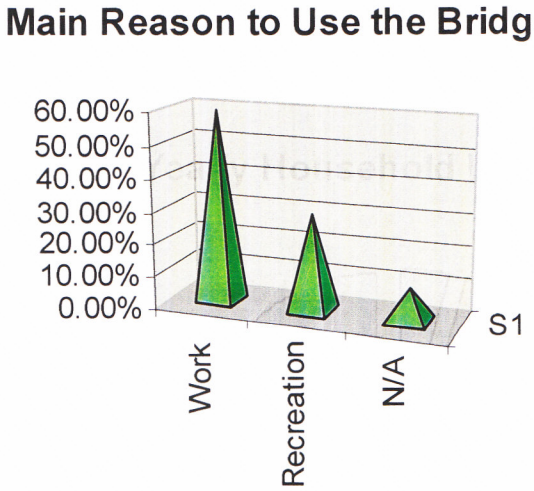
	1	2	3	4	5	6	7	8	N/A
Series1	9.80%	38.10	14.50	20.00	8.80%	3.90%	2.70%	1.80%	0.50%

Graph 8.0



Around 25.6% of the people surveyed have a household income in between $50,000-$74,999 while 15.4% of people have an income of $75,999-$99,999. Incomes of $100,000-$125,000 were 13.6% of people surveyed and $35,000-$49,000 with 13.4%.

Graph 9.0



We found that 59.4% of people mainly use the bridge daily to get to work while 29.3% of people use it for recreation purposes. Other people used it for things such as appointments, gas, or grocery shopping.

	Work	Recreation	N/A
Series1	59.80%	30.00%	10.20%

Graph 10.0

We found that 42.6% of the people who cross the bridge each week use it 10 or more times going either way. Only 14.3% use it once a week while 13.6% use it twice.

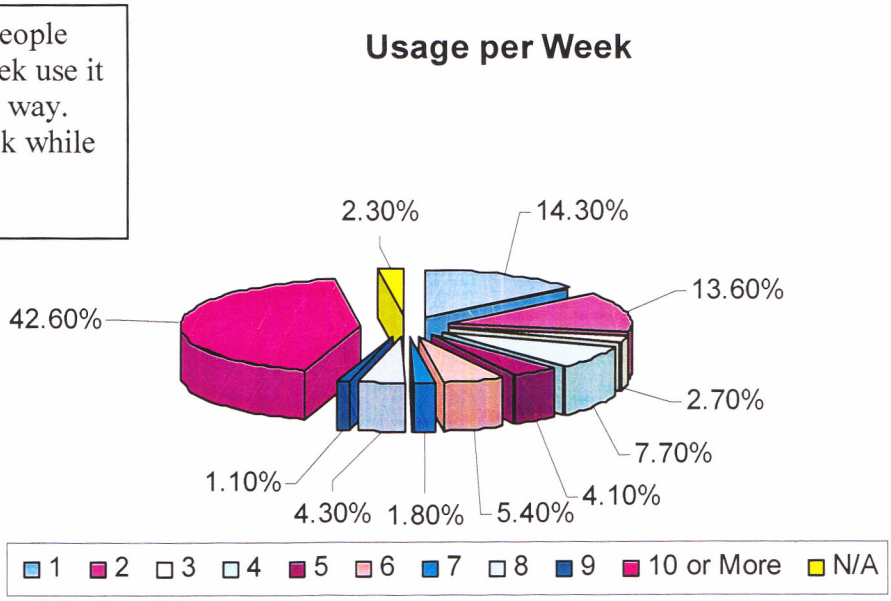
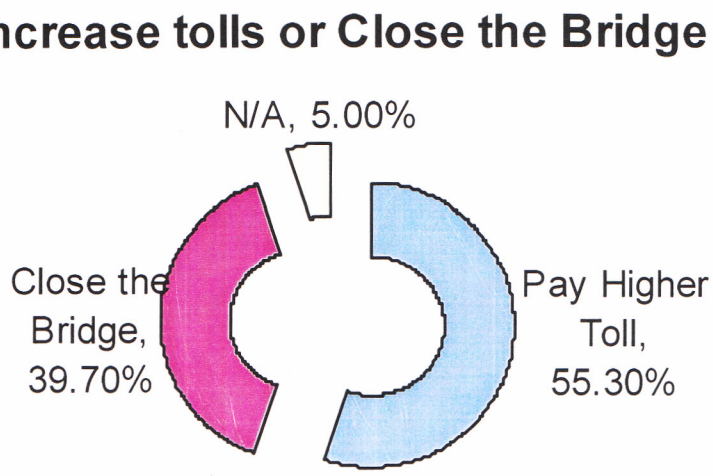


Table 2.0

Who Owns the Bridge	Percent answered
City of Bellevue	19.3%
Bellevue Bridge Commission	45.4%
Sarpy County	1.1%
The State	3.9%
Other	8.6%
I have no idea	20.4%
N/A	0.9%

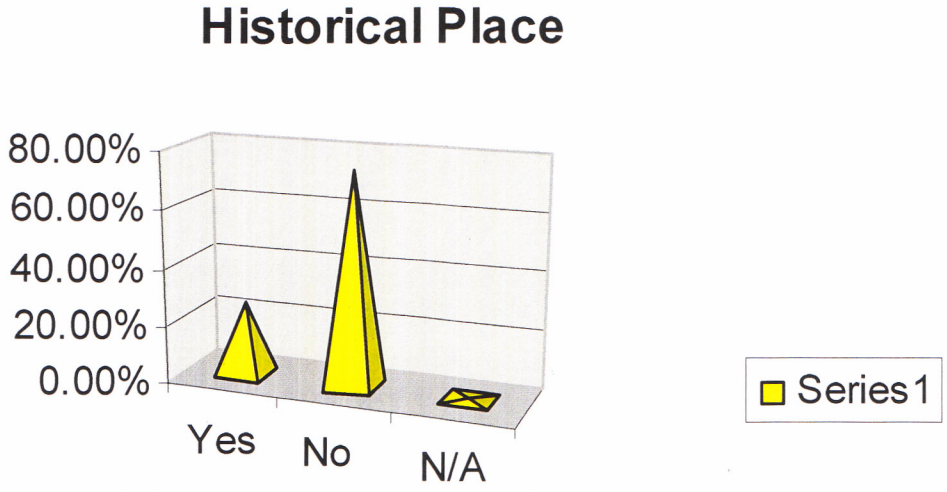
Roughly 45.4% of people surveyed believe that the Bellevue Bridge is owned by the Bellevue Bridge Commission. 20.4% of people had no idea and 19.3% of people believe the City of Bellevue owns it.

Graph 11.0



Of the 441 people surveyed, 55.1% of people would rather pay the increased toll and keep the bridge open rather than the 39.5% of people who would rather close the bridge and find another route.

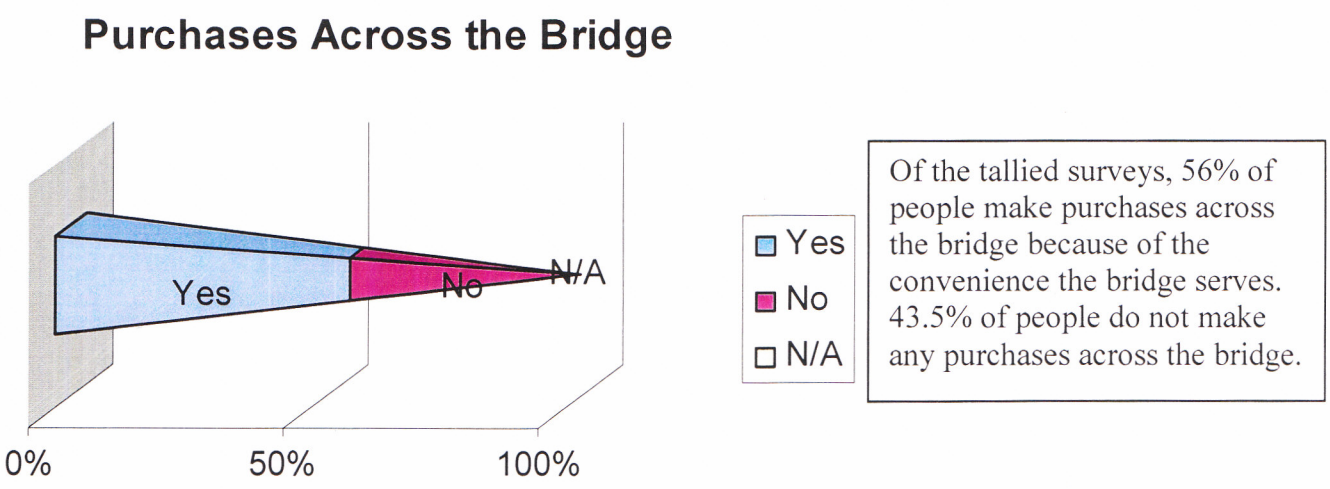
Graph 12.0



	Yes	No	N/A
Series1	25.20%	74.60%	0.20%

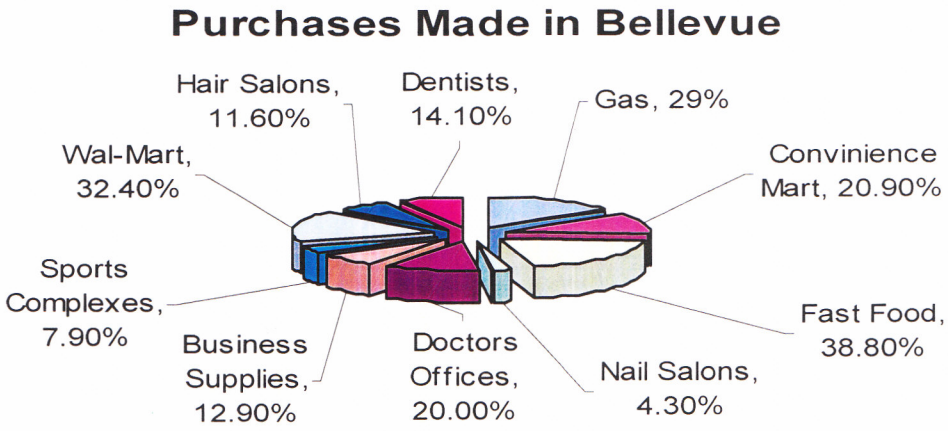
We found that 74.6% of the people we surveyed did not know that the Bellevue Bridge is trying to become a historical place while only 25.2% knew about the historical status of the Bridge.

Graph 13.0



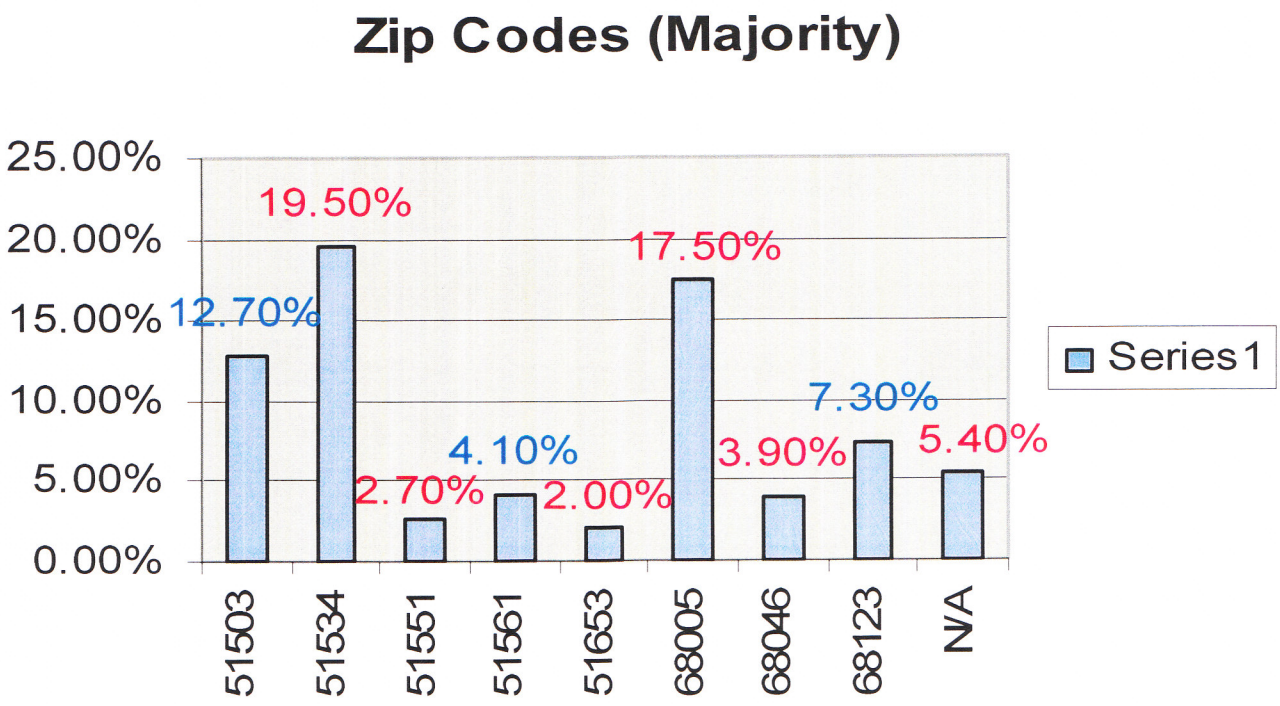
Of the tallied surveys, 56% of people make purchases across the bridge because of the convenience the bridge serves. 43.5% of people do not make any purchases across the bridge.

Graph 14.0



Of the 56% of people who make purchases across the bridge in either Iowa or Nebraska, 29% purchase gas, 20.9% use it for convienence mart purchases, 38.8% buy fast food or go out to a restaurant, 4.3% use it for a nail salon, and 12.9% buy business supplies. 7.9% of people use it to attend sports games or practices at local sports complexes, 32.4% buy groceries or other items at Wal-Mart, 11.6% cross the bridge to go to a hair salon, and 14.1% use it for dental purposes.

Graph 15.0



Out of the 441 people surveyed, we acculated 70 different area codes from Nebraska and Iowa. This chart represents the majority of people in each area who use the bridge. 35 of the 70 came from Iowa, along with the majority of those surveyed. An additional survey was filled out by a traveler who came from Carson City, Nevada. The total number of zip codes tallied was 71.

B. Presentation of Conclusions, rationale to support conclusions

From the data we have collected, we were able to distinguish the main types of people who use the bridge. In order to correctly present these findings to the Nebraska Historical Society, we had to pick out what information was relevant and most important in our research. This section will highlight the importance of the survey and the people who use it.

Typical Users

Based upon the information gathered, we have put together a general description of the people who mostly use the bridge. From the information expressed in Exhibit 2.0 on page (?) we concluded that the bridge users are mostly elderly, 60+ (18.6%). These people are mostly retired, (13.4%), and use the bridge for recreation.

The second largest age group was 40-44, (13.8%). The third largest groups were the 45-49 and 55-59 both with 13.4%. These people most likely use the bridge to go to and from work: some occupations most likely held by these people are professionals, laborers, technicians and managerial. The ethnicity is mostly white (94.6%). They are shown to have between 2-3 people in their households and have an average yearly income of $50-74.9 thousand.

In their spare time they like to do a variety of things. The males were found to be most interested in out door activities such as hunting, fishing, camping, golf and other sports. The elderly portion of these males may be more interested in gardening, working on cars and traveling. The females were found to be most interested in their families, camping, reading walking and other outdoor exercises. The elderly portion of the females we found to be interested in knitting, cooking, crocheting, scrap booking and church.

Overall uses for Bridge

This section will provide information bases on what the people surveyed use the bridge for and their opinions on what should happen with the bridge. The majority of the people responded that they use the bridge 10 or more times a week (42.6%). If the bridge were to close down, most of the people who use the bridge on a daily basis would be forced to find an alternate route which would lengthen their commute. Based on where

some people live, it could take an extra 45 minutes just to get to their first destination. Not only does this effect their time and schedules, but it also affects their wallets. With the increasing gas prices, people would be less willing to do such a long commute.

Since most people use the bridge for work purposes (59.4%), the bridge is an essential part of their life. On average over 3000 cars cross the bridge daily; sending all these cars to an alternate route would only further congest the already over crowded interstates, highways, and other bridges. In answer to question 18 of the survey, the alternate routes that would be most convenient would be to use Interstate 80 or the South Omaha Bridge.

The convenience the bridge provides for people on a daily basis strongly influences the out come of question 16 on the survey. We asked if people would rather close the bridge or pay a higher toll to keep it open, 55.1% of those surveyed said they would pay the higher toll. This outcome shows just how much people are willing to sacrifice for the sake of convenience and time because this route is such a vital part of their everyday lives.

The people surveyed also said that in addition to work and recreation, they use the bridge to make purchases in Bellevue. Those surveyed who answered yes that they make purchases across the bridge (56.0%) were mostly likely from different areas in and around Iowa. Some purchases made would most likely be fast food/restaurants (38.8%), Wal-Mart (32.4%), and gas (29.0%).

Exhibit 2.0
Survey Results Expressed in Percent Answered

1. What is your Gender?
   Male 48.3 Female 50.1

2. Marital Status:
   Married 74.1 Single 22.7

3. What is your Age? **(SELECT ONE ONLY)**
   __18-24 3.2 __ 25-29 6.1 __ 30-34 10.4
   __35-39 9.1 __ 40-44 13.8 __ 45-49 13.4
   __50-54 10.9 __ 55-59 13.4 __ 60+ 18.6

4. What is your Nationality/Ethnic Background?
   (SELECT ONE ONLY)
   -African American 0.9 -Asian/Pacific Islander .2
   -Caucasian 94.6 -Hispanic 1.4
   -American Indian/Alaskan Native .7
   -Other_____ 0.0

5. What is the occupation of the chief wage earner in your household? **(SELECET ONE ONLY)**
   -Laborer 10.2 -Armed Forces 6.3 -Self Employed 5.9
   -Managerial 8.6 -Business Owner 2.7 -Professional 27.7
   -Technical 10.2 -Sales 5.2 -Retired 13.4
   -Education 5.9 -Other__5.9____

6. How many members are in your immediate family? (Including Yourself)

9.8	38.1	14.5	20.0	8.8	3.9	2.7	1.8
1	2	3	4	5	6	7	8 or more

7. What is your Zip Code?
   _____ N/A

8. What is your yearly household income?
   __ Under $20,000 4.3 __ $20,000 to $34,999 7.5
   __ $35,000 to $49,999 13.4 __ $50,000 to$74,999 25.6
   __ $75,999 to $99,999 15.4 __ $100,000 to 125,000 13.6
   __ $125,001+ 7.5

9. What type of things do you like to do in your spare time?
   _____N/A_____
   _____
   _____

10. What is the main reason you used the **Bellevue Bridge today**?
    (SELECT ONLY ONE)

    __ Work 59.4 __ Recreation 29.3

11. How many times a week do you cross the Bridge going either way?
    (CIRCLE ONLY ONE)

14.3	2.7	4.1	1.8	1.1					
1 –	2 -	3 –	4 –	5 –	6 –	7 –	8 –	9 –	More then 10
	13.6	7.7	5.4	4.3					42.6

12. Who do you believe owns the Bellevue Bridge?
    (SELECT ONE ONLY)
    _ City of Bellevue 19.3 _ Sarpy County 1.1
    _ Bellevue Bridge Commission 45.4 _ The State 3.9
    _ I have no idea 20.4
    _ Other_____8.6____

13. If you had a choice between closing the bridge or increasing the tolls $1.00 per trip to keep the bridge open, which would you choose?

    A. Pay the higher toll 55.1
    B. Close the Bridge 39.5

14. What would you do if they closed the Bellevue Bridge down? **(PLEASE EXPLAIN)**
    _____N/A_____
    _____
    _____

15. Are you aware that the Bellevue Bridge is trying to be named a historical place/ landmark?

    Yes 25.2 **No** 74.6

16. Do you make purchases in Bellevue or across the river because of the convenience the bridge provides?

    Yes 56.0 **No** 43.5

    If yes, please check which types of products or services you purchase in Bellevue. **(Check ALL that Apply)**

    _ Gas 29.0 _ Sports Complexes 7.9
    _ Convenience Marts 20.9 _ Wal-Mart 32.4
    _ Fast food/Restaurants 38.8 _ Hair Salons 11.6
    _ Nail Salons 4.3 _ Dentists 14.1
    _Doctors Offices 20.0
    _ Business Supplies 12.9

17. How badly would it affect you if the Bellevue Bridge closed down? (Please Explain)
    _____N/A_____
    _____
    _____

18. What route would you choose if you could not use the Bellevue Bridge?
    _____N/A_____
    _____
    _____

Coating Condition Assessment of the Bellevue Toll Bridge over the Missouri River Bellevue Bridge Commission Sarpy County, Nebraska and Mills County, Iowa

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Project Engineer

Revision 2 – October 13, 2016

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JN360301
Bellevue Toll Bridge Report.doc

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COATING CONDITION ASSESSMENT

APPENDICES

INTRODUCTION

As authorized by an agreement between InfraStructure, LLC and KTA-Tator, Inc. (KTA), KTA has completed a coating condition assessment of the Bellevue Toll Bridge over the Missouri River (Bellevue Bridge) located near the City of Bellevue, Nebraska.

The purpose of this assessment was to determine the condition of the existing coatings on the structure in order to develop a maintenance painting strategy, recommendations, and an opinion of probable construction costs for future coating rehabilitation. The concrete piers and bridge deck were also visually examined for defects and tested for chlorides. This report contains the results of the field inspection and testing, laboratory analysis of field samples, a discussion of the results, recommendations, and opinions of probable construction costs for recommended painting. Photographs depicting typical conditions found during the field investigation are included as part of this report.

Photograph 1 – View of the Bellevue Toll Bridge

SUMMARY

The coatings on the Bellevue Bridge Beam Spans, Deck Truss Spans, and Through-Truss Spans (Spans 1 to 11) are in poor condition overall. In many areas the coatings have worn thin and, in some places, no protective coatings remain. The existing coatings are 64 years old, and the paint's binder has degraded to the point where, in some instances, the silver finish coat could be removed by rubbing with a cloth. Additionally, in a few cases, steel repairs that were required as a result of corrosion were observed. In other areas pack rust between built-up members has caused distension of the members or plates. In many other areas there is steel section loss beginning. The existing coatings have exceeded their useful service life. KTA recommends total coating removal by abrasive blast cleaning and repainting. The coating rehabilitation work should be initiated within the next one or two years.

The coatings on the Bellevue Bridge steel had a relatively narrow range of dry film thickness. The overall range was from 1.4 mils to 13.5 mils. The average coating thickness was 5.6 mils. Coating adhesion ratings varied only slightly between 0A or 1A, both of these ratings are considered poor adhesion. The substrate had a layer of mill scale beneath the prime coat and, in many instances, the mill scale was fractured and some underfilm corrosion was visible.

The concrete bridge piers and pier caps were in fair to good condition with some cracks and areas where the concrete was chipped and spalled. The most concrete deterioration was found on Abutment No. 1 which had several cracks and spalled areas. On the Nebraska side of the bridge, the abutment and piers were painted. The coatings applied to the piers were in good condition overall. Coating adhesion on the piers was rated fair (2A or 3A).

The surface of the bridge deck was visually examined and found to be in good condition. There were, however, several shallow hairline cracks found in the deck and curbs.

The laboratory analysis has found that the existing coating systems on both the steel surfaces and concrete surfaces contains concentrations of the toxic metals lead and chromium. Lead concentrations ranged from 151 parts per million (PPM) to 335,000 PPM. Chromium concentrations ranged from below the test method detection limit up to 615 PPM. The presence of these toxic metals in the existing paint films will necessitate the implementation of worker protection and environmental protection controls, in order to comply with federal, state and local regulations. Pulverized concrete samples obtained by drilling into the deck and some of the pier caps revealed that chlorides (presumably from de-icing salts) are present within the concrete and had penetrated the concrete to some degree. The bridge deck would benefit from the application of a penetrating sealer material to avoid future deicing salt penetration and corrosion of the reinforcing steel, thus extending the life of the deck. This work however, would not be required for several years.

Details of the proposed coating repair recommendations along with an opinion of probable construction costs for performing the coating rehabilitation work is presented later in this report.

Photograph 2 – Span 6 Bottom Chord – Note Pack Rust Causing Curvature (distension) of the Bottom Cover Plate

Photograph 3 – Span 5 – Finish Coat could be Removed by Rubbing with a Soft Cloth

BACKGROUND

The Bellevue Toll Bridge is owned and maintained by the Bellevue Bridge Commission. The bridge carries two lanes of traffic along Nebraska Highway 370 (Iowa County Road H10) across the Missouri River. The Bridge connects the City of Bellevue in Sarpy County, Nebraska to Interstate 29 in Mills County, Iowa. The overall bridge length is approximately 1,965 feet and has a roadway width of 22 feet. The bridge has three simple beam spans supported by steel bents, Warren-type deck truss spans, and a two-span Warren continuous through truss.

The bridge's original construction was completed in 1952 and underwent a rehabilitation project in 2004. During the rehabilitation, the concrete deck was replaced, shear studs were added to the stringers, galvanized deck drains were added, the expansion joints were replaced, bearings at Abutment No. 1 were replaced, Flex-Beam guardrail was replaced with Thrie Beam guardrail, and various concrete and steel repairs were performed. The underside of the deck was formed with galvanized stay-in-place forms. The concrete repairs included coating the piers. At some point, additional steel strengthening was performed at some guardrail posts, and bottom flange cover plates were added to some of the floorbeams.

Using drawings provided by InfraStructure, LLC, KTA determined the surface area of the bridge's fabricated structural steel. The total surface area of the entire bridge fabricated structural steel is approximately 216,200 square feet.

FIELD VISIT

The field coating condition assessment was completed by KTA Project Engineer, Michael P. Reina, P.E. between June 6th and June 9th, 2016. The bridge was accessed from the ground level at the abutments, and piers on land, and by utilizing an under-bridge inspection unit (snooper truck) for the remainder of the bridge. The tests and inspections performed, including the observations made during the investigation, are discussed herein.

The following methods, standards, and practices were used to evaluate the existing coating and underlying substrate conditions.

- **Visual** – A visual assessment of the coated surfaces was conducted to determine the type, extent, and location of coating breakdown and corrosion on the structure. Visual Standard SSPC VIS 2, "Standard Method for Evaluating Rusting on Painted Steel Surfaces," was used. An excerpt from this visual standard showing 1% to 10% concentrations of various types of rusting is shown in Figure 1. When the percentage of coating breakdown or corrosion is presented in the report, that designation represents the percentage of the total surface area of the individual bridge members or grouping of bridge members being discussed. Concrete piers and the bridge deck surface were examined for cracks, spalls, and exposed reinforcing steel. Coatings on the concrete piers were examined for cracking, peeling, blisters, and other coating defects.

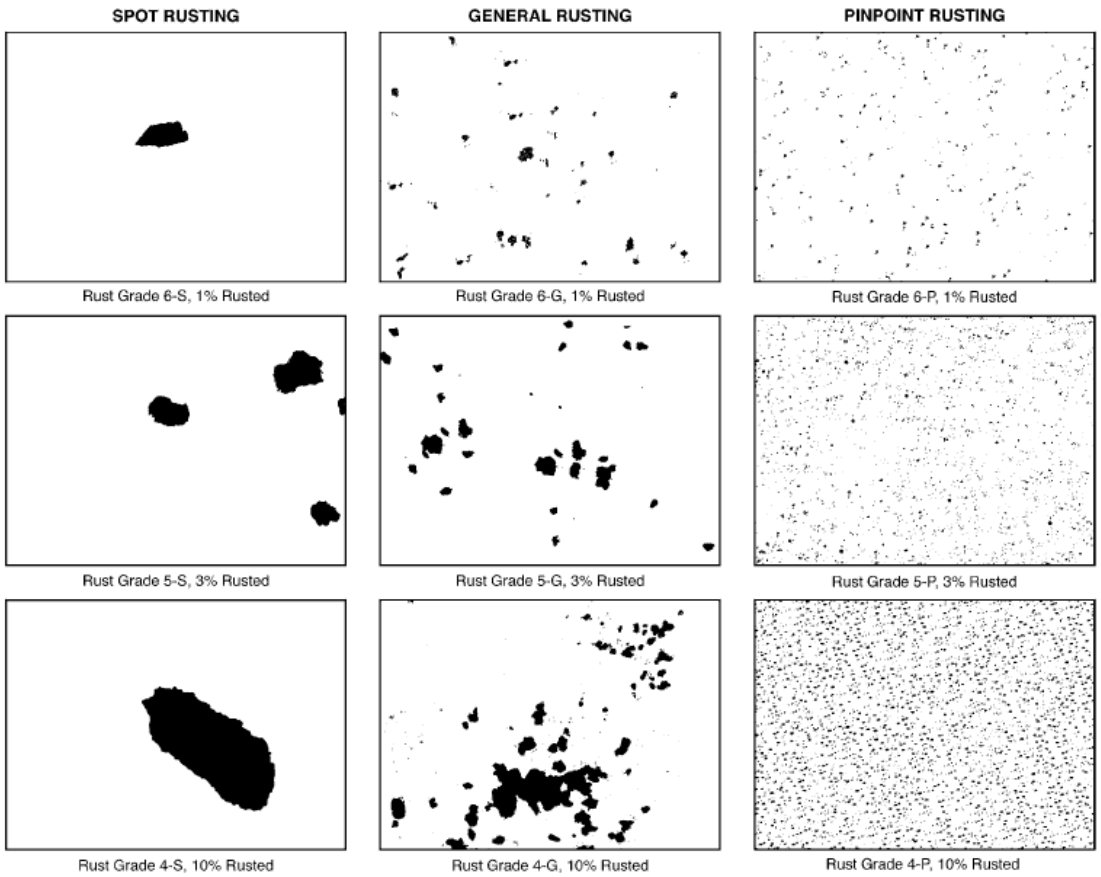


Figure 1 – Standard for Visual Percentage of Corrosion or Coating Defects

- **Coating Thickness** – Dry film thickness was determined using a Positector 6000. The Positector 6000 is a portable, battery operated, digital coating thickness gage that non-destructively measures non-magnetic coating thickness over ferrous substrates using a magnetic principle. Gage calibration was verified prior to and after use with the National Institute of Standards and Technology (NIST) thickness standards.

- **Number of Coats** – The number of coats present and the thickness of each were determined using a Tooke Gage Mark IV with a 2X cutting tip. This hand-held gage with a microscope (50X) destructively measures the thickness of each coat in multi-coat systems (up to 50 mils). Observation of a coating cross-section created with a cutting tip of known angle shows coating thickness in addition to intercoat contamination, voids, underlying rust, mill scale, and pinholes. Additionally, the number of coating layers and the thickness of each layer was determined from paint samples examined by a digital microscope in KTA's laboratory.

- **Adhesion** – Adhesion testing was conducted in accordance with ASTM D 3359, "Measuring Adhesion by Tape Test," Method A. This method involves cutting an "X" through the coating down to the substrate using a razor knife, followed by the application of pressure sensitive tape. The tape is then rapidly removed from the X-cut and the adhesion is then rated according to the amount of coating removed using an ASTM rating scale. Typical ratings of

4A to 5A are considered by KTA to represent good adhesion, 2A to 3A represent fair adhesion, while 0A to 1A represent poor adhesion.

- **Paint Samples** – Samples were removed for further laboratory examination to determine if toxic metal concentrations are present in the existing coating films and to generically identify the coating type. A list of samples that were obtained during the field visit is included in the "Field Samples" section of this report.

- **Concrete Samples** – Samples of concrete dust obtained by drilling 3/8" diameter holes in the bridge deck and pier caps were collected to determine the concentration of chlorides present in the concrete. The holes were drilled and the dust was collected from two depths. The first sample was at the surface of the concrete, and the second sample was collected from a depth of approximately 2" to 2¼" (approximate depth of reinforcing). The samples were obtained at the different depths to discover the extent of chloride penetration into the concrete.

- **Photographs** – Photographs of typical coating conditions were taken and are included as part of the report.

Visual Inspection – Deck Truss Spans

Overall, the condition of the coatings on the Deck Truss Spans (Spans 1 to 4, 7 and 8) was poor. The amount of corrosion or coating deterioration ranged from 10% to over 50%. The higher amounts of coating deterioration were found in areas that are more environmentally exposed. The coatings on the interior stringers, upper lateral bracing, and sway frame members were in somewhat better condition than the bottom chords and bottom lateral bracing members. The outside facing portions of the truss members and exterior stringers were in worse condition than remaining surfaces of the same members. The portion of the floorbeams that extend past the exterior stringers were also in poor condition with little paint remaining. Most of these floorbeam ends had a layer of surface rust, but others had areas where perforations (rust-through holes) where found in the webs at the interface between the web and top flange. Channel members had been installed to strengthen the floorbeam ends in a few locations. A rust-through hole was found in the bottom chord in Span 1. Pinpoint corrosion was found on most of the stringer bottom flanges and on the upper lateral bracing. Pinpoint corrosion and areas of rusted bare steel were also found on the floorbeam webs and flanges. Floorbeam and overhanging bracket surfaces adjacent to the expansion joints had areas of surface rust. Some of the overhanging brackets at expansion joints had section loss. The beam sections that support the guardrails had less areas of rusting than many other bridge members, but these posts had many areas where the primer was exposed. The angle shaped member at the top of the guardrail posts also had significant amounts of rust. Cracks and checks were found in the coatings at a few locations. There were some areas where concrete from the previous deck pouring operations had accumulated on the bottom flanges of the stringers and floorbeams. Under normal circumstances, this would be a problem as the alkalinity in the concrete can attack and damage coatings, but in this case, few coatings remain on these surfaces. The galvanized surfaces of the stay-in-place forms and deck drains were in good condition with little to no corrosion.

Photograph 4 – Typical Coating Condition of Inside Face of the Top Chord

Photograph 5 – Rust Areas on Top of the Top Chord, Floorbeam, and Stringer

Photograph 6 – Pinpoint Rusting on the Interior Surface of the Top Chord

Photograph 7 – Typical Condition of More Environmentally Exposed Truss Members

Photograph 8 – Typical Condition of the Bottom Chords

Photograph 9 – Edge Corrosion and Pinpoint Rust on Sway Frame Struts

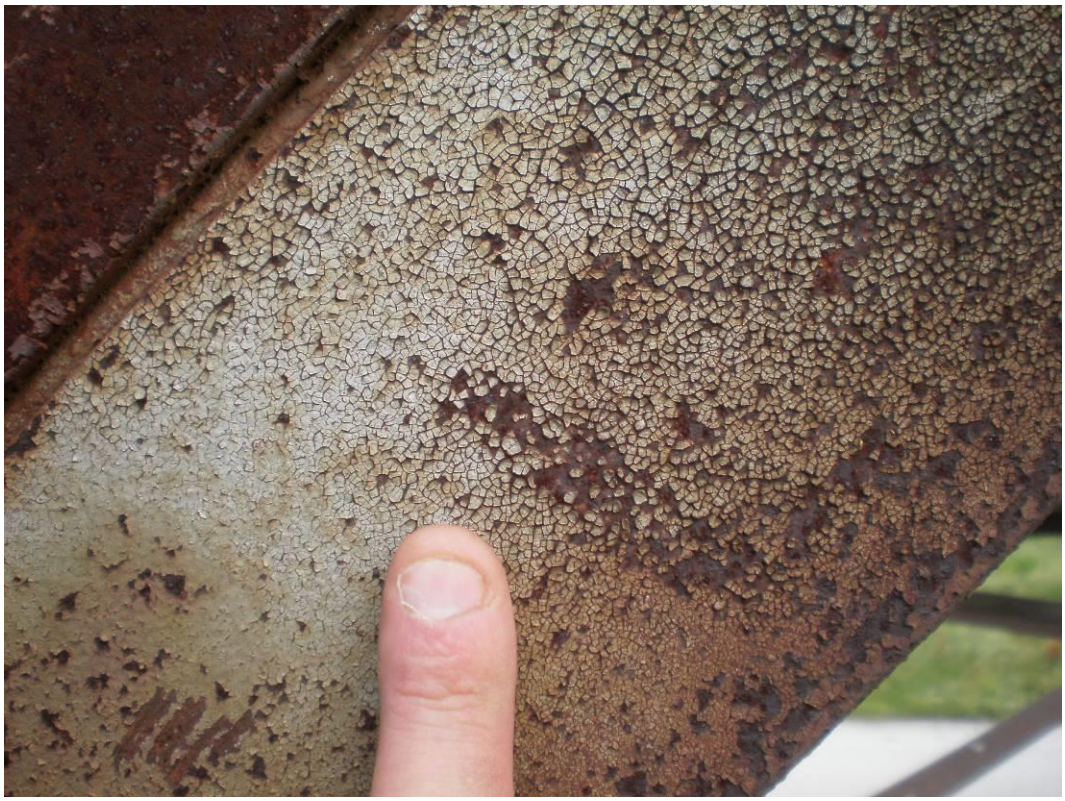
Photograph 10 – Corrosion Perforation in Bottom Chord in Span 1 – Note No Paint Remaining

Photograph 11 – Typical Condition of Outside Face of the Top Chord

Photograph 12 – Coating Failure and Rust on the Outside Face of the Exterior Stringers

Photograph 13 – Rust on Floorbeams and Floorbeam Ends

Photograph 14 – Rusted Areas on a Floorbeam



Photograph 15 – Cracks and Checks in the Coating on a Truss Diagonal

Photograph 16 – Floorbeam End with Perforation and Strengthening Channel

Photograph 17 – Section Loss at Floorbeam Ends

Photograph 18 – Overhanging Brackets at an Expansion Joint
Note Bracket Rusted Away at the Top of the Photograph

Photograph 19 – Typical Conditions at Bottom Chord Gusseted Connections

Photograph 20 – Areas where the Paint is Worn Thin or No Paint Remains

Visual Inspection – Beam Spans

The coatings on the Beam Spans (Spans 9 to 11) and steel bents were in poor condition. The overall rate of corrosion and coating defects was estimated to range from 3% to 16% of the members' surface. The beam bottom flanges were generally in worse condition with areas of corrosion on the underside of the bottom flange, along the beam edges and adjacent areas of the upper surface of the bottom flanges, and along the underside of the top flanges. These members also had pinpoint corrosion and small areas of spot corrosion mainly concentrated on the webs. All surfaces of the diaphragms also displayed pinpoint and spot corrosion. The coatings on the steel bents were similarly in poor condition and little coating remained on the bearings. In Span 11, on the beam top flange, there were a few locations where a patch plate or strengthening steel plate was added. The plate and its connection bolts were not painted and were rusted. The guardrail posts and top angle were also in poor condition with areas of rust and exposed primer. This was the only part of the bridge where graffiti was found.

Photograph 21 – Typical Condition of the Interior Beams and Diaphragms

Photograph 22 – Edge Rusting and Small Spot Corrosion on the Exterior Beam Bottom Flange

Photograph 23 – Typical Condition of the Bearings

Photograph 24 – Corrosion at Abutment No. 2 Bearings – Note Section Loss on the Beam Bearing Stiffener

Photograph 25 – Corrosion on the Guardrail Posts

Photograph 26 – Coating Wear on Beam Web and Bottom Flange

Photograph 27 – Typical Coating Condition of the Steel Bents

Photograph 28 – Areas where No Coating Remains on a Bent Column

Photograph 29 – Repair Plate on Beam Top Flange

Photograph 30 – Graffiti on Beam at Abutment No. 2

Photograph 31 – Corrosion and Section Loss on Guardrail Post Bracket at Abutment No. 2

Photograph 32 – Typical Coating Condition on the Steel Bent Struts

Photograph 33 – Typical Pack Rust at Bent Column Anchor Bolts

Visual Inspection – Continuous Through-Truss Spans

The coating condition of the main spans of the bridge (Spans 5 and 6) was poor. Truss members both above and below the road deck level had many areas of coating deterioration and rusting. The areas were more prevalent at locations where roadway moisture splashing from vehicles impacts the members. The amount of coating failure and corrosion was estimated to range from 16% to approximately 50% of the members' surface area in these "splash zones". Coatings on truss members outside of the splash zone were in somewhat better condition but were still rated poor overall. Many truss members both above and below the deck level appeared to be red in color. This resulted from the original silver finish coat being worn away exposing the primer. Floor system members directly beneath the deck were also in poor condition with corrosion areas ranging from 3% to 33%. Similar to the Deck Truss Spans, the gusset plates, interior portions of box sections, and the floorbeam extensions at the guardrail posts were in poor condition. Some areas where corrosion was occurring in the faying surfaces between built-up members (i.e. pack rust) were observed on the truss bottom chords. This pack rust has caused distension (permanent deformation) on both the top cover plate and the bottom cover plate of the chord section. A few floorbeam bottom flanges had been strengthened by adding a bottom cover plate. The new cover plates appeared to have been shop painted, but the floorbeams did not appear to have been repainted. Adjacent to these floorbeams, a short length of some of the stringers were blast cleaned and repainted. Coatings in these localized areas were in good

condition. In a few locations, at the connection between the floorbeam and the truss vertical, a strengthening plate had been installed.

Photograph 34 – Typical Coating Condition at Truss Portals

Photograph 35 – Slightly Better Coating Condition above the Splash Zone

Photograph 36 – Typical Coating Failure and Rust on the Interior of Box Members

Photograph 37 – Coating Wear to Bare Steel on Truss Diagonals and Verticals

Photograph 38 – Areas of Corrosion and Exposed Primer on Truss Members

Photograph 39 – Areas on Truss Bottom Chord with Little Paint Remaining

Photograph 40 – Areas of Exposed Primer on Outside Face of Truss Members

Photograph 41 – Exposed Primer on Truss Members

Photograph 42 – Typical Areas of Spot and Pinpoint Corrosion on Stringers and Floorbeams

Photograph 43 – Corrosion Areas on Stringer Bottom Flange and Bottom Chord

Photograph 44 – Typical Corrosion at Floorbeam Extension to Truss Vertical Connection

Photograph 45 – Corrosion on Floorbeam Extension and Bottom Chord

Photograph 46 – Corrosion at Lower Lateral Bracing Connection

Photograph 47 – Corrosion on Lower Lateral Bracing

Photograph 48 – Corrosion and Section Loss on Intermediate Diaphragm

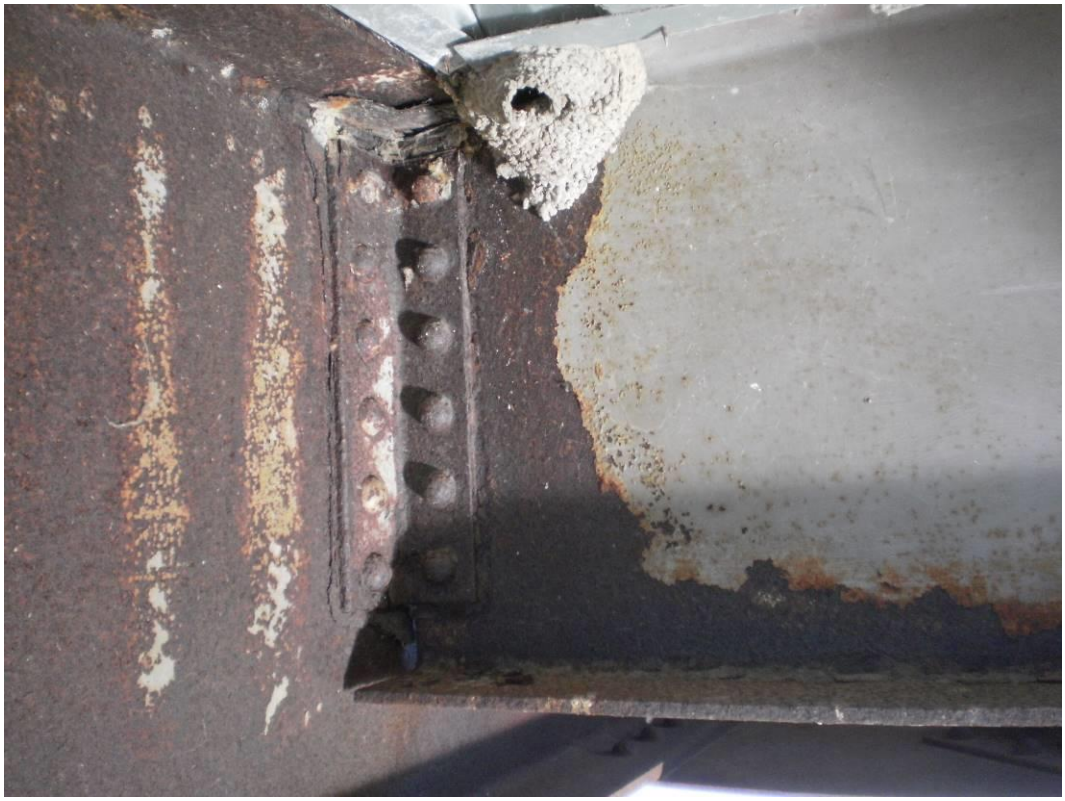
Photograph 49 – Distended Bottom Chord Cover Plate

Photograph 50 – Interior of Bottom Chord in Distended Area – Note Pack Rust and Laminated Corrosion

Photograph 51 – Delamination and Corrosion at Truss Bottom Chord

Photograph 52 – Section Loss along Web of Truss Bottom Chord

Photograph 53 – Rust along Stringer Bottom Flange



Photograph 54 – Coating Failure to Rust at Stringer to Floorbeam Connection

Photograph 55 – Touch-up Area on Stringer End – Note Adjacent Stringer Not Touched-up

Photograph 56 – Newer Floorbeam Bottom Flange Cover Plate

Photograph 57 – Corrosion on Upper Flange Surface at Floorbeam Cover Plate

Photograph 58 – Strengthening Plate added at Floorbeam to Truss Connection

Photograph 59 – Rust on Bottom Chord Gusset Plate

Visual Inspection – Concrete Piers

The concrete bridge piers and pier caps were in fair to good condition with some cracks and areas where the concrete was chipped/spalled from the surface. Previous cracks appeared to have been repaired with caulk. The upward facing portions of the pier caps were generally in worse condition than the rest of pier with areas where the concrete was chipped. The chipped areas were found most often at areas or cracks that were previously repaired. The most concrete deterioration was found on the pedestal of Abutment No. 1 which had several cracks and spalled areas. On the Nebraska side of the bridge, the abutment and piers (Abutment No. 1 and Piers 1 to 4) were painted. The coatings were in good condition overall with only few areas of peeling and lifting paint. On the Iowa side of the bridge, the pier cap cracks were more frequent. Some cracks were exuding efflorescence. On the underside of a few of the pier caps on the Iowa side of the bridge, the concrete had degraded to the point that aggregate was visible. The steel bent foundations were in good overall condition with cracks previously repaired with caulk.

Photograph 60 – Painted Pier with Repaired Cracks – Note Chipping at Base

Photograph 61 – Area of Chipping at Previous Repair

Photograph 62 – Typical Good Condition of Previous Crack Repair

Photograph 63 – Minor Areas of Chipping/Spalling

Photograph 64 – Chipped/Spalled Areas with Rust Stain
(It was not determined if the stain was from reinforcing or form ties)

Photograph 65 – Area of Lifting Coating on a Pier Cap

Photograph 66 – Chipped/Spalled Areas on a Pier Cap

Photograph 67 – Horizontal Cracks in the Pier Cap at Pier 4

Photograph 68 – Closer View of a Crack from the Previous Photograph

Photograph 69 – Good Condition of Pier 5

Photograph 70 – Cracks at Pier 6

Photograph 71 – Cracks exuding Efflorescence

Photograph 72 – Exposed Aggregate at the Underside of the Pier Cap at Pier 7

Photograph 73 – Typical Condition at Steel Bent Foundations

Photograph 74 – Good Condition of Concrete at Abutment No. 2

Photograph 75 – Good Condition of Abutment No. 1 Backwall

Photograph 76 – Crack and Chipped/Spalled Area on Abutment No. 1 Pedestal

Visual Inspection – Bridge Deck

The bridge deck concrete was in good condition visually with some hairline cracks. The majority of the cracks were transverse to the direction of traffic. Some of the cracks extended the full width of the deck but most were less than the width of one traffic lane. Additional cracks in the deck were emanating from the inlet of the deck drains. Some aggregate was showing in the bridge deck concrete along the curb lines. A few locations had small areas where the surface of the deck was chipped. The concrete curbs had vertical hairline cracks at intervals of approximately every 3 feet to 10 feet depending on the span. The cracks in the curbs were frequently located adjacent to guardrail posts.

Photograph 77 – Typical Good Condition of the Bridge Deck

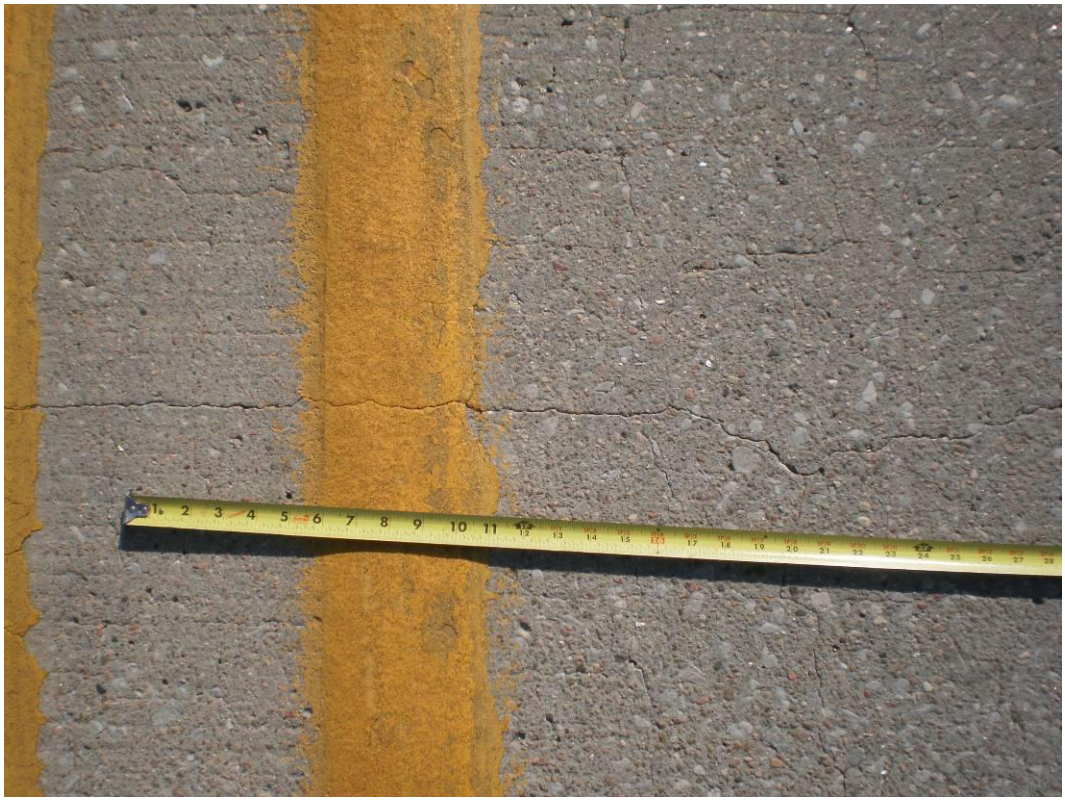
Photograph 78 – Exposed Aggregate along the Curb

Photograph 79 – Typical Transverse Crack in the Bridge Deck

Photograph 80 – Vertical Cracks in the Curb

Photograph 81 – Chipped Area and Exposed Aggregate at a Deck Drain

Photograph 82 – Crack in Deck at a Drain Inlet



Photograph 83 – Transverse Crack at the Centerline of the Bridge

Photograph 84 – Chipped Area Near Pier 4

Photograph 85 – Cracked Curb at Strip Seal Joint Extrusion at Pier 5

Photograph 86 – Chipped Area of Curb in Span 5 Near Midspan, Upstream Side of Bridge

Photograph 87 – Mechanical Damage to Deck – Span 6, Downstream Lane, 4 Panels from Iowa Portal

Photograph 88 – Deck Drains Plugged with Grout from Midspan of Span 10 to Abutment No. 2

Dry Film Thickness

Total coating system dry film thickness measurements were obtained for the existing coating system. The following table summarizes the range of the thicknesses (DFT) obtained with a Positector 6000, magnetic-type dry film thickness gage:

Table 1 – Dry Film Thickness Measurements

Bridge Segment	Span or Bent	Member	DFT Range (mils)	DFT Average (mils)
Nebraska Deck Truss Spans	1	Interior Stringer	5.2 to 13.0	8.5
	1	Upstream Top Chord	4.9 to 10.2	7.3
	1	Upper Lateral Bracing	5.3 to 13.5	9.0
	1	Lower Lateral Bracing	2.3 to 5.2	3.8
	1	Floorbeam	3.2 to 5.2	4.4
	2	Floorbeam	4.8 to 5.9	5.3
	2	Interior Stringer	4.1 to 6.2	5.2
	2	Downstream Top Chord	5.4 to 7.9	6.6
	2	Downstream Exterior Stringer	3.3 to 7.3	5.6
	2	Downstream Truss Vertical	1.9 to 4.1	2.8
	2	Downstream Truss Diagonal	4.8 to 6.5	5.8
	3	Interior Stringer	4.1 to 6.3	4.8
	3	Upper Lateral Bracing	8.0 to 10.1	9.0
	4	Downstream Truss Top Chord	3.6 to 8.9	6.4
	4	Downstream Truss Vertical	3.7 to 5.8	4.9
	4	Downstream Truss Gusset Plate	4.3 to 7.7	5.6
	4	Floorbeam	5.9 to 7.2	6.6
	4	Downstream Exterior Stringer	5.1 to 6.2	5.8
	4	Lower Lateral Bracing	3.4 to 5.2	4.1
	4	Sway Frame Diagonal	3.9 to 5.1	4.2
Through-Truss Spans	5	Upstream Bottom Chord	6.1 to 8.9	7.4
	5	Upstream Bottom Chord (Inside)	10.2 to 13.2	11.5
	5	Interior Stringer	3.7 to 6.5	5.2
	5	Interior Stringer	3.9 to 8.6	5.3
	5	Lower Lateral Bracing	4.5 to 8.6	5.9
	5	Downstream Bottom Chord	3.2 to 11.8	7.6
	5	Downstream Exterior Stringer	2.8 to 5.6	4.1
	5	Galvanized Scupper Pipe	3.6 to 4.0	3.8
	5	Upstream Bottom Chord	2.5 to 5.0	3.9
	6	Downstream Bottom Chord	6.0 to 7.2	6.6
	6	Floorbeam	3.8 to 6.8	5.2
	6	Interior Stringer	4.9 to 6.5	5.6
	6	Interior Stringer (Touch-Up)	1.4 to 2.0	1.8
	6	Interior Stringer (Original)	4.2 to 9.6	5.5
	6	Upstream Bottom Chord	2.7 to 8.3	6.0
Iowa Deck Truss Spans	7	Downstream Truss Vertical	2.9 to 5.2	3.9
	7	Upstream Exterior Stringer	4.5 to 6.0	5.2
	7	Upstream Top Chord	5.1 to 7.5	6.1
	7	Floorbeam	4.1 to 6.3	5.5
	8	Top Lateral Bracing	3.7 to 7.0	5.2
	8	Interior Stringer	5.1 to 7.4	6.1
	8	Downstream Truss Vertical	3.4 to 6.2	4.6

Bridge Segment	Span or Bent	Member	DFT Range (mils)	DFT Average (mils)
Iowa Beam Spans	Span 9	Upstream Girder	4.7 to 8.5	6.2
	Bent 9	Floorbeam	4.3 to 8.2	6.1
	Bent 9	Upstream Column	4.5 to 5.3	5.0
	Span 10	Interior Girder	4.0 to 4.7	4.4
	Span 10	Diaphragm	4.3 to 6.6	5.5
	Span 11	Downstream Girder	3.4 to 6.5	5.3
	Bent 10	Floorbeam	4.1 to 6.7	5.2
	Bent 10	Bottom Strut	4.1 to 6.5	4.9
	Bent 10	Downstream Column	3.7 to 4.7	4.3

The overall coating thickness ranged from 1.4 mils to 13.5 mils. The average coating thickness was 5.6 mils. Notice that coating thickness is higher in areas that are more sheltered from the environment (weathering) (e.g. sunlight, wind, and rain). These areas include the interior stringers, upper lateral bracing, and interior surfaces of built-up box members. A new coating system typically has a specified thickness range from 8 to 14 mils.

The number of coats present on the structure was measured in the field using a Tooke Gage. Measurements indicated that two coats of paint were present. The coating system consisted of a red primer and a silver finish coat. On the stringer ends that were touch-up painted, there was one dark green coat of paint. Galvanized stay-in-place forms and drainage scuppers were galvanized.

Adhesion

Coating adhesion varied, but was rated consistently poor for the original bridge coatings (0A or 1A). Of the 51 tests conducted, 42 tests were rated 0A, and 7 were rated 1A. Good adhesion (5A) was found on galvanized surfaces, where the coatings were repaired at the stringer ends, and where cover plates were added to the floorbeam bottom flanges. In areas with poor adhesion, the test process consistently forced adhesive failure between the primer and the steel substrate.

Substrate Examination

The substrate beneath the coatings had a layer of mill scale beneath the prime coat. In some instances, the mill scale was fractured and underfilm corrosion was visible. The substrate in areas where steel repairs were performed had a roughen surface texture, indicative of steel that had been abrasive blast cleaning.

Photograph 89 – Typical Substrate Condition

FIELD SAMPLES

The following samples of existing coatings were obtained during the KTA field visit. Samples identification numbers preceded with the letter "P" are from concrete surfaces.

Table 2 – Field Coating Samples

Sample ID	Sample Description
1	Span 1 - Upstream Top Chord
2	Span 2 - Intermediate Floorbeam
3	Span 4 - Downstream Truss Gusset Plate
4	Span 5 - Upstream Bottom Chord
5	Span 6 - Downstream Bottom Chord
6	Span 7 - Downstream Truss Vertical
7	Span 9 - Upstream Girder
8	Span 10 - Interior Girder
P1	Pier 2 - Pier Cap
P2	Pier 2 - Bent Column
P3	NE Abutment - Pedestal

Samples of concrete dust pulverized and obtained by a rotary drill during the field visit are identified in the following table. Samples identification numbers preceded with the letter "S" are from the surface of the pier cap or bridge deck. Samples preceded with "D" were obtained at a depth of 2" to 2¼" which was assumed to be the depth of the uppermost layer or mat of reinforcing bars.

Table 3 – Field Concrete Samples

Sample ID	Sample Description
S1	Pier 1 – Pier Cap
D1	Pier 1 – Pier Cap
D2	Pier 1 – Pier Cap – at Popout
S2	Pier 3 – Pier Cap
D3	Pier 3 – Pier Cap
S3	Pier 5 – Pier Cap
D4	Pier 5 – Pier Cap
S4	Pier 7 – Pier Cap – Centerline Bridge
D5	Pier 7 – Pier Cap – Centerline Bridge
S5	Deck – Span 1 – Midspan Curb Line
D6	Deck – Span 1 – Midspan Curb Line
S6	Deck – Span 1 – Midspan Middle of Lane
D7	Deck – Span 1 – Midspan Middle of Lane
S7	Deck – Span 2 – Pier 1 – High Side Strip Seal at Curb
D8	Deck – Span 2 – Pier 1 – High Side Strip Seal at Curb
S8	Deck – Span 2 – Pier 2 – Low Side Strip Seal at Curb
D9	Deck – Span 2 – Pier 2 – Low Side Strip Seal at Curb
S9	Deck – Span 3 – Midspan at Centerline Bridge
D10	Deck – Span 3 – Midspan at Centerline Bridge
S10	Deck – Span 3 – Midspan at Scupper
D11	Deck - Span 3 - Midspan at Scupper
S11	Deck – Span 4 – 15’ From Pier Curb at Crack
D12	Deck - Span 4 - 15' From Pier 3 Curb at Crack
S12	Deck - Span 3 - 3' from Pier 4 Curb at Patch
D13	Deck - Span 3 - 3' from Pier 4 Curb at Patch
S13	Deck - Span 5 - Midspan at Curb High Side of Strip Seal
D14	Deck - Span 5 - Midspan at Curb High Side of Strip Seal
S14	Deck - Span 5 - Pier 5 Strip Seal at Curb
D15	Deck - Span 5 - Pier 5 Strip Seal at Curb
S15	Deck - Span 6 - Pier 6 High Side Joint at Curb
D16	Deck - Span 6 - Pier 6 High Side Joint at Curb
S16	Deck - Span 6 - Midspan Low Side of Strip Seal at Curb
D17	Deck - Span 6 - Midspan Low Side of Strip Seal at Curb
S17	Deck - Span 7 - Midspan at Curb
D18	Deck - Span 7 - Midspan at Curb
S18	Deck - Span 7 - Midspan at Center of Lane
D19	Deck - Span 7 - Midspan at Center of Lane
S19	Deck - Span 8 - Pier 8 High Side of Joint at Curb
S20	Deck - Span 8 - Pier 8 - High Side of Joint at Centerline Bridge

LABORATORY INVESTIGATION

The laboratory investigation consisted of chloride content, inductively coupled plasma (ICP) spectroscopy and infrared spectroscopy. The results of the testing and a description of the test methods employed can be found below.

Chloride Content by AASHTO T260

The submitted concrete samples were digested with nitric acid and filtered according to a modified AASHTO T 260-97 (2011). The modification was to accommodate a smaller sample size and to perform only one titration per sample instead of the duplicate, again to accommodate the sample size provided. The resulting solution was titrated according to Method II: Gran Plot Method, which is Section 6.4.2 of AASHTO T260-97 (2011), except that the Gran plots were produced using Microsoft Excel instead of by hand with Gran paper. A chloride ion selective electrode and an Oakton pH/°C/mV/Ion 6+ digital millivolt meter were used to perform the titrations. The electrode was standardized with 100 mL of each of the following solutions: 10 ppm, 100 ppm, and 1000 ppm chloride solutions, each of which contained 2 mL of Ionic Strength Adjuster (ISA). The sample solution was initially titrated to its endpoint at approximately 300 mV with a standard solution of 0.01 N (nominal) silver nitrate. The titration was continued in 0.50 mL increments, and the volume added and the millivolt meter reading for each increment were recorded. At least five increments were added after the equivalence point was reached.

Section 6.4.2 of AASHTO T 260-97 (2011) specified initial titration to 225 ± 5 mV and then titration in 0.50 mL increments for at least 5 increments. However, the sample solutions that contained relatively small amounts of chloride initially had a millivolt meter reading greater than 225 mV and the initial titration was not required. All titrations were continued at least five millivolt meter readings past their respective endpoints using increments of 0.50 mL.

The titrant, 0.01 N silver nitrate, was standardized against 25.00 mL of 0.01 N sodium chloride. The concentration of the titrant made was 0.009879 N. The titration data, calculations, and Gran plots for the standardization of the two batches of 0.01 N silver nitrate titrant and the analyses of the concrete samples are available upon request.

The results of the analyses are reported in Table 4, “Total Chloride Ion Content.”

Table 4 - Total Chloride Ion Content

Sample ID	Sample Description	Total Chloride Ion Content (%)	Chloride Concentration (Lbs / CY)
S1	Pier 1 – Pier Cap	0.200	7.8
D1	Pier 1 – Pier Cap	0.370	14.5
D2	Pier 1 – Pier Cap – at Popout	0.108	4.2
S2	Pier 3 – Pier Cap	0.124	4.9
D3	Pier 3 – Pier Cap	0.161	6.3

Sample ID	Sample Description	Total Chloride Ion Content (%)	Chloride Concentration (Lbs / CY)
S3	Pier 5 – Pier Cap	0.117	4.6
D4	Pier 5 – Pier Cap	0.040	1.6
S4	Pier 7 – Pier Cap – Centerline Bridge	0.306	12.0
D5	Pier 7 – Pier Cap – Centerline Bridge	0.200	7.8
S5	Deck – Span 1 – Midspan Curb Line	0.290	11.4
D6	Deck – Span 1 – Midspan Curb Line	0.054	2.1
S6	Deck – Span 1 – Midspan Middle of Lane	0.380	14.9
D7	Deck – Span 1 – Midspan Middle of Lane	0.304	11.9
S7	Deck – Span 2 – Pier 1 – High Side Strip Seal at Curb	0.406	15.9
D8	Deck – Span 2 – Pier 1 – High Side Strip Seal at Curb	0.278	10.9
S8	Deck – Span 2 – Pier 2 – Low Side Strip Seal at Curb	0.319	12.5
D9	Deck – Span 2 – Pier 2 – Low Side Strip Seal at Curb	0.040	1.6
S9	Deck – Span 3 – Midspan at Centerline Bridge	0.340	13.3
D10	Deck – Span 3 – Midspan at Centerline Bridge	0.126	4.9
S10	Deck – Span 3 – Midspan at Scupper	0.135	5.3
D11	Deck - Span 3 - Midspan at Scupper	0.035	1.4
S11	Deck – Span 4 – 15’ From Pier Curb at Crack	0.235	9.2
D12	Deck - Span 4 - 15' From Pier 3 Curb at Crack	0.216	8.5
S12	Deck - Span 3 - 3' from Pier 4 Curb at Patch	0.435	17.0
D13	Deck - Span 3 - 3' from Pier 4 Curb at Patch	0.150	5.9
S13	Deck - Span 5 - Midspan at Curb High Side of Strip Seal	0.183	7.2
D14	Deck - Span 5 - Midspan at Curb High Side of Strip Seal	0.103	4.0
S14	Deck - Span 5 - Pier 5 Strip Seal at Curb	0.360	14.1
D15	Deck - Span 5 - Pier 5 Strip Seal at Curb	0.050	2.0
S15	Deck - Span 6 - Pier 6 High Side Joint at Curb	0.144	5.6
D16	Deck - Span 6 - Pier 6 High Side Joint at Curb	0.048	1.9
S16	Deck - Span 6 - Midspan Low Side of Strip Seal at Curb	0.402	15.7
D17	Deck - Span 6 - Midspan Low Side of Strip Seal at Curb	0.120	4.7
S17	Deck - Span 7 - Midspan at Curb	0.200	7.8
D18	Deck - Span 7 - Midspan at Curb	0.044	1.7
S18	Deck - Span 7 - Midspan at Center of Lane	0.168	6.6
D19	Deck - Span 7 - Midspan at Center of Lane	0.070	2.7
S19	Deck - Span 8 - Pier 8 High Side of Joint at Curb	0.355	13.9
S20	Deck - Span 8 - Pier 8 High Side of Joint at Centerline Bridge	0.356	13.9

The overall range in chloride content was 0.035% to 0.435%. The average of all the tests was 0.204%. The distribution of chloride content values was 3 results over 0.40%, 9 results between 0.30% and 0.4%, 4 results between 0.20% and 0.30%, and 23 results with chloride concentration less than or equal to 0.20%. The percent change in chloride concentration between

samples from the surface of the concrete and samples at the level of the reinforcement ranged from 45.5% increase to 87.5% increase with an average increase of 58.4%. The amount of chloride content was less at the surface than deeper in the concrete in the same location at Piers 1 and 3. For the bridge deck all the chloride concentration results were higher at the surface of the concrete as opposed to at the reinforcement bar depth as expected. The chloride concentration range for surface samples was 0.117% to 0.435% with an average of 0.273%. The chloride concentration range for samples obtained deeper in the concrete was 0.035% to 0.370% with an average of 0.133%.

Inductively Coupled Plasma Spectroscopy

The field coating samples listed in Table 2 were sent to Schneider Laboratories Global, Inc. in Richmond, Virginia, for total lead, cadmium, and chromium content using inductively coupled plasma (ICP) spectroscopy in accordance with EPA 6010C. The results are shown in units of parts per million (PPM). The results of the testing are included in Appendix A and summarized in the following table:

Table 5 – Toxic Metal Concentrations

Sample ID	Lead Concentration (PPM)	Cadmium Concentration (PPM)	Chromium Concentration (PPM)
1	322,000	ND	53.2
2	324,000	ND	54.7
3	318,000	ND	615
4	232,000	ND	51.2
5	335,000	ND	25.9
6	334,000	ND	38.5
7	259,000	ND	58.5
8	326,000	ND	37.3
P1	347	ND	ND
P2	151	ND	ND
P3	806	ND	16.7

Results with the value of "ND" indicate the concentration was less than the detection limit of the testing equipment/method or "Non-Detected". These results can be considered to not contain the metal (e.g. none of the existing coatings contain cadmium and Sample P1 and P2 did not contain chromium).

Infrared Spectroscopy

Infrared spectroscopic analysis was performed using a Mattson Galaxy Model 3020 Fourier transform infrared spectrometer. This technique involved combining sample scrapings with potassium bromide powder and forming pellets under high pressure. The pellets were then placed in the optical path of the spectrometer and spectra were obtained over the range of 4000 to 400 cm^{-1}. Three spectra were obtained and are provided in Appendix A.

Briefly, the analysis revealed the following:

1. The spectrum obtained of the total chip of Sample 3 (Span 4 – Downstream Truss Gusset Plate) was consistent with a degraded alkyd resin, as evidenced by the bands near 1737, 1288, 1238, and 700 cm^{-1}.

2. The spectrum obtained of total chip of Sample 8 (Span 10 – Interior Girder) was consistent with a degraded alkyd resin, as evidenced by the bands near 1737, 1288, and 700 cm^{-1}.

3. The spectrum obtained of the topcoat of Sample P3 (NE Abutment - Pedestal) was most consistent with an acrylic resin, as evidenced by the spectral bands at 1733, 1238, and 1162 cm^{-1}.

DISCUSSION

General Discussion of Maintenance Painting

Many factors affect the service life of a coating system. These include the type of coating originally applied, the type and quality of surface preparation, in-service exposure environment, number of coats and film thickness, and the history of maintenance painting activities.

If a particular coating has provided satisfactory corrosion prevention and remains adherent and in relatively good condition, it is typically cost effective to extend the life of the system through overcoating, retaining as much of the existing coating as possible. When the coatings are in poor condition, a "full removal" strategy is usually considered, which removes all existing coatings. This strategy effectively places the bridge at the beginning of a new maintenance painting cycle. This strategy is also the most expensive approach.

Maintenance painting strategies for bridge structures generally fall into four main categories: (1) deferral of maintenance, (2) spot repairs, (3) spot repairs with full overcoats, and (4) complete coating removal and replacement.

Each of the strategies after "deferral" is progressively more complex and requires progressively more work. Correspondingly, each option also offers greater long-term protection to the structure, but at additional costs. When paints containing hazardous metals are present, the issues associated with removing these paints impact the decision making process.

Strategy 1 – Deferral of Maintenance

Maintenance painting can be deferred if the existing coating system is in good condition, if the service life of the structure is limited, or there is some other benefit for postponing the work. Bridges identified for deferral of maintenance must be carefully selected. For example, if extensive corrosion and coating deterioration is present and maintenance painting is deferred for a period of time, the level of surface preparation required to properly prepare the surface increases correspondingly. If left unattended for too long, the opportunity to salvage any of the existing coating will ultimately be lost, and total coating removal will be required. In some cases, when the structure is corroding extensively, but is still structurally sound, painting can be deferred because the highest level of surface preparation (abrasive blast cleaning) is already needed, whether performed today or several years from now. The strategy in this case is to allocate the money to repair coatings on other structures that have an immediate need that are not so badly deteriorated in order to stop the corrosion from propagating to the point that total removal is the only option for those structures as well.

Strategy 2 – Spot Repairs

Spot repairs, as the name suggests, involves surface preparation and coating application only to the individual spots of corrosion or coating breakdown. The amount of coating being removed is minimized, reducing the impact of hazardous materials handling, containment, and worker protection when toxic metals are present. Spot repairs also serve to repair the existing coating film only where it is needed, repairing the corroded areas and stopping the propagation of the breakdown. Coatings in essentially any condition may be spot repaired, but it is only practical when the level of breakdown is minor and somewhat isolated and covers a small percentage of the surface (e.g., 1 or 2%). A disadvantage of this approach involves aesthetics. The repair spots are sometimes applied to areas that are readily visible to the general public and it is often also necessary to address aesthetic issues along with technical painting issues

Surface preparation of individual spots of corrosion/coating failure are typically performed in accordance with SSPC-SP 3, “Power Tool Cleaning,” to remove loose paint, loose rust, and loose mill scale. However, in some instances an increased level of surface cleanliness by power tool cleaning is desired. In such cases, SSPC-SP15, “Commercial Grade Power Tool Cleaning” or SSPC-SP11, “Power Tool Cleaning to Bare Metal” is specified. The edges of the existing coating around the periphery of the spot repair should also be feather edged to provide a smooth transition from the spot repair area to the intact coating surrounding the repair. Vacuum shrouded power tools should be used to minimize the containment requirements, but containment tarps will also be required to capture the lead paint chips that are not captured by the vacuum.

Similar to spot repairs, zone coating repairs involve surface preparation and coating application over a larger area that exhibits more concentrated levels of breakdown, but work is still limited to those areas. For example, steel members beneath roadway expansion joints (where moisture leaks and advanced coating deterioration often occurs) are often painted for a given distance on either side of the joint, without any significant painting on the rest of the structure. If the zones are large enough, power tool cleaning is often replaced by abrasive blast

cleaning. When blast cleaning, however, a fully enclosed containment equipped with a dust collection system is required around the zone area.

Strategy 3 – Spot Repairs with Full Overcoat(s)

The application of a full overcoat serves two primary purposes: the additional coat provides added barrier protection and helps to seal minor defects that are not apparent when conducting spot repairs. It also offers an improved appearance (not patch-work-like) when compared to spot repairs. Overcoats also add complexity and cost to the overall project. The complexity increases because a contractor must now access all coated areas of the structure in order to thoroughly clean (i.e., pressure wash) the existing coating to receive a new coating layer. Furthermore, the adhesion qualities of the existing coating must also be adequate, otherwise the stresses imparted (contractive shrinkage stress as the coating dries/cures and stress imparted by the added weight of new paint layers) by the overcoat can cause disbonding of the existing system. Stresses are even further exacerbated when the structure is located in climates with freeze/thaw cycling conditions. This strategy is typically used when the amount of visible corrosion and coating deterioration covers less than 10% of the surface area and the existing coating adhesion is adequate. When considering this option and allowing the existing coating system to remain, it must be realized that, at some point in the future, the coating system will require total removal and toxic metal issues, if present, must then be addressed.

In order to apply an overcoat, all surfaces must be cleaned by pressure washing to remove chalk, chlorides, pigeon litter, dirt, and other debris. When lead or other toxic metals are present in the coating, measures will have to be taken to collect paint chips that are dislodged during pressure washing, causing this option to be more costly than if lead was not present. In some instances, state regulations also mandate that the cleaning water be captured and contained. Capturing and containing cleaning water can add considerable cost and an increased degree of difficulty to the project.

Prior to overcoating, surface preparation of areas of spot corrosion/coating failure should be performed as previously discussed under Strategy 2, Spot Repairs, prior to overcoating.

Strategy 4 – Total Coating Removal and Replacement

Total removal and replacement is the final option for maintenance painting. It is the most costly option (especially when removing existing coatings that contain toxic metals) but it offers the greatest opportunity for lower cost, longer term protection. With this approach, all of the mill scale, rust, and paint are completely removed and a new coating system with a new design life is applied. All paint containing toxic metals is removed at the same time, eliminating hazardous metals from future consideration. This method also provides the most pleasing and uniform coating appearance.

The specifications should require the removal of all coating, corrosion, and mill scale by abrasive blast cleaning in accordance with SSPC-SP10, Near-White Metal Blast Cleaning. Blast cleaning must be performed within total containment with an engineered dust collection system.

Pre-Surface Preparation Cleaning (All Strategies)

The initial pre-cleaning step prior to any surface preparation process discussed above would be to remove any debris, dirt, grime, pigeon droppings, etc. that have accumulated on areas of the bridge where work will take place. This can be accomplished by brushing, vacuuming, or pressure water cleaning. However, it must be recognized that any pre-cleaning procedure must carefully address worker and environmental protection issues related to the exposure to pigeon droppings (histoplasmosis) and toxic metals concentrations (lead, cadmium, and chromium) in the existing coatings.

Soluble Salt Remediation (All Strategies)

Field testing for surface soluble salt concentrations were not performed on steel members or the piers as part of this investigation. With any of the coating options discussed, it is imperative that soluble salt levels (i.e., chlorides, sulfates, ferrous ions) be lowered to acceptable concentrations prior to coating. Chloride concentrations can vary significantly depending on the severity of the winter and the quantity of deicing salts used. Most specifications require that chlorides are to be remediated to less than 7 $\mu g/cm^2$, sulfates less than 17 $\mu g/cm^2$, and ferrous ions less than 10$\mu g/cm^2$. The level of salt contamination when applying organic coatings, such as those proposed should be kept below 7 $\mu g/cm^2$. Therefore, KTA always prefers testing for this contamination prior to and during any painting contract work. In many instances, chloride contamination can be reduced to acceptable levels by pressure water cleaning and/or abrasive blast cleaning with a combination of finely graded and coarser abrasive media.

Toxic Metals in Existing Coatings

Laboratory testing of paint chip samples from the Bellevue Bridge revealed that there are detectable levels of lead and chromium. The presence of toxic metals will necessitate stringent controls in conjunction with any surface preparation or future construction activities. The controls are necessary to address and comply with Federal, State and local regulatory requirements regarding the disposal of waste, worker protection, protection of the public, and environmental protection.

Chloride Concentration

When tested in accordance with AASHTO T260, the pulverized concrete had a chloride concentration range for surface samples from 0.117% to 0.435% with an average of 0.273%. The chloride concentration range for samples obtained deeper in the concrete was 0.035% to 0.370% with an average of 0.133%. The amount of decrease in the chloride concentration gives an idea of the rate of salt penetration. The results indicate that de-icing salts are penetrating the pier caps and bridge deck. Ideally, the goal would be to limit the amount of chlorides reaching the rebar depth to a threshold or limit that would eliminate or slow the corrosion of the rebar. Unfortunately, the corrosion of reinforcing steel is dependent on many variables including the concrete mix design, the coverage depth, type of reinforcing used, the amount of carbonation and

the resultant change in pH of the concrete. Therefore, a decision-making threshold regarding chloride content in existing concrete can be elusive. ACI 318 allows a maximum water-soluble chloride ion content of 0.15% for reinforced concrete exposed to chlorides in service. The British Code CP110 gives a value of 0.35% and the Norwegian Code NS3474 gives a value of 0.6%. In the Illinois Department of Transportation Report PRR-155 "Effectiveness of Concrete Deck Sealers and Laminates for Chloride Protection of New and In Situ Reinforced Bridge Decks for Illinois", the author references values from other sources which consistently report that 1.2 lbs/yd^3 (0.03%) is the chloride level at which corrosion is initiated, 3.0 lbs/yd^3 (0.08%) is the level of chloride needed to rapidly accelerate corrosion, and greater than 7.0 lbs/yd^3 (0.18%) is the level that causes major loss of the steel section. KTA believes these values are for plain (uncoated) reinforcing bars. The rebar used in the Bellevue Bridge deck were epoxy coated. In the past, KTA has relied on laboratory studies that have found that at 0.40% chloride concentration there is a substantial increase in the corrosion rate. Since only three of the results found during this investigation exceed 0.40% (at the concrete surface), there is no immediate need to seal the deck or pier surfaces.

Recommendations for the Bellevue Toll Bridge

As detailed in the "General Discussion of Maintenance Painting" section of this report, there are often multiple coating rehabilitation strategies that can be considered for any given bridge structure. The ultimate strategies selected can also be influenced by extraneous factors such as availability of funding, coating conditions of other bridges in the system, the overall painting philosophy of an organization, public perception, etc.

Based on the information obtained for this structure, the previously presented maintenance paint strategies were used to formulate the following recommendations for the Bellevue Bridge. An opinion of probable construction cost for painting related items based on these recommendations is provided.

The coatings on the Bellevue Bridge Beam Spans, Deck Truss Spans, and Through-Truss Spans (Spans 1 to 11) are in poor condition overall. The existing coatings are 64 years old. Additionally, in a few cases, steel repairs were required as a result of corrosion. In other areas pack rust between built-up members has caused distension of the members or plates. In many other areas there is steel section loss beginning. Based on these observation, it is obvious that the existing coatings are beyond their useful service life and are no longer protecting the steel.

Based on the information obtained for the bridge, the previously presented maintenance paint strategies were used to formulate the following recommendations for the Bellevue Toll Bridge.

<u>Option 1</u> – <u>Total Coating Removal and Replacement</u>

KTA recommends total coating removal and replacement for the structural steel on Spans 1 to 11. This includes all steel both above and below the bridge deck. The work would include pre-cleaning to remove debris, bird droppings, and de-icing salts. After pre-cleaning, the existing

coatings should be removed by abrasive blast cleaning in accordance with SSPC-SP 10 "Near White Metal Blast Cleaning." Following blast cleaning, recoating can be performed with a three-coat, high performance coating system such as an organic zinc-rich primer, an epoxy intermediate coat, and a urethane finish. These coating systems have a proven history of performance on bridge structures throughout the country. The project specifications should require the work to be performed in a Class 1A containment system per SSPC Guide 6, "Guide for Containing Surface Preparation Debris Generated During Paint Removal Operations". The containment system provides containment of paint and debris from escaping to the ground beneath the bridge or into the river, and ventilation airflow for the workers and to place the containment in a negative pressure (so air is flowing into the contained area and thus contaminants cannot escape). The amount or concentration of lead in the existing coatings has little bearing on the containment requirements. Iowa Department of Transportation requires containment systems for bridge cleaning and painting regardless of whether or not the existing coatings contain toxic metals. The coating rehabilitation work for the bridge structural steel should be initiated within the next one or two years. The new coating system has an expected service life of 27 years before any additional maintenance painting would be required.

Option 2 – Zone Coating Removal and Replacement

If the complete coating removal and replacement recommendation above is cost prohibitive, an alternate strategy involving the minimum recommended scope of painting work could be considered. This option would exclude from the work members of the bridge that have somewhat better coating condition and less present corrosion. The members that could be eliminated are: all deck truss span stringers and upper lateral bracing; all beam span girders, diaphragms, and bents with the exception that all steel within five feet of Abutment 2 would be cleaned and painted; the through-truss stringers, below deck lateral bracing, and all above deck members above the splash zone of 15 feet higher the top of the deck. The advantage of this approach would be an initial cost savings. The surface preparation, coating system, and containment requirements would be the same as for Option 1. The service life of the painted areas would be the same as for Option 1 (27 years). The main disadvantage would be that areas not painted would continue to degrade and corrode. The determination when the excluded members need to be painted would be based on the onset of steel section loss that would weaken the members. Therefore, more frequent condition inspections may be necessary. Another possible disadvantage to Option 2 would be the poor bridge aesthetics.

For either option, the specifications should address the particular concern of the pack-rust found at some faying surfaces including the bottom chord cover plate. Pack-rust should be removed by a combination of abrasive blast cleaning and chipping with hand tools, or power tools such as a needle gun or chipping hammer. The prepared surface would then be painted with the organic zinc rich primer. The seam area would then receive a coat of a thin-film 100% solids epoxy penetrating sealer, then the remaining coating system. The blasted steel should receive the zinc primer first so that the sacrificial anode protection of the zinc is not lost. Since the zinc primer cannot bridge the crevice, the subsequent application of the penetrating sealer will still allow the wicking action of the material into the seams.

The concrete bridge piers and pier caps were in fair to good condition with some cracks and areas where the concrete was chipped on surface. The most concrete deterioration was found on Abutment No. 1 which had several cracks and chipped/spalled areas. On the Nebraska side of the bridge, the abutment and piers were painted. The coatings applied to the piers were in good condition overall. Coating adhesion on the piers was rated fair (2A or 3A).

The surface of the bridge deck was visually examined and found to be in good condition. There were, however, several shallow hairline cracks found in the deck and curbs.

Sealing the bridge deck, curbs, abutments, and piers with a penetrating sealer material should be considered to extend the life of the concrete. The sealing work can be deferred for several years (e.g. four to five years) since chloride concentrations are not yet too high at the rebar depth. However, the bridge deck would benefit from performing the work sooner. KTA has specified silane-type penetrating sealers such as MasterProtect® H 400, TK Products TK-290 WB, or equal products for bridge decks. The expected life of the deck sealer is five years and a reapplication of the sealer would be required every five years. KTA considered a thin polymer overlay, but mechanical abrading (e.g. steel shot blasting) is required for surface preparation, the cost is approximately 5 times that of the sealer, and the expected service life is the same. Polymer or epoxy overlays are more beneficial for bridge decks that are in worse condition. For the piers, additional crack repair, patching, and the application of an acrylic coating system is also recommended.

Future Maintenance Considerations

Many coating specifications include provisions for a one-year anniversary inspection as part of the painting contract. A percentage or (specific dollar amount) is held as retainage until the anniversary inspection and any resulting coating touch-up is complete. Generally, any defects in the applied coating system will be revealed in the first year of service life. The new coating system on the bridge's fabricated structural steel is expected to last over 25 years without any coating maintenance being performed. At that time the amount of corrosion is expected to be limited to approximately 5% of the bridge surface area. To economically maintain the coating system, spot repairs as described previously should be performed in years 27 and 36. Additional spot repairs and overcoating would then likely be needed in year 50.

Periodic cleaning of the bridge structural steel, bridge deck, and piers by pressure water washing to remove deicing salts would improve the longevity of the bridge. Since this is a cleaning activity containment of the wash water for disposal would not be required. Federal Highway Administration Publication Number FHWA-HIF-11042 "Bridge Preservation Guide" suggest washing or cleaning bridge deck or the entire bridge at a frequency of every 1 to 2 years. Ideally, the bridge deck, piers, and steel members would be cleaned every spring to remove the accumulated salts from the previous winter. However, the cost and impact to traffic may be prohibitive if performed yearly. The amount of deicing salts used as well as the amount rain that the bridge receives in a given year would also effect the frequency. The cost for contract work to pressure wash the bridge deck is expected to be $25,000; the cost to pressure wash the piers is expected to be an additional $25,000; and the cost to pressure wash all the bridge steel members

is expected to be $177,100. If the washing is performed by in-house maintenance personnel or portions of the through truss above the splash zone are eliminated, the costs would be reduced.

OPINION OF PROBABLE CONSTRUCTION COSTS

An opinion of probable construction costs for the recommended total coating removal and replacement options for the Bellevue Bridge has been prepared. This analysis involved making various assumptions, based upon experience, as to how a contractor might staff and proceed with this type of work. Crew sizes, production rates, material and equipment requirements are evaluated, and man-days and project-days are calculated. From this project time estimate, costs associated with labor, materials, and equipment are factored in and the estimate is developed. Overhead and profit are added as a multiplier to the base estimate. For the purposes of this probable cost opinion, all labor was considered to be union painters and all equipment was calculated at rental rates. Production days were calculated from an estimated square footage of paintable steel surfaces and an allocated production rate. The requirements for environmental protection, worker health and safety, waste disposal, and containment are also included. Maintenance and protection of traffic is not included in the estimated costs. Finally, a variance multiplier is used on the final estimated cost to develop a range of anticipated bid prices. This multiplier allows for the variations in contractor bidding techniques, new technology, and scheduling of the work within the painting season.

During the field investigation, it was determined that there are no staging areas for the contractor's equipment on the bridge and the work has to be performed with little impact to vehicular traffic. Therefore, it will be necessary to stage the contractor's equipment on barges moored in the river or in ground areas beneath the bridge. A tunnel style containment will need to be used for the above deck portions of the through truss spans for Option 1. For Option 2 the above deck containments would be limited to the splash zone height and only be required in the plane of the trusses. Lane closures will be required during the erection and dismantling of the above deck containments. The lane widths would need to be narrowed to 9 or 10 feet, if possible, during work on the above deck portions of the through truss spans. If the travel lanes cannot be narrowed, a continuous single lane closure with alternating traffic would be required (day and night). The costs for maintenance and protection of traffic during construction is not included in the costs since KTA does not have any expertize or experience in estimating such costs. For bridge painting projects, KTA tracks both contract award pricing and cost trends in many parts of the country, but we do not complete the same research for traffic control costs.

KTA developed an opinion of probable painting costs for the recommended options. The costs include all the painting related work items including surface preparation, pack-rust removal, soluble salt mitigation, painting, containment, environmental protection, hazardous waste disposal, and worker health and safety. Costs for maintenance and protection of traffic are not included. Costs for sealing the bridge deck and painting the abutments and piers are also included. The cost opinion calculations are attached in Appendix B and summarized in the following table:

Table 6 – Opinions of Probable Costs for Rehabilitation

Painting Strategy	Surface Area	Expected Bid Cost Range
Option 1 – Total Coating Removal & Replacement Entire Bridge (All Spans, All Steel)	216,200 ft^2	$2,824,400 to $3,419,000
Option 2 – Zone Coating Removal & Replacement Minimum Scope of Painting Work See Description on Page 63	104,700 ft^2	$1,921,200 to $2,325,700
Pressure Water Washing and Sealing the Bridge Deck and Curbs	54,300 ft^2	$69,800 to $84,500
Pressure Water Washing and Painting the Abutments and Piers	26,800 ft^2	$68,000 to $82,300

The Bellevue Toll Bridge Commission should allow at least six to seven months for construction for the recommended coating rehabilitation. The costs shown above are what a contractor would bid on project. The bridge owner's cost associated with specification development, construction administration, and construction inspection are not included. Most bridge owners prefer to have full-time construction inspection during the project. The cost for these specifications and construction oversight on behalf of the bridge owner are typically 3% to 4% of the contract bid cost.

Analysis Report

Schneider Laboratories Global, Inc

2512 W. Cary Street • Richmond, Virginia • 23220-5117
804-353-6778 • 800-785-LABS (5227) • Fax 804-359-1475

Customer: KTA-Tator, Inc. (1861)
Address: 115 Technology Drive
Pittsburgh, PA 15275

Attn:

Project: Infrastructure LLC
Location: Bellevue Toll Bridge
Number: 360301

Order #: 175475

Matrix Paint
Received 06/30/16
Reported 07/05/16

PO Number: 16PO-324

Sample ID / Parameter	Cust. Sample ID	Location / Method	Result	RL*	Units	Analysis Date	Analyst
175475-001	1	Span 1 Upstream Top Chord					
Metals Analysis							
Cadmium		EPA 6010C / 3050B	**<6.41**	6.41	mg/kg	07/01/16	DLJ
Chromium		EPA 6010C / 3050B	**53.2**	16.0	mg/kg	07/01/16	DLJ
Lead		EPA 6010C / 3050B	**322000**	6410	mg/kg	07/01/16	DLJ
175475-002	2	Span 2 Inter. Floor Beam					
Metals Analysis							
Cadmium		EPA 6010C / 3050B	**<6.67**	6.67	mg/kg	07/01/16	DLJ
Chromium		EPA 6010C / 3050B	**54.7**	16.7	mg/kg	07/01/16	DLJ
Lead		EPA 6010C / 3050B	**324000**	6670	mg/kg	07/01/16	DLJ
175475-003	3	Span 4 Downstream Plate					
Metals Analysis							
Cadmium		EPA 6010C / 3050B	**<6.50**	6.49	mg/kg	07/01/16	DLJ
Chromium		EPA 6010C / 3050B	**615**	16.2	mg/kg	07/01/16	DLJ
Lead		EPA 6010C / 3050B	**318000**	6490	mg/kg	07/01/16	DLJ
175475-004	4	Span 5 Upstream Bot Chord					
Metals Analysis							
Cadmium		EPA 6010C / 3050B	**<6.63**	6.62	mg/kg	07/01/16	DLJ
Chromium		EPA 6010C / 3050B	**51.2**	16.6	mg/kg	07/01/16	DLJ
Lead		EPA 6010C / 3050B	**232000**	6620	mg/kg	07/01/16	DLJ
175475-005	5	Span 6 Downstream Bot					
Metals Analysis							
Cadmium		EPA 6010C / 3050B	**<6.56**	6.56	mg/kg	07/01/16	DLJ
Chromium		EPA 6010C / 3050B	**25.9**	16.4	mg/kg	07/01/16	DLJ
Lead		EPA 6010C / 3050B	**335000**	6560	mg/kg	07/01/16	DLJ
175475-006	6	Span 7 Downstream Vert.					
Metals Analysis							
Cadmium		EPA 6010C / 3050B	**<6.65**	6.64	mg/kg	07/01/16	DLJ
Chromium		EPA 6010C / 3050B	**38.5**	16.6	mg/kg	07/01/16	DLJ
Lead		EPA 6010C / 3050B	**334000**	6640	mg/kg	07/01/16	DLJ

All internal QC parameters were met. Unusual sample conditions, if any, are described. Surrogate Spike results designated with "D" indicate that the analyte was diluted out. "MI" indicates matrix interference. Concentration and *Reporting Limit (RL) based on areas provided by client. Values are reported to three significant figures. Solid PPM = mg/kg | PPB = µg/kg and Water PPM = mg/L | PPB = µg/L. The test results reported relate only to the samples submitted.

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Address: 115 Technology Drive
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Attn:

Project: Infrastructure LLC
Location: Bellevue Toll Bridge
Number: 360301

Order #: 175475

Matrix Paint
Received 06/30/16
Reported 07/05/16

PO Number: 16PO-324

Sample ID / Parameter	Cust. Sample ID	Location / Method	Result	RL*	Units	Analysis Date	Analyst
175475-007	7	Span 9 Upstream Girder					
Metals Analysis							
Cadmium		EPA 6010C / 3050B	**<6.63**	6.62	mg/kg	07/01/16	DLJ
Chromium		EPA 6010C / 3050B	**58.5**	16.6	mg/kg	07/01/16	DLJ
Lead		EPA 6010C / 3050B	**259000**	6620	mg/kg	07/01/16	DLJ
175475-008	8	Span 10 Interior Girder					
Metals Analysis							
Cadmium		EPA 6010C / 3050B	**<6.41**	6.41	mg/kg	07/01/16	DLJ
Chromium		EPA 6010C / 3050B	**37.3**	16.0	mg/kg	07/01/16	DLJ
Lead		EPA 6010C / 3050B	**326000**	6410	mg/kg	07/01/16	DLJ
175475-009	P1	Pier 2 Pier Cap					
Metals Analysis							
Cadmium		EPA 6010C / 3050B	**<6.56**	6.56	mg/kg	07/01/16	DLJ
Chromium		EPA 6010C / 3050B	**<16.4**	16.4	mg/kg	07/01/16	DLJ
Lead		EPA 6010C / 3050B	**347**	6.56	mg/kg	07/01/16	DLJ
Sample contains substrate which may affect the calculation of weight percent and mg/kg.							
175475-010	P2	Pier 2 Bent Column					
Metals Analysis							
Cadmium		EPA 6010C / 3050B	**<6.23**	6.23	mg/kg	07/01/16	DLJ
Chromium		EPA 6010C / 3050B	**<15.6**	15.6	mg/kg	07/01/16	DLJ
Lead		EPA 6010C / 3050B	**151**	6.23	mg/kg	07/01/16	DLJ
175475-011	P3	NE Abutment Pedestal					
Metals Analysis							
Cadmium		EPA 6010C / 3050B	**<6.48**	6.47	mg/kg	07/01/16	DLJ
Chromium		EPA 6010C / 3050B	**16.7**	16.2	mg/kg	07/01/16	DLJ
Lead		EPA 6010C / 3050B	**806**	6.47	mg/kg	07/01/16	DLJ

175475-07/05/16 02:09 PM

Abisola O Kasali

Reviewed By: **Abisola Kasali**
Metals Supervisor

All internal QC parameters were met. Unusual sample conditions, if any, are described. Surrogate Spike results designated with "D" indicate that the analyte was diluted out. "MI" indicates matrix interference. Concentration and *Reporting Limit (RL) based on areas provided by client. Values are reported to three significant figures. Solid PPM = mg/kg | PPB = µg/kg and Water PPM = mg/L | PPB = µg/L. The test results reported relate only to the samples submitted.

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Project: Infrastructure LLC
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Order #: 175475

Matrix Paint
Received 06/30/16
Reported 07/05/16

PO Number: 16PO-324

Sample ID / Parameter	Cust. Sample ID / Method	Location	Result	RL*	Units	Analysis Date	Analyst

Certifications

Parameter	Method	Matrix	NC	NY	RI	VA
Cadmium	EPA 6010C	Paint	X	X	X	X
Chromium	EPA 6010C	Paint	X	X	X	X
Lead	EPA 6010C	Paint	X	X	X	X

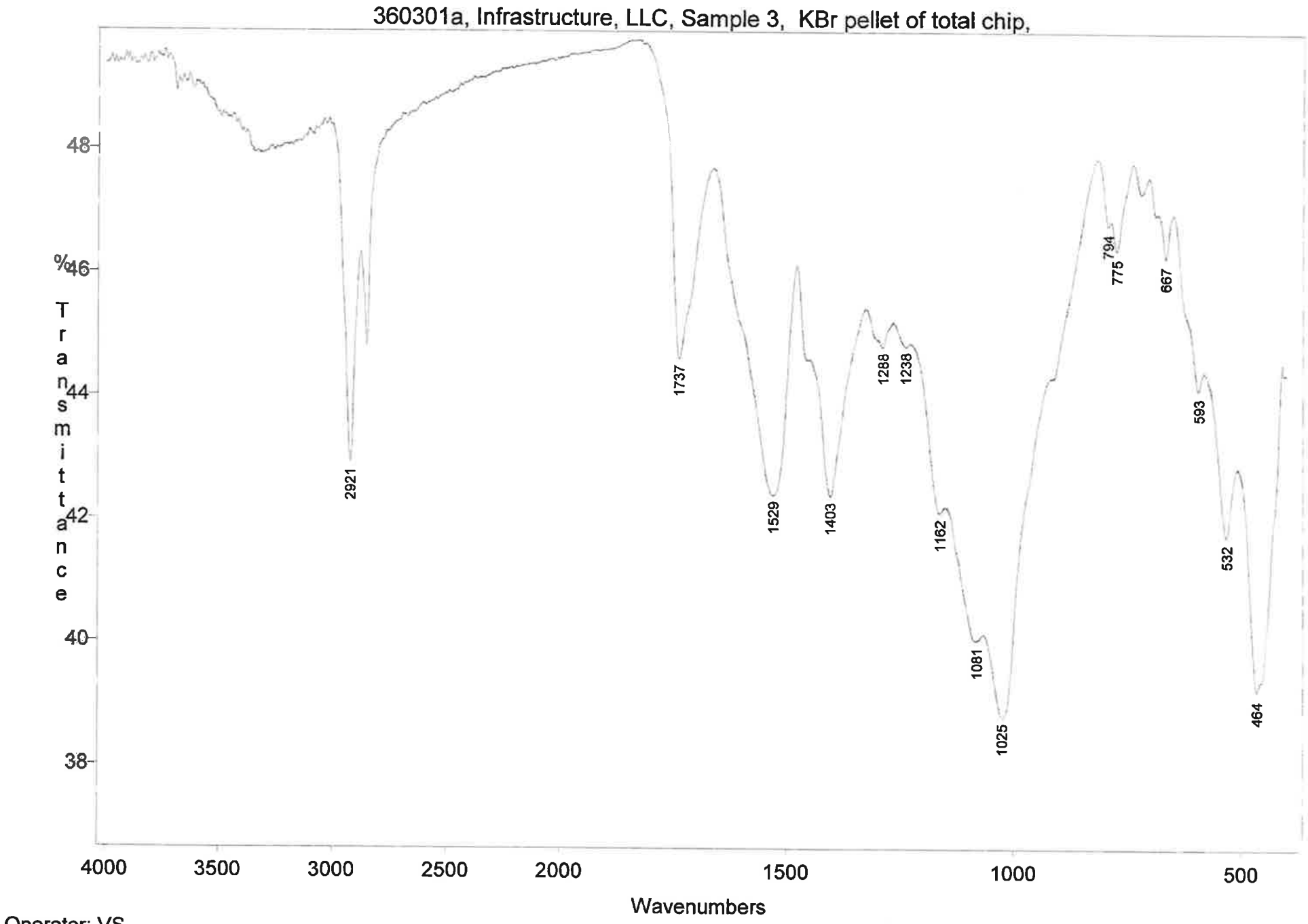
Key

State	Regulatory Agency - Lab ID	Certificate Number
NC	NCDENR	593
NY	NYELAP-11413	54668
RI	RIDOH	LAO00084
VA	Virginia DCLS/DEQ - 460135	8259

'X' indicates that the analyte is accredited.

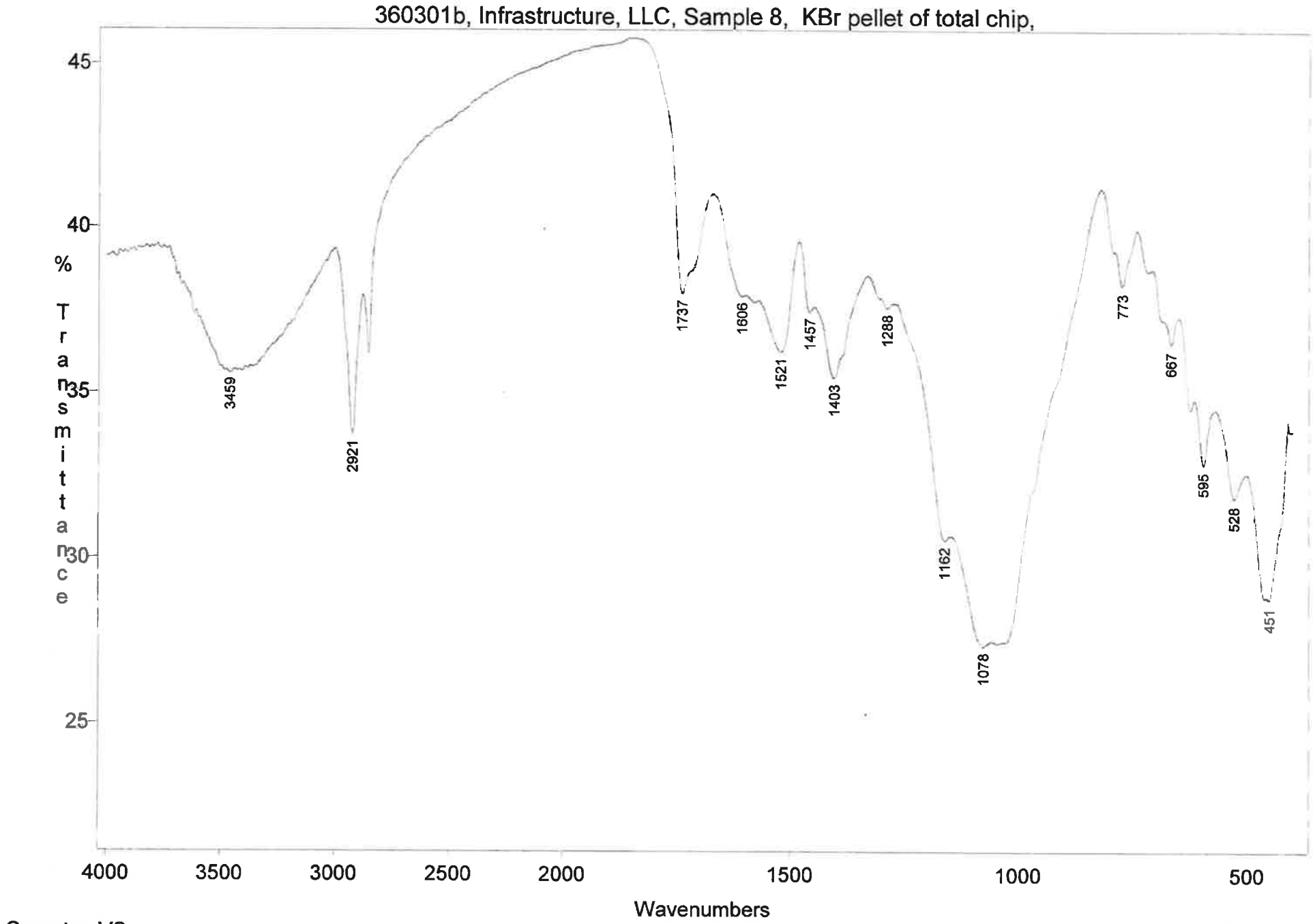
If your state is not listed above, call laboratory for accreditation/certification information.

All internal QC parameters were met. Unusual sample conditions, if any, are described. Surrogate Spike results designated with "D" indicate that the analyte was diluted out. "MI" indicates matrix interference. Concentration and *Reporting Limit (RL) based on areas provided by client. Values are reported to three significant figures. Solid PPM = mg/kg | PPB = µg/kg and Water PPM = mg/L | PPB = µg/L. The test results reported relate only to the samples submitted.



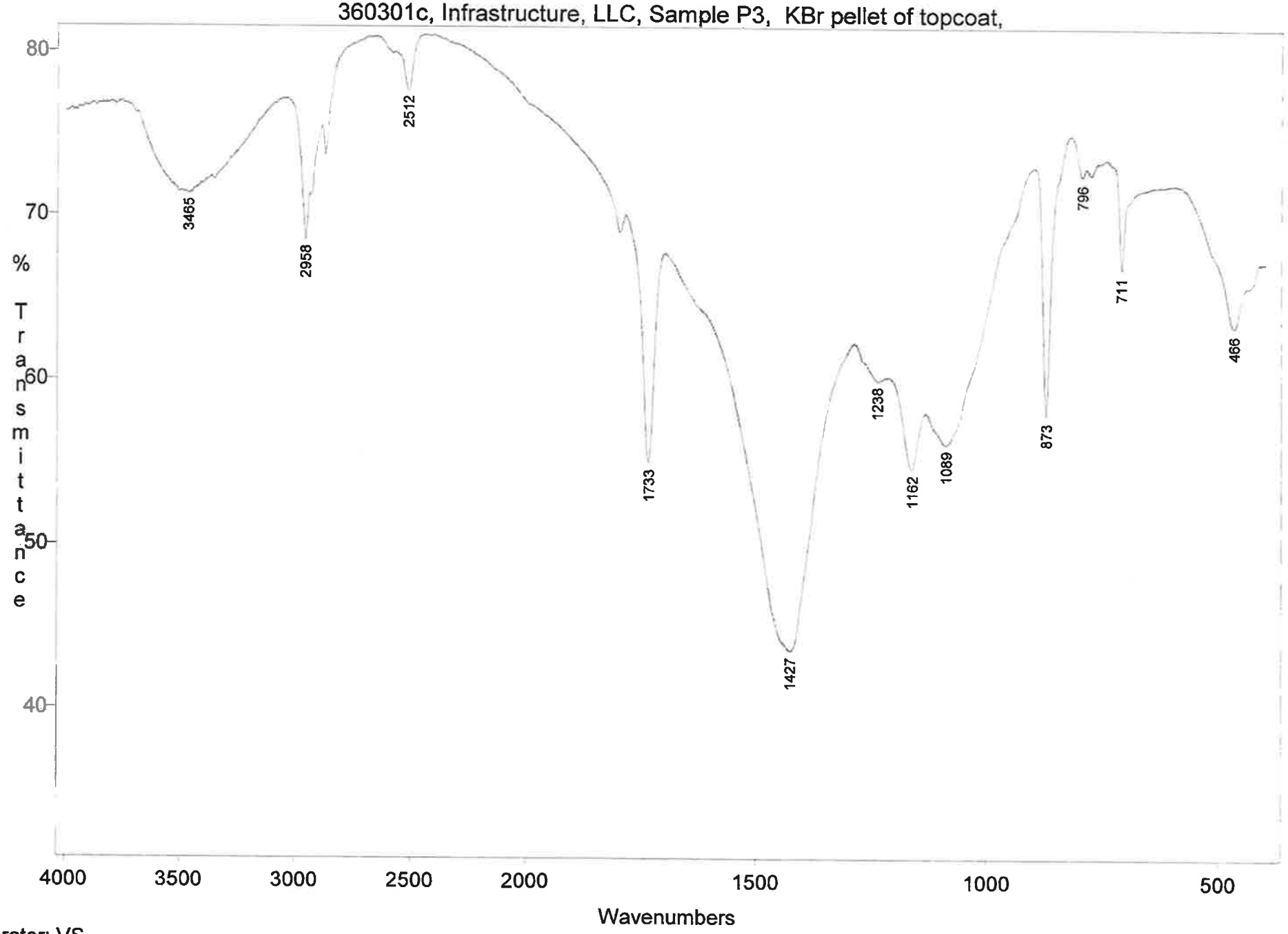
Operator: VS
Resolution: 4.0

Scans: 32
Date: Fri Jun 24 09:58:08:76 2016



Operator: VS
Resolution: 4.0

Scans: 32
Date: Fri Jun 24 10:06:44:33 2016



Operator: VS
Resolution: 4.0

Scans: 32
Date: Fri Jun 24 10:11:21:76 2016

Bellevue Toll Bridge Over the Missouri River

Infrastructure, LLC / Bellevue Bridge Commision

Given: ENTIRE BRIDGE - Complete Coating Removal & Replacement - SSPC-SP 10 / Organic Zinc / Epoxy / Urethane

Assumptions : All Fabricated Structural Steel Included. Underside SIP Forms Excluded
Hazardous Metals, Equipment Staged On Ground or Barges Under Bridge,
Bridge Open During Rehab, Crew Works 6 Days / Week,
One Workday Lost per Week on Average due to Adverse Weather
Class 1A Containments Required for Abrasive Blast Cleaning
Bridge Surface Preparation Waste & Debris will Test Hazardous

Total Surface Area =	216,200	sq ft
Longest Containment Length =	425	ft
No. of Spans =	11	
Platform Length =	425	ft
Platform Width =	32	ft
Required Platform Deck Area =	13,600	sq ft
Containment Draft Area =	640	sq ft
Cross Draft =	Yes	Yes or No
Hazardous Metals =	Yes	Yes or No
Recyclable Abrasive =	No	Yes or No

Assume Crew Size

Class	No.	Rate/hr	OT Rate
Foreman	1	$60	$90
Abrasive Blasters	6	$55	$83
Intermediate & Finish Coat Painters	3	$55	$83
Laborers	3	$50	$75

Labor Cost per Day = $7,755 @ Hours / Day = 10

Labor

Mobilize =	5	Days
Platform =	5	Days
Rigging / Containment Moves =	39	Days
Pack Rust Removal =	6	Days
Blast Clean / Prime =	69	Days
Full Intermediate Coat =	34	Days
Full Finish Coat =	34	Days
Cleanup, Demob, Punch List =	6	Days
Total Production Days =	134	Days
Calendar Months =	6.3	Months

Subtotal Labor = $1,039,170

Bellevue Toll Bridge Over the Missouri River

Infrastructure, LLC / Bellevue Bridge Commision

Given: ENTIRE BRIDGE - Complete Coating Removal & Replacement - SSPC-SP 10 / Organic Zinc / Epoxy / Urethane

Materials

	Rate	Unit	Cost
Full Prime =	$0.49	/sq ft	$105,938
Epoxy Sealer at Pack Rust =	$0.15	/sq ft	$525
Full Intermediate =	$0.31	/sq ft	$67,022
Full Finish =	$0.32	/sq ft	$69,184
Thinner =	$0.05	/sq ft	$10,810
Blast Media =	$50	/ton	$37,835
Subtotal Materials =			**$291,314**

Equipment

Item	#Months	Qty	Rate	Cost
Blast Machines =	6.3	2	$5,550	$69,412
HEPA Filters for Vacuum Unit =	6.3	2	$260	$3,252
Dust Collectors =	6.3	2	$6,800	$85,045
Dust Collector Duct =	NA	160	$25	$4,000
Blast Hoses =	6.3	6	$940	$35,269
Blast Nozzles =	6.3	6	$160	$6,003
Blast Hoods =	NA	6	$250	$1,500
Containment Lighting =	NA	1	$550	$550
Air Compressors (1,600cfm) =	6.3	2	$4,600	$57,531
Airless Spray Pumps =	6.3	2	$1,000	$12,507
Spray Lines =	6.3	9	$250	$14,070
Spray Guns =	NA	9	$300	$2,700
Generators =	6.3	2	$600	$7,504
Platform (Roof Decking and Cables) =	NA	13,600	$5	$68,000
Containment Outriggers =	NA	118	$180	$21,240
Containment Tarps =	NA	36,560	$0.50	$18,280
Tarp Cables =	NA	5,667	$0.50	$2,833
Crane =	2.9	1	$4,800	$13,720
Picks & Pick Cables =	6.3	2	$3,105	$38,833
Pressure Washers =	6.3	0	$700	$0
Pick-up Trucks (w/ fuel) =	6.3	3	$1,000	$18,760
Large Trucks (w/Fuel) =	6.3	1	$1,200	$7,504
Crew Per Diem =	NA	2,574	$75	$193,050
Barge Rental & Mobilization =	3.1	2	$9,550	$59,719
Hand Tools =	6.3	20	$10	$1,251
Power Tools =	6.3	9	$50	$2,814
Office Trailer =	6.3	1	$450	$2,814
Storage Trailer =	6.3	2	$375	$4,690
Subtotal Equipment =				**$752,851**

Bellevue Toll Bridge Over the Missouri River

Infrastructure, LLC / Bellevue Bridge Commision

Given: ENTIRE BRIDGE - Complete Coating Removal & Replacement - SSPC-SP 10 / Organic Zinc / Epoxy / Urethane

Health and Safety

Item	# Months	Qty	Rate	Cost
Tyvek Suits =	6.3	26	$50	$8,129
Blood Lead Testing =	NA	13	$100	$1,300
Worker Exposure Monitoring =	6.3	6	$30	$1,126
Worker Exposure Monitor Analysis =	6.3	6	$26	$976
Wash Trailer =	6.3	1	$450	$2,814
Waste Disposal (Tons) =	NA	784	$300	$235,118
Safety Boat =	6.3	1	$500	$3,127

Subtotal Other Costs =	**$252,589**

Engineering & Submittals

Item	Hours	Qty	Rate	Cost
Drafting =	40	1	$65	$2,600
Engineering =	30	1	$175	$5,250
Administrative Submittal Support =	40	1	$45	$1,800

Subtotal Engineering & Submittals =	**$9,650**

Total

Subtotal Job =	$2,345,574
Overhead (10%) =	$234,557
Subtotal with Overhead=	$2,580,131
Profit (15%) =	$387,020
Location Factor (Omaha) =	1.002
Total Cost =	**$2,973,085**
Cost / Sq ft =	$13.75

Expected Bid Range:	**$2,824,400**	**to**	**$3,419,000**
	$13.06	to	$15.81

Bellevue Toll Bridge Over the Missouri River

Infrastructure, LLC / Bellevue Bridge Commision

Given: MINIMAL AREAS - Complete Coating Removal & Replacement - SSPC-SP 10 / Organic Zinc / Epoxy / Urethane

Assumptions : All Deck Truss Stringers and Upper Lateral Bracing Excluded.
Thru Truss - Truss Members in 15' Splash Zone, Bottom Chords, & Floorbeams Only
Girder Spans - Only 5' Zone at Abutment 2 Included
Underside SIP Forms Excluded
Hazardous Metals, Equipment Staged On Ground or Barges Under Bridge,
Bridge Open During Rehab, Crew Works 6 Days / Week,
One Workday Lost per Week on Average due to Adverse Weather
Class 1A Containments Required for Abrasive Blast Cleaning
Bridge Surface Preparation Waste & Debris will Test Hazardous

Total Surface Area =	104,700	sq ft
Longest Containment Length =	425	ft
No. of Spans =	11	
Platform Length =	425	ft
Platform Width =	32	ft
Required Platform Deck Area =	13,600	sq ft
Containment Draft Area =	640	sq ft
Cross Draft =	Yes	Yes or No
Hazardous Metals =	Yes	Yes or No
Recyclable Abrasive =	No	Yes or No

Assume Crew Size

Class	No.	Rate/hr	OT Rate
Foreman	1	$60	$90
Abrasive Blasters	6	$55	$83
Intermediate & Finish Coat Painters	3	$55	$83
Laborers	3	$50	$75

Labor Cost per Day = $7,755 @ Hours / Day = 10

Labor

Mobilize =	5	Days
Platform =	5	Days
Rigging / Containment Moves =	39	Days
Pack Rust Removal =	6	Days
Blast Clean / Prime =	33	Days
Full Intermediate Coat =	17	Days
Full Finish Coat =	17	Days
Cleanup, Demob, Punch List =	6	Days
Total Production Days =	98	Days
Calendar Months =	4.6	Months

Subtotal Labor = $759,990

Bellevue Toll Bridge Over the Missouri River

Infrastructure, LLC / Bellevue Bridge Commision

Given: MINIMAL AREAS - Complete Coating Removal & Replacement - SSPC-SP 10 / Organic Zinc / Epoxy / Urethane

Materials

	Rate	Unit	Cost
Full Prime =	$0.49	/sq ft	$51,303
Epoxy Sealer at Pack Rust =	$0.15	/sq ft	$525
Full Intermediate =	$0.31	/sq ft	$32,457
Full Finish =	$0.32	/sq ft	$33,504
Thinner =	$0.05	/sq ft	$5,235
Blast Media =	$50	/ton	$18,323
Subtotal Materials =			**$141,347**

Equipment

Item	#Months	Qty	Rate	Cost
Blast Machines =	4.6	2	$5,550	$50,764
HEPA Filters for Vacuum Unit =	4.6	2	$260	$2,378
Dust Collectors =	4.6	2	$6,800	$62,197
Dust Collector Duct =	NA	160	$25	$4,000
Blast Hoses =	4.6	6	$940	$25,794
Blast Nozzles =	4.6	6	$160	$4,390
Blast Hoods =	NA	6	$250	$1,500
Containment Lighting =	NA	1	$550	$550
Air Compressors (1,600cfm) =	4.6	2	$4,600	$42,075
Airless Spray Pumps =	4.6	2	$1,000	$9,147
Spray Lines =	4.6	9	$250	$10,290
Spray Guns =	NA	9	$300	$2,700
Generators =	4.6	2	$600	$5,488
Platform (Roof Decking and Cables) =	NA	13,600	$5	$68,000
Containment Outriggers =	NA	118	$180	$21,240
Containment Tarps =	NA	18,280	$0.50	$9,140
Tarp Cables =	NA	2,833	$0.50	$1,417
Crane =	2.9	1	$4,800	$13,720
Picks & Pick Cables =	4.6	2	$3,105	$28,400
Pressure Washers =	4.6	0	$700	$0
Pick-up Trucks (w/ fuel) =	4.6	3	$1,000	$13,720
Large Trucks (w/Fuel) =	4.6	1	$1,200	$5,488
Crew Per Diem =	NA	1,664	$75	$124,800
Barge Rental & Mobilization =	2.3	2	$9,550	$43,675
Hand Tools =	4.6	20	$10	$915
Power Tools =	4.6	9	$50	$2,058
Office Trailer =	4.6	1	$450	$2,058
Storage Trailer =	4.6	2	$375	$3,430
Subtotal Equipment =				**$559,334**

Bellevue Toll Bridge Over the Missouri River

Infrastructure, LLC / Bellevue Bridge Commision

Given: MINIMAL AREAS - Complete Coating Removal & Replacement - SSPC-SP 10 / Organic Zinc / Epoxy / Urethane

Health and Safety

Item	# Months	Qty	Rate	Cost
Tyvek Suits =	4.6	26	$50	$5,945
Blood Lead Testing =	NA	13	$100	$1,300
Worker Exposure Monitoring =	4.6	6	$30	$823
Worker Exposure Monitor Analysis =	4.6	6	$26	$713
Wash Trailer =	4.6	1	$450	$2,058
Waste Disposal (Tons) =	NA	380	$300	$113,861
Safety Boat =	2.3	1	$500	$1,143

Subtotal Other Costs = $125,845

Engineering & Submittals

Item	Hours	Qty	Rate	Cost
Drafting =	30	1	$65	$1,950
Engineering =	30	1	$175	$5,250
Administrative Submittal Support =	40	1	$45	$1,800

Subtotal Engineering & Submittals = $9,000

Total

Subtotal Job =	$1,595,515
Overhead (10%) =	$159,551
Subtotal with Overhead=	$1,755,066
Profit (15%) =	$263,260
Location Factor (Omaha) =	1.002
Total Cost =	**$2,022,363**
Cost / Sq ft =	$19.32

Expected Bid Range:	**$1,921,200**	**to**	**$2,325,700**
	$18.35	to	$22.21

Bellevue Toll Bridge Over the Missouri River

Infrastructure, LLC / Bellevue Bridge Commision

Given: ENTIRE BRIDGE - Complete Coating Removal & Replacement - SSPC-SP 10 / Organic Zinc / Epoxy / Urethane

Assumptions : All Fabricated Structural Steel Included. Underside SIP Forms Excluded
Hazardous Metals, Equipment Staged On Ground or Barges Under Bridge,
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Bridge Surface Preparation Waste & Debris will Test Hazardous

Total Surface Area =	216,200	sq ft
Longest Containment Length =	425	ft
No. of Spans =	11	
Platform Length =	425	ft
Platform Width =	32	ft
Required Platform Deck Area =	13,600	sq ft
Containment Draft Area =	640	sq ft
Cross Draft =	Yes	Yes or No
Hazardous Metals =	Yes	Yes or No
Recyclable Abrasive =	No	Yes or No

Assume Crew Size

Class	No.	Rate/hr	OT Rate
Foreman	1	$60	$90
Abrasive Blasters	6	$55	$83
Intermediate & Finish Coat Painters	3	$55	$83
Laborers	3	$50	$75

Labor Cost per Day = $7,755 @ Hours / Day = 10

Labor

Mobilize =	5	Days
Platform =	5	Days
Rigging / Containment Moves =	39	Days
Pack Rust Removal =	6	Days
Blast Clean / Prime =	69	Days
Full Intermediate Coat =	34	Days
Full Finish Coat =	34	Days
Cleanup, Demob, Punch List =	6	Days
Total Production Days =	134	Days
Calendar Months =	6.3	Months

Subtotal Labor = $1,039,170

Bellevue Toll Bridge Over the Missouri River

Infrastructure, LLC / Bellevue Bridge Commision

Given: ENTIRE BRIDGE - Complete Coating Removal & Replacement - SSPC-SP 10 / Organic Zinc / Epoxy / Urethane

Materials

	Rate	Unit	Cost
Full Prime =	$0.49	/sq ft	$105,938
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Full Finish =	$0.32	/sq ft	$69,184
Thinner =	$0.05	/sq ft	$10,810
Blast Media =	$50	/ton	$37,835
Subtotal Materials =			**$291,314**

Equipment

Item	#Months	Qty	Rate	Cost
Blast Machines =	6.3	2	$5,550	$69,412
HEPA Filters for Vacuum Unit =	6.3	2	$260	$3,252
Dust Collectors =	6.3	2	$6,800	$85,045
Dust Collector Duct =	NA	160	$25	$4,000
Blast Hoses =	6.3	6	$940	$35,269
Blast Nozzles =	6.3	6	$160	$6,003
Blast Hoods =	NA	6	$250	$1,500
Containment Lighting =	NA	1	$550	$550
Air Compressors (1,600cfm) =	6.3	2	$4,600	$57,531
Airless Spray Pumps =	6.3	2	$1,000	$12,507
Spray Lines =	6.3	9	$250	$14,070
Spray Guns =	NA	9	$300	$2,700
Generators =	6.3	2	$600	$7,504
Platform (Roof Decking and Cables) =	NA	13,600	$5	$68,000
Containment Outriggers =	NA	118	$180	$21,240
Containment Tarps =	NA	36,560	$0.50	$18,280
Tarp Cables =	NA	5,667	$0.50	$2,833
Crane =	2.9	1	$4,800	$13,720
Picks & Pick Cables =	6.3	2	$3,105	$38,833
Pressure Washers =	6.3	0	$700	$0
Pick-up Trucks (w/ fuel) =	6.3	3	$1,000	$18,760
Large Trucks (w/Fuel) =	6.3	1	$1,200	$7,504
Crew Per Diem =	NA	2,574	$75	$193,050
Barge Rental & Mobilization =	3.1	2	$9,550	$59,719
Hand Tools =	6.3	20	$10	$1,251
Power Tools =	6.3	9	$50	$2,814
Office Trailer =	6.3	1	$450	$2,814
Storage Trailer =	6.3	2	$375	$4,690
Subtotal Equipment =				**$752,851**

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Worker Exposure Monitor Analysis =	6.3	6	$26	$976
Wash Trailer =	6.3	1	$450	$2,814
Waste Disposal (Tons) =	NA	784	$300	$235,118
Safety Boat =	6.3	1	$500	$3,127

Subtotal Other Costs =	**$252,589**

Engineering & Submittals

Item	Hours	Qty	Rate	Cost
Drafting =	40	1	$65	$2,600
Engineering =	30	1	$175	$5,250
Administrative Submittal Support =	40	1	$45	$1,800

Subtotal Engineering & Submittals =	**$9,650**

Total

Subtotal Job =	$2,345,574
Overhead (10%) =	$234,557
Subtotal with Overhead=	$2,580,131
Profit (15%) =	$387,020
Location Factor (Omaha) =	1.002
Total Cost =	**$2,973,085**
Cost / Sq ft =	$13.75

Expected Bid Range:	**$2,824,400**	**to**	**$3,419,000**
	$13.06	to	$15.81

Bellevue Toll Bridge Over the Missouri River

Infrastructure, LLC / Bellevue Bridge Commision

Given: MINIMAL AREAS - Complete Coating Removal & Replacement - SSPC-SP 10 / Organic Zinc / Epoxy / Urethane

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Platform Width =	32	ft
Required Platform Deck Area =	13,600	sq ft
Containment Draft Area =	640	sq ft
Cross Draft =	Yes	Yes or No
Hazardous Metals =	Yes	Yes or No
Recyclable Abrasive =	No	Yes or No

Assume Crew Size

Class	No.	Rate/hr	OT Rate
Foreman	1	$60	$90
Abrasive Blasters	6	$55	$83
Intermediate & Finish Coat Painters	3	$55	$83
Laborers	3	$50	$75

Labor Cost per Day = $7,755 @ Hours / Day = 10

Labor

Mobilize =	5	Days
Platform =	5	Days
Rigging / Containment Moves =	39	Days
Pack Rust Removal =	6	Days
Blast Clean / Prime =	33	Days
Full Intermediate Coat =	17	Days
Full Finish Coat =	17	Days
Cleanup, Demob, Punch List =	6	Days
Total Production Days =	98	Days
Calendar Months =	4.6	Months

Subtotal Labor = $759,990

Bellevue Toll Bridge Over the Missouri River

Infrastructure, LLC / Bellevue Bridge Commision

Given: MINIMAL AREAS - Complete Coating Removal & Replacement - SSPC-SP 10 / Organic Zinc / Epoxy / Urethane

Materials

	Rate	Unit	Cost
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Full Finish =	$0.32	/sq ft	$33,504
Thinner =	$0.05	/sq ft	$5,235
Blast Media =	$50	/ton	$18,323
Subtotal Materials =			**$141,347**

Equipment

Item	#Months	Qty	Rate	Cost
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Dust Collectors =	4.6	2	$6,800	$62,197
Dust Collector Duct =	NA	160	$25	$4,000
Blast Hoses =	4.6	6	$940	$25,794
Blast Nozzles =	4.6	6	$160	$4,390
Blast Hoods =	NA	6	$250	$1,500
Containment Lighting =	NA	1	$550	$550
Air Compressors (1,600cfm) =	4.6	2	$4,600	$42,075
Airless Spray Pumps =	4.6	2	$1,000	$9,147
Spray Lines =	4.6	9	$250	$10,290
Spray Guns =	NA	9	$300	$2,700
Generators =	4.6	2	$600	$5,488
Platform (Roof Decking and Cables) =	NA	13,600	$5	$68,000
Containment Outriggers =	NA	118	$180	$21,240
Containment Tarps =	NA	18,280	$0.50	$9,140
Tarp Cables =	NA	2,833	$0.50	$1,417
Crane =	2.9	1	$4,800	$13,720
Picks & Pick Cables =	4.6	2	$3,105	$28,400
Pressure Washers =	4.6	0	$700	$0
Pick-up Trucks (w/ fuel) =	4.6	3	$1,000	$13,720
Large Trucks (w/Fuel) =	4.6	1	$1,200	$5,488
Crew Per Diem =	NA	1,664	$75	$124,800
Barge Rental & Mobilization =	2.3	2	$9,550	$43,675
Hand Tools =	4.6	20	$10	$915
Power Tools =	4.6	9	$50	$2,058
Office Trailer =	4.6	1	$450	$2,058
Storage Trailer =	4.6	2	$375	$3,430
Subtotal Equipment =				**$559,334**

Bellevue Toll Bridge Over the Missouri River

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Given: MINIMAL AREAS - Complete Coating Removal & Replacement - SSPC-SP 10 / Organic Zinc / Epoxy / Urethane

Health and Safety

Item	# Months	Qty	Rate	Cost
Tyvek Suits =	4.6	26	$50	$5,945
Blood Lead Testing =	NA	13	$100	$1,300
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Worker Exposure Monitor Analysis =	4.6	6	$26	$713
Wash Trailer =	4.6	1	$450	$2,058
Waste Disposal (Tons) =	NA	380	$300	$113,861
Safety Boat =	2.3	1	$500	$1,143

Subtotal Other Costs = $125,845

Engineering & Submittals

Item	Hours	Qty	Rate	Cost
Drafting =	30	1	$65	$1,950
Engineering =	30	1	$175	$5,250
Administrative Submittal Support =	40	1	$45	$1,800

Subtotal Engineering & Submittals = $9,000

Total

Subtotal Job =	$1,595,515
Overhead (10%) =	$159,551
Subtotal with Overhead=	$1,755,066
Profit (15%) =	$263,260
Location Factor (Omaha) =	1.002
Total Cost =	**$2,022,363**
Cost / Sq ft =	$19.32

Expected Bid Range:	**$1,921,200**	**to**	**$2,325,700**
	$18.35	to	$22.21

June 29, 2007

FUTURE BELLEVUE BRIDGE
A CONCEPTUAL DESIGN

Introduction

This is a brief report on a conceptual design of a future bridge to replace the existing Bellevue Bridge. The report was prepared for the Bellevue Bridge Commission as an aid to make future plans for the disposition of the existing Bellevue Bridge. The existing Bellevue Bridge built in 1952 is located on Highway 370 over the Missouri River, east of the City of Bellevue, NE. The description of the conceptual design includes project location, project length, bridge type, cost estimate and permits required by various regulatory agencies. All issues that may affect the design of the bridge are not identified in this report. No land survey, location study, traffic study or geotechnical investigation was done to prepare this report. The contents of this report should be considered conceptual in nature.

Bridge Layout

The existing bridge has two lanes, with a clear roadway width of 22ft. Bridge length is 2,000ft. The approach roadway at each end is situated on high earth embankment. On the north side of the west approach is a wastewater treatment operated by the City of Bellevue. On the south side of the west approach is Hayworth Park that includes a camp ground and marina. Payne Drive leading into Hayworth Park intersects Highway 370 approximately 640ft west of the bridge. There is a local road under the bridge that exits Hayworth Park from the north and winds around the wastewater treatment plant connecting back to Highway 370. The east end of the bridge spans a Missouri River levee and has farmland on both sides. The wastewater treatment plant will be decommissioned on a future date and the land sold to the Bridge Commission. There is a BNSF underpass approximately 1,400ft west of the bridge. See attached aerial view for layout of the bridge.

Since this is a toll bridge, the new bridge will need to be constructed on new alignment without closing the existing bridge. As such, the alignment is shown 100ft north of the existing bridge. The new alignment will pass through the wastewater treatment plant on the west and farmland on the east, merging back to the existing roadway alignment. The existing intersection of Payne Drive with Highway 370 and the local road will need to be reconstructed. The BNSF underpass to the west is expected to stay in place. Approach roadway embankment for the new bridge will be similar in height to the existing embankment. The new embankment will require approximately 200ft of new right of way from the toe of the existing embankment. Approximate project length is estimated to be one mile. The limits of the project are shown in the attached aerial view.

Bridge Configuration

The cost of a bridge depends on factors such as span length, bridge width and aesthetic requirements. The most economical bridge will have the minimum required width, shortest possible bridge length and the most efficient structural components. With those considerations in mind a bridge as described below will produce the most economical structure.

The minimum standards for a rural highway will require two 12ft lanes with 8ft shoulders on each side. The roadway width will be 40ft. A wider cross-section with more lanes can be considered if traffic count dictates it. A typical cross-section of the bridge is shown.

The Missouri River is a navigable channel with minimum horizontal and vertical clearances set by the Coast Guard. This clearance width will determine the length of main river span. For a recent bridge design over the Missouri River at Rulo, NE, where the river is similar in width and curvature, the Coast Guard required a

navigation clearance width of 420ft. This clearance width matches the existing navigation clearance span of the Bellevue Bridge. On this basis it is assumed that the new bridge will have the same clearance requirements. Due to the close proximity of the new bridge to the existing bridge and to maintain existing river hydraulics, both bridges will have approximately the same overall length and hydraulic opening. Under these two conditions, a span arrangement is shown that will satisfy both navigation clearance and river hydraulics. The river section will be a steel plate girder bridge of spans 300ft + 425ft + 300ft; the Nebraska approach section will be a concrete girder bridge with spans 155ft + 155ft; and the Iowa approach section will be a concrete girder bridge with spans 172.5ft + 180ft + 180ft + 172.5ft. The mix of concrete girders and steel girders will provide the most cost efficient bridge superstructure.

Design Process and Permits

A typical design process for such a bridge will go through the following steps. The items shown are not necessarily sequential and may not be comprehensive.

- Land survey
- Location study
- Environmental impact study
- Traffic study
- Historic Bridge review
- Preliminary design
- Final Design
- Public involvement
- Utility conflicts
- DOT and county agreements
- Corp of Engineers permits
- Coast Guard permit
- EPA review

If the project is privately funded without public funding, certain requirements and rules are waived. The full scope of rules and regulations to be followed will need further investigation.

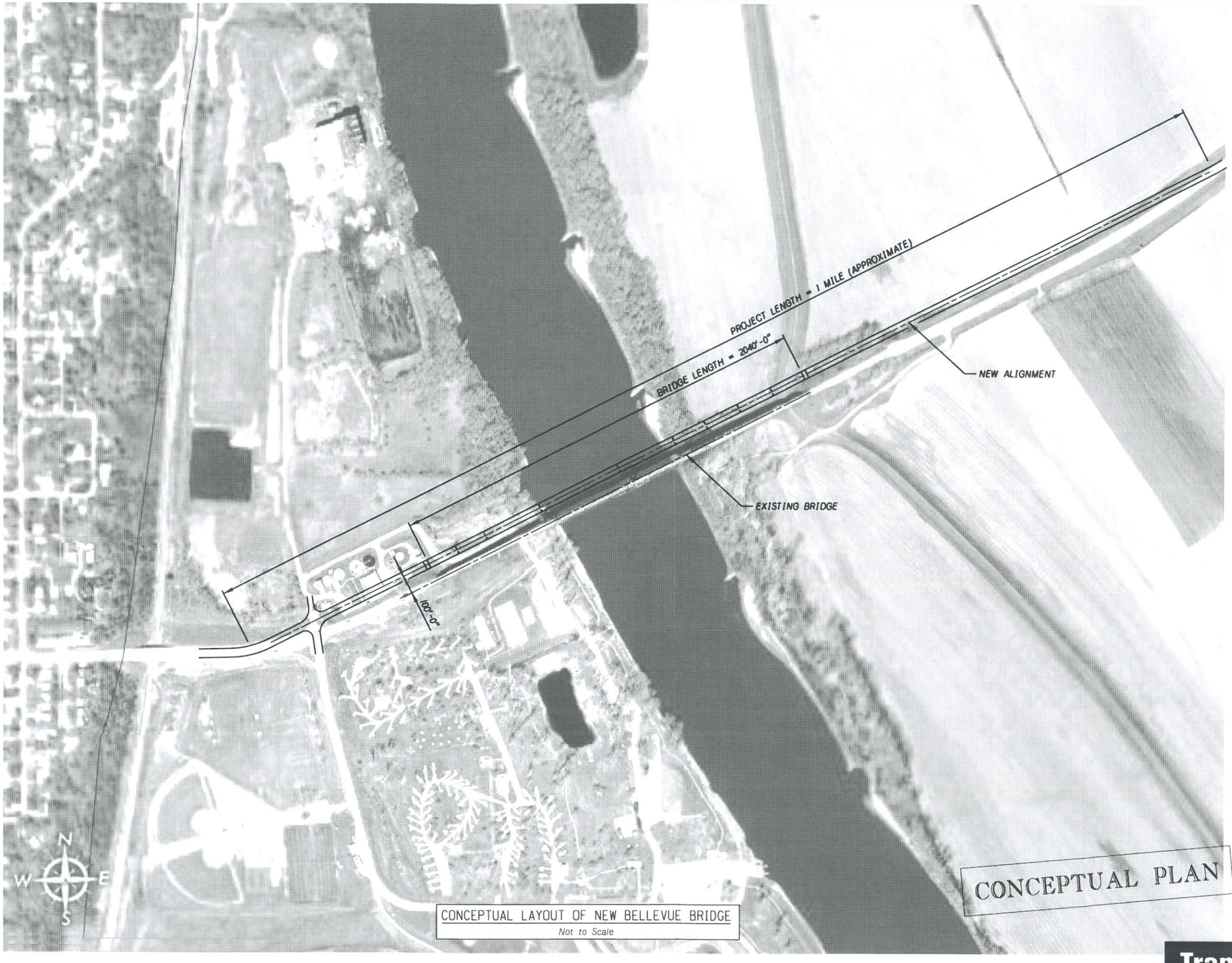
Costs

For planning purposes it is customary to use dollars per square feet to estimate the cost of such projects. Cost data is available from Nebraska Department of Roads based on actual bids received on past projects. Using such sources, the cost estimate for a bridge as described in this report is derived below. Costs shown are based on 2007 prices.

River section	= $300/Sqft x 1025ft x 43ft = $13,250,000
NE section	= $120/Sqft x 310ft x 43ft = $1,600,000
IA section	= $120/Sqft x 705ft x 43ft = $3,650,000
Approach Roadway	= $2,000,000
New Right-of-Way	= $200,000
Contingency	= $2,000,000
Total approx. cost	= $23,000,000

Cost of demolishing the wastewater treatment plant, related cleanup and utility relocation is not included. The Engineering fee for design and construction services of such a project typically ranges from 10% to16% of construction cost depending on the complexity of the project.

This report is authored by TranSystems Corporation. Questions related to this report may be directed to Sam Gogoi, 402-502-4401.



CONCEPTUAL LAYOUT OF NEW BELLEVUE BRIDGE

Not to Scale

CONCEPTUAL PLAN

Tran Systems

Sheet A

STRUCTURE NUMBER
S370 01918 00

LICENSED PROFESSIONAL ENGINEER
SAMAR GOGOI 13899 IOWA
6/29/07

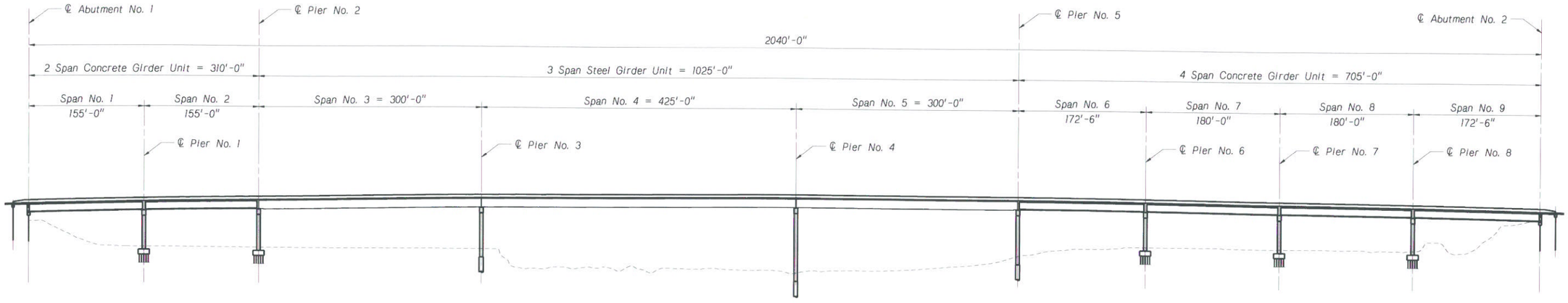
2040'-0" - 9-SPAN BRIDGE

COUNTY SARPY,NE / MILLS,IA **LOCATION** BELLEVUE, NE
HWY. NO. 370 **SKEW** 0°
REF. POST. **ROADWAY** 40'-0"
STA. 100+00.00 **DESIGN LIVE LOAD** HL93
DESIGNED BY SG **DETAILED BY** EAN **CHECKED BY** MJJ **DATE** JULY 2007

BELLEVUE BRIDGE COMMISSION

PROFESSIONAL STRUCTURAL ENGINEER
SAMAR GOGOI E-7876 STATE OF NEBRASKA
6/29/07

SHEET NO. 1/3



ELEVATION OF NEW BELLEVUE BRIDGE

Not to Scale

CONCEPTUAL PLAN

Tran Systems

Sheet A

STRUCTURE NUMBER
S370 01918 00

LICENSED PROFESSIONAL ENGINEER
SAMAR GOGOI
13899
4/29/07
IOWA

2040'-0" - 9-SPAN BRIDGE

BELLEVUE BRIDGE COMMISSION

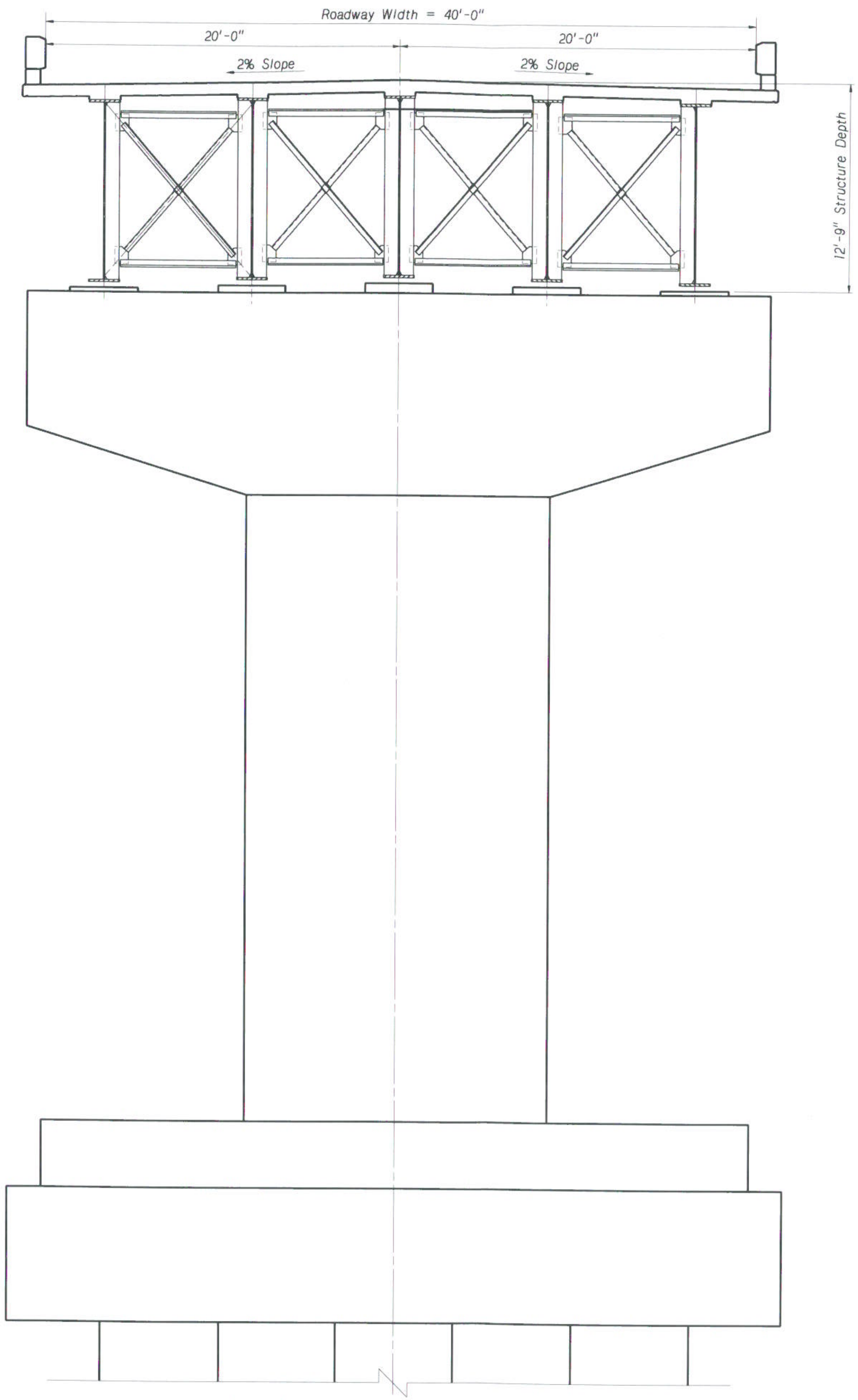
DETAILED BY EAN **CHECKED BY** MJJ **DATE** JULY 2007

DESIGNED BY SG
DESIGN LIVE LOAD HL93
ROADWAY 40'-0"
SKEW 0°
LOCATION BELLEVUE, NE

COUNTY SARPY,NE / MILLS,IA
HWY. NO. 370
REF. POST.
STA. 100+00.00

PROFESSIONAL STRUCTURAL ENGINEER
SAMAR GOGOI
E-7876
STATE OF NEBRASKA
4/29/07

SHEET NO. 2/3



TYPICAL SECTION/ELEVATION OF RIVER PIER

Scale: 1/4" = 1'-0"

CONCEPTUAL PLAN

STRUCTURE NUMBER S370 01918 00

LICENSED PROFESSIONAL ENGINEER SAMAR GOGOI 13899 IOWA

2040'-0" - 9-SPAN BRIDGE

COUNTY SARPY,NE / MILLS,IA **LOCATION** BELLEVUE, NE

HWY. NO. 370 **SKEW** 0°

REF. POST. **ROADWAY** 40'-0"

STA. 100+00.00 **DESIGN LIVE LOAD** HL93

DESIGNED BY SG **DETAILED BY** EAN **CHECKED BY** MJJ **DATE** JULY 2007

BELLEVUE BRIDGE COMMISSION

PROFESSIONAL STRUCTURAL ENGINEER SAMAR GOGOI E-7876 STATE OF NEBRASKA

TranSystems

SHEET NO. 3 / 3

Sheet A

BELLEVUE BRIDGE COMMISSION

BELLEVUE BRIDGE

FUTURE BELLEVUE BRIDGE COST ESTIMATE

November, 2010

PREPARED FOR

Bellevue Bridge Commission
Attention: Mr. Donald Fenster, DDS
1604 Brenda Drive
Bellevue, NE 68005

PREPARED BY

HNTB Corporation
Central Park Plaza North
222 South 15th Street, Suite 247-N
Omaha, NE 68102
Phone: (402) 342-4421
Fax: (402) 342-9334

HNTB

HNTB Corporation
Engineers Architects Planners

222 South 15th Street, Suite 247-N
Omaha, NE 68102

Telephone (402) 342-4421
Facsimile (402) 342-9334
www.hntb.com

November 13, 2010

Dr. Donald Fenster
Chairman
Bellevue Bridge Commission
1604 Brenda Drive
Bellevue NE 68005

Re: Task Order No. 06 – Bellevue Bridge Replacement Cost Estimate

Dear Dr. Fenster;

We have completed the Cost Estimate for the replacement cost of the Bellevue Bridge. The cost estimate is of a conceptual design of a replacement bridge completed in 2007. A copy of that study completed by me should be available in your files.

Cost of bid items were based on recent bids received by the Nebraska Department of Roads on similar projects. Bridge life expectancy is estimated to be 75 years and is dependent on proper maintenance of the existing bridge. The cost estimate was done based on 2010 cost data and inflated at 2.5% inflation per year to arrive at 2027 cost.

Please let me know if you have any questions regarding the cost study.

Regards,

Sam Gogoi, PE, SE
HNTB Corporation

	Made by	Date	Job Number
NTB	jcf	11/13/2010	46482
	Checked by	Date	
	SG	11/15/2010	Sheet Number
Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

COST SUMMARY-OVERALL

Item No.	Item Description	Total Cost
1	GENERAL CONSTRUCTION AND ROADWAY	$5,723,255
2	MAIN RIVER BRIDGE	$15,071,290
3	NEBRASKA APPROACH BRIDGE	$1,287,009
4	IOWA APPROACH BRIDGE	$2,634,347
	SUBTOTAL=	$24,715,901
	TYPICAL ENGINEERING FEE, 10% (SEE NOTE 9)=	$2,471,590
	CONTINGENCY, 10%=	$2,471,590
	TOTAL COST OF NEW BRIDGE IN 2010 DOLLARS=	$29,659,081
	TOTALCOST OF NEW BRIDGE IN 2027 DOLLARS=	$45,129,800

MAINTENANCE COST OF EXISTING BRIDGE THROUGH 2027 (SEE NOTE 12)=	$1,050,000

ASSUMPTIONS FOR COST ESTIMATE:

1 COST ESTIMATE IS BASED ON THE REPORT "FUTURE BELLEVUE BRIDGE-A CONCEPTUAL DESIGN", DATED JUNE 29, 2007.
2 COSTS FOR MAIN RIVER BRIDGE BASED ON 1026'-0" X 42'-8" STEEL PLATE GIRDER BRIDGE.
3 COSTS FOR NEBRASKA APPROACH BRIDGE BASED ON 311'-0" X 42'-8" PPC BEAM BRIDGE.
4 COSTS FOR IOWA APPROACH BRIDGE BASED ON 706'-0" X 42'-8" PPC BEAM BRIDGE.
5 APPROACH ROADWAY LENGTH REQUIRED: 1,000' FOR NEBRASKA SIDE AND 2,240' FOR IOWA SIDE.
6 EXISTING ROW ASSUMED AS 50' ON BOTH SIDES OF CENTERLINE OF ROADWAY.
7 CONSTRUCTION COSTS DATA BASED ON THE RULO BRIDGE PROJECT, NEAR RULO, NE OVER THE MISSOURI RIVER, WHICH IS A NEBRASKA DEPARTMENT OF ROADS PROJECT LET ON JULY 8, 2010.
8 ADDITIONAL COST DATA BASED ON AVERAGE UNIT BID PRICES OBTAINED FROM NDOR
9 COST OF DEMOLISHING THE WASTEWATER TREATMENT PLANT, RELATED CLEANUP, AND UTILITY RELOCATION IS NOT INCLUDED.
10 THE TYPICAL ENGINEERNG FEE INCLUDES PLANNING, HYDRAULIC, GEOTECHNICAL, ROADWAY, AND STRUCTURAL DESIGN SERVICES AND CONSTRUCTION INSPECTION SERVICES AS REQUIRED FOR PRELIMINARY DESIGN, FINAL DESIGN, AND PERMITTING.
11 BRIDGE LIFE EXPECTANCY IS ESTIMATED TO BE 75 YEARS. A 2.5% YEARLY INFLATION WAS USED TO CALCULATE THE FUTURE 2027 COST.
12 BRIDGE MAINTENANCE COST ESTIMTED TO BE $50,000 PER YEAR IN 2010. TOTAL MAINTENANCE COST THROUGH 2027 INCLUDING A YEARLY INFLATION OF 2.5% IS ESTIMATD TO BE $1,050,000

	Made by	Date	Job Number
	jcf	11/12/2010	46482
	Checked by	Date	
	SG	11/15/2010	Sheet Number
Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

COST SUMMARY
GENERAL AND ROADWAY

	Made by	Date	Job Number
HNTB	jcf	11/12/2010	46482
	Checked by	Date	
	SG	11/15/2010	Sheet Number
Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

COST SUMMARY-GENERAL

Item No.	Item Description	Unit	Quantity	Unit Cost	Cost
1	MOBILIZATION	LS	1	$1,500,000	1,500,000
2	REMOVAL, EXISTING BRIDGE	LF	2000	$1,500	3,000,000
3	RIGHT OF WAY ACQUISITION	AC	4	$4,000	16,000
4	GENERAL CLEARING AND GRUBBING	LS	1	$50,000	50,000
5	EXCAVATION FOR APPROACH ROADWAY	CY	6000	$4.00	24,000
6	EARTHWORK, EMBANKMENT	CY	41760	$10	417,600
7	REMOVE, ASPHALT SURFACE	SY	533	$5	2,667
8	COVER CROP SEEDING	AC	2	$400	800
9	TEMPORARY SEEDING	AC	2	$400	800
10	EROSION CHECKS	LF	700	$3.00	2,100
11	FABRIC SILT FENCE	LF	2500	$3.00	7,500
12	PERMANENT PAVEMENT MARKING	LF	5280	$0.35	1,848
13	DELINEATOR, TYPE III	EACH	40	$25	1,000
14	9" DOWELED CONCRETE PAVEMENT	SY	8907	$45	400,800
15	FOUNDATION COURSE 4"	SY	11133	$9.00	100,200
16	STABILIZED SUBGRADE	SY	11133	$6.00	66,800
17	EARTH SHOULDER CONSTRUCTION	STA	33	$350	11,690
18	MISCELLANEOUS, ROADWAY	LS	1	$50,000	50,000
19	W-BEAM GUARDRAIL	LF	113	$20	2,250
20	BRIDGE APPROACH SECTIONS	EACH	4	$2,500	10,000
21	GUARDRAIL END TREATMENT, TYPE II	EACH	4	$1,800	7,200
22	CONSTRUCTION STAKING AND SURVEYING	LS	1	$50,000	50,000
				TOTAL=	***5,723,255***

	Made by	Date	Job Number
HNTB	jcf	11/12/2010	46482
	Checked by	Date	
	SG	11/15/2010	Sheet Number
Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

RIGHT OF WAY ACQUISITION

GENERAL

ROW

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				BEGINNING	END			
		(FT)	(FT)	(FT)	(FT)	(FT)	(FT^2)	(AC)
ROW (NEBRASKA)	NONE NEEDED							
ROW (IOWA)	1	2240		86.000	50.000	68.00	152320	3.50
							Total =	3.50

*EXISTING ROW IS 50' ON EACH SIDE OF EXISTING ROADWAY.

Grand Total = 3.50

	Made by	Date	Job Number
HNTB	jcf	11/12/2010	46482
	Checked by	Date	
	SG	11/15/2010	Sheet Number
Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

NEW PAVEMENT

GENERAL

9" DOWELED CONCRETE PAVEMENT

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(SQ FT)	(SQ YD)
ROW (NEBRASKA)	1	1050.000		24.000	24.000	24.00	25200.00	2800.00
ROW (IOWA)	1	2290.000		24.000	24.000	24.00	54960.00	6106.67
							Total =	8906.67

FOUNDATION COURSE, 4"

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(SQ FT)	(SQ YD)
ROW (NEBRASKA)	1	1050.000		30.000	30.000	30.00	31500.00	3500.00
ROW (IOWA)	1	2290.000		30.000	30.000	30.00	68700.00	7633.33
							Total =	11133.33

STABILIZED SUBGRADE

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(SQ FT)	(SQ YD)
ROW (NEBRASKA)	1	1050.000		30.000	30.000	30.00	31500.00	3500.00
ROW (IOWA)	1	2290.000		30.000	30.000	30.00	68700.00	7633.33
							Total =	11133.33

EARTH SHOULDER CONSTRUCTION

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(LF)	(STA)
ROW (NEBRASKA)	1	1050.000					1050.00	10.50
ROW (IOWA)	1	2290.000					2290.00	22.90
							Total =	33.40

HNTB	Made by jcf	Date 11/12/2010	Job Number 46482
	Checked by SG	Date 11/15/2010	Sheet Number
Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

REMOVE PAVEMENT

GENERAL

REMOVE ASPHALT PAVEMENT

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(SQ FT)	(SQ YD)
ROW (NEBRASKA)	1	100.000		24.000	24.000	24.00	2400.00	266.67
ROW (IOWA)	1	100.000		24.000	24.000	24.00	2400.00	266.67
							Total =	533.33

Grand Total = 533.33

	Made by	Date	Job Number
HNTB	jcf	11/12/2010	46482
	Checked by	Date	
	SG	11/15/2010	Sheet Number
Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

EMBANKMENT

GENERAL

EMBANKMENT

ITEM	LENGTH	WIDTH, TOP	WIDTH, BTM	HEIGHT		HEIGHT AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
ROW (NEBRASKA)	1000	40.000	76.000	6.000	6.000	6.00	348,000	12,889
ROW (IOWA)	2240	40.000	76.000	6.000	6.000	6.00	779,520	28,871
							Total =	41,760

*Based on average height of 6' with 3:1 sideslopes.

Grand Total = 41,760

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	jcf	11/12/2010	46482
	Checked by	Date	
	SG	11/15/2010	Sheet Number
Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

COST SUMMARY
MAIN RIVER BRIDGE

	Made by	Date	Job Number
	jcf	11/12/2010	46482
	Checked by	Date	
	SG	11/15/2010	Sheet Number
Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

COST SUMMARY-MAIN SPAN

Item No.	Item Description	Unit	Quantity	Unit Cost	Cost
1	PIER EXCAVATION	LS	1	1,510,000	1,510,000
2	CLASS 47BD-4000 CONCRETE FOR BRIDGE	CY	5,589	550	3,073,862
3	STEEL SUPERSTRUCTURE	LBS	3,485,510	1.35	4,705,439
4	EPOXY COATED REINFORCING STEEL	LBS	828,699	0.90	745,829
5	DRILLED SHAFT (6'-0" DIAMETER)	LF	600	2,000	1,200,000
6	ROCK SOCKET (5'-6" DIAMETER)	LF	320	1,000	320,000
7	DRILLED SHAFT (7'-0" DIAMETER)	LF	570	2,500	1,425,000
8	ROCK SOCKET (6'-6" DIAMETER)	LF	540	1,300	702,000
9	FOUNDATION INSPECTION HOLES	LF	180	150	27,000
10	TEST DRILLED SHAFT	EACH	2	500,000	1,000,000
11	EXPANSION BEARING, TFE TYPE	EACH	8	2,500	20,000
12	FIXED BEARING DEVICE, TYPE 1	EACH	8	9,000	72,000
13	NAVIGATION LIGHTING SYSTEM	EACH	1	35,000	35,000
14	TEMPORARY NAVIGATION LIGHTING SYSTEM	EACH	1	25,000	25,000
15	1 1/2" CONDUIT IN BRIDGE	LF	1026	10	10,260
16	CLEARANCE GUAGE	LS	1	20,000	20,000
17	DECK JOINT SEAL, TYPE IV	LF	87	1,500	129,900
18	DRAINAGE SYSTEM	EACH	2	25,000	50,000
				TOTAL=	***15,071,290***

NTB	Made by jcf	Date 11/12/2010	Job Number 46482
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Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

CLASS 47BD-4000 CONCRETE FOR BRIDGE

RIVER SPANS

SLAB

ITEM	NO	LENGTH	HEIGHT	WIDTH MAX	WIDTH MIN	WIDTH AVG	QUANTITY	QUANTITY
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
Main Bridge	1	1026.000	0.708	42.667	42.667	42.67	31007.97	1148.44
							Total =	1148.44

HAUNCH & MISC

ITEM	NO	LENGTH	HEIGHT	WIDTH MAX	WIDTH MIN	WIDTH AVG	QUANTITY	QUANTITY
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
HAUNCH	4	1026.000	0.167	1.833	2.500	2.17	1481.94	54.89
TURNDOWNS	2	42.666	2.250	1.000	1.583	1.29	248.00	9.19
PIER THICKENING	2	42.666	0.792	1.542	1.542	1.54	104.15	3.86
							Total =	67.93

CONCRETE RAILS

ITEM	NO	LENGTH	HEIGHT	WIDTH MAX	WIDTH MIN	WIDTH AVG	QUANTITY	QUANTITY
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
CONCRETE RAILS	2	1026.000	1.000	2.520	2.520	2.52	5171.04	191.52
			*Rail = 2.52 ft^3/LF				Total =	191.52

PIERS - End

ITEM	NO	LENGTH	HEIGHT	WIDTH MAX	WIDTH MIN	WIDTH AVG	QUANTITY	QUANTITY
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
CAP AREA 1	2	6.000	5.000	44.000	44.000	44.00	2640.00	97.78
CAP AREA 2	2	6.000	4.000	44.000	21.000	32.50	1560.00	57.78
STEM WALL	2	2.500	5.000	44.000	44.000	44.00	1100.00	40.74
PEDESTALS APPROACH	8	5.000	2.500	0.500	0.500	0.50	50.00	1.85
PEDESTALS MAIN SPAN	8	4.000	3.500	0.500	0.500	0.50	56.00	2.07
COLUMN AREA 1	2	13.000	38.600	5.000	5.000	5.00	5018.00	185.85
COLUMN AREA 2	2	1.000	38.600	19.630	19.630	19.63	1515.44	56.13
PIER WALL AREA 1	1	19.000	35.000	7.000	7.000	7.00	4655.00	172.41
PIER WALL AREA 2	1	1.000	35.000	38.480	38.480	38.48	1346.80	49.88
FOOTING	2	36.000	7.000	24.000	24.000	24.00	12096.00	448.00
							Total =	1112.49

PIERS - Intermediate

ITEM	NO	LENGTH	HEIGHT	WIDTH MAX	WIDTH MIN	WIDTH AVG	QUANTITY	QUANTITY
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
CAP AREA 1	2	7.000	8.000	44.000	44.000	44.00	4928.00	182.52
CAP AREA 2	2	7.000	4.000	44.000	21.000	32.50	1820.00	67.41
PEDESTALS	4	5.000	7.000	0.500	0.500	0.50	70.00	2.59
COLUMN AREA 1	2	12.000	31.000	6.000	6.000	6.00	4464.00	165.33
COLUMN AREA 2	2	1.000	31.000	28.270	28.270	28.27	1752.74	64.92
PIER WALL AREA 1	2	18.000	40.000	8.000	8.000	8.00	11520.00	426.67
PIER WALL AREA 2	2	1.000	40.000	50.270	50.270	50.27	4021.60	148.95
FOOTING	2	42.000	8.000	28.000	28.000	28.00	18816.00	696.89
							Total =	1755.27

SEAL COURSE FOR PIERS

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
END PIERS	1	40.000	8.000	28.000	28.000	28.00	8960.00	331.85
INTERMEDIATE PIERS	2	46.000	9.000	32.000	32.000	32.00	26496.00	981.33
							Total =	1313.19

Grand Total = 5,589 CY

	Made by	Date	Job Number
HNTB	jcf	11/12/2010	46482
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EPOXY COATED REINFORCING STEEL

RIVER SPANS

SLAB

ITEM	NO	TOTAL CONCRETE	TYP. REINF/CY	TOTAL REINF.	QUANTITY
		(CY)	(LBS/CY)	(LBS)	(LBS)
Main Bridge	1	1216	260.000	316,257	316,257
				Total =	316,257

CONCRETE RAILS

ITEM	NO	TOTAL CONCRETE	TYP. REINF/CY	TOTAL REINF.	QUANTITY
		(CY)	(LBS/CY)	(LBS)	(LBS)
Main Bridge	1	192	205.000	39,262	39,262
				Total =	39,262

PIERS

ITEM	NO	TOTAL CONCRETE	TYP. REINF/CY	TOTAL REINF.	QUANTITY
		(CY)	(LBS/CY)	(LBS)	(LBS)
Main Bridge	1	2868	165.000	473,181	473,181
				Total =	473,181

Grand Total = 828,699

NTB	Made by jcf	Date 11/12/2010	Job Number 46482
	Checked by SG	Date 11/15/2010	Sheet Number
Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

FOUNDATION ELEMENTS

RIVER SPANS

DRILLED SHAFTS - 6'-0" DIAMETER

ITEM	NO	LENGTH	TIP ELEV				QUANTITY	QUANTITY
		(FT)	(FT)				(LF)	(LF)
6'-0" DIAMETER-PIER 1	4	75.000	732.000				300.00	300.00
6'-0" DIAMETER-PIER 4	6	50.000	741.000				300.00	300.00
						Total =		600.00

DRILLED SHAFTS - 7'-0" DIAMETER

ITEM	NO	LENGTH	TIP ELEV				QUANTITY	QUANTITY
		(FT)	(FT)				(LF)	(LF)
7'-0" DIAMETER-PIER 2	6	50.000	721.000				300.00	300.00
7'-0" DIAMETER-PIER 3	6	45.000	723.000				270.00	270.00
						Total =		570.00

ROCK SOCKET - 5'-6" DIAMETER

ITEM	NO	LENGTH	TIP ELEV				QUANTITY	QUANTITY
		(FT)	(FT)				(LF)	(LF)
5'-6" DIAMETER- PIER 1	4	35.000	732.000				140.00	140.00
5'-6" DIAMETER- PIER 4	6	30.000	741.000				180.00	180.00
						Total =		320.00

ROCK SOCKET - 6'-6" DIAMETER

ITEM	NO	LENGTH	TIP ELEV				QUANTITY	QUANTITY
		(FT)	(FT)				(LF)	(LF)
6'-6" DIAMETER-PIER 2	6	45.000	721.000				270.00	270.00
6'-6" DIAMETER-PIER 3	6	45.000	723.000				270.00	270.00
						Total =		540.00

	Made by	Date	Job Number
	jcf	11/12/2010	46482
	Checked by	Date	
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STRUCTURAL STEEL

RIVER SPANS

SLAB

ITEM	NO. GIRDERS	LENGTH		WEIGHT	QUANTITY	QUANTITY
	(#)	(FT)		(LBS)		(LBS)
GIRDERS, GRADE 70	4	250.000		498,275		498,275
GIRDERS, GRADE 50	4	775.000		2,653,320		2,653,320
SEPARATORS & MISC				327,790		327,790
SHEAR STUDS				6,125		6,125
			Total =			3,485,510

Grand Total = 3,485,510 LBS

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MISCELLANEOUS

RIVER SPANS

REMOVAL OF EXISTING BRIDGE

ITEM	NO	LENGTH						QUANTITY
		(FT)						(FT)
BELLEVUE BRIDGE	1	2000.0						2000.00
							Total =	2000.00

EXPANSION BEARINGS

ITEM	NO							QUANTITY
								(EACH)
Main Bridge	8							8.00
							Total =	8.00

FIXED BEARINGS

ITEM	NO							QUANTITY
								(EACH)
Main Bridge	8							8.00
							Total =	8.00

1 1/2" CONDUIT IN BRIDGE

ITEM	NO	LENGTH						QUANTITY
		(FT)						(FT)
Main Bridge	1	1026.000						1026.00
							Total =	1026.00

DECK JOINT SEAL, TYPE IV

ITEM	NO	LENGTH						QUANTITY
		(FT)						(FT)
Main Bridge	2	43.300						86.60
							Total =	86.60

	Made by	Date	Job Number
	jcf	11/12/2010	46482
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COST SUMMARY
NEBRASKA APPROACH BRIDGE

	Made by	Date	Job Number
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	Checked by	Date	
	SG	11/15/2010	Sheet Number
Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

COST SUMMARY-NEBRASKA APPROACH

Item No.	Item Description	Unit	Quantity	Unit Cost	Cost
1	ABUTMENT EXCAVATION	LS	1	$15,000	15,000
2	PIER EXCAVATION	LS	1	$15,000	15,000
3	CLASS 47BD-4000 CONCRETE FOR BRIDGE	CY	713	$550	392,018
4	PRECAST/PRESTRESSED CONCRETE GIRDERS	CY	362	$925	334,955
5	EPOXY COATED REINFORCING STEEL	LBS	158925	$0.90	143,032
6	STEEL DIAPHRAGM	EACH	8	$750	6,000
7	STEEL EXPANSION DIAPHRAGM	EACH	4	$1,200	4,800
8	STRUCTURAL STEEL FOR SUBSTRUCTURE	EACH	5000	$3	15,000
9	HP 14X89 STEEL PILING	LF	3300	$50	165,000
10	TEST PILE	EACH	2	$5,000	10,000
11	EXPANSION BEARING, TFE TYPE	EACH	10	$1,200	12,000
12	FIXED BEARING DEVICE, TYPE 1	EACH	10	$1,200	12,000
13	GRANULAR BACKFILL	CY	230	$45	10,350
14	SUBSURFACE DRAINAGE MATTING	SQ. YD.	47	$45	2,115
15	1 1/2" CONDUIT IN BRIDGE	LF	311	$10	3,110
16	CLASS 47BD-4000 CONC FOR APPROACHES	CY	98	$300	29,334
17	EPOXY COATED REINF. STEEL, APPROACHES	LBS	21889	$0.90	19,700
18	STRIP SEAL	LF	43	$300	12,990
19	ROCK RIPRAP, TYPE "B"	TONS	1145	$45	51,525
20	RIPRAP FILTER FABRIC	SQ. YD.	1320	$4	5,280
21	STEEL SHEET PILING	SQ. FT.	1140	$20	22,800
22	DRAINAGE SYSTEM	EACH	1	$5,000	5,000
				TOTAL=	***1,287,009***

NTB	Made by jcf	Date 11/12/2010	Job Number 46482
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CLASS 47BD-4000 CONCRETE FOR BRIDGE

NEBRASKA APPROACH

SLAB

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
NEBRASKA APPROACH	1	311.000	0.625	42.667	42.667	42.67	8293.33	307.16
							Total =	307.16

HAUNCH & MISC

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
HAUNCH	5	311.000	0.250	4.021	4.021	4.02	1563.09	57.89
TURNDOWN AT LAST PIER	1	42.666	2.333	1.000	1.583	1.29	128.59	4.76
TURNDOWN AT ABUT.	1	42.667	2.833	7.479	7.479	7.48	904.15	33.49
BEAM EMBED. TURN. ABUT	5	-1.333	1.000	6.288	6.288	6.29	-41.92	-1.55
PIER DIAPHRAGM	1	35.000	4.000	7.479	7.479	7.48	1047.08	38.78
BEAM EMBED. PIER DIAPH	10	-1.667	1.000	6.288	6.288	6.29	-104.79	-3.88
							Total =	129.49

CONCRETE RAILS

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
CONCRETE RAILS	2	311.000	1.000	2.520	2.520	2.52	1567.44	58.05
			*Rail = 2.52 ft^3/LF				Total =	58.05

ABUTMENT

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
MAIN BARREL	1	42.000	3.500	4.000	4.000	4.00	588.00	21.78
PEDESTALS	5	4.000	4.000	0.500	0.500	0.50	40.00	1.48
GRADE BEAM	1	42.667	2.500	3.000	3.000	3.00	320.00	11.85
ANCHOR BLOCK	1	34.000	5.500	3.000	3.000	3.00	561.00	20.78
WING FOOTING	2	16.500	3.500	4.000	4.000	4.00	462.00	17.11
WING WALL	2	20.500	1.167	5.833	6.750	6.29	300.95	11.15
							Total =	84.15

PIERS

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
CAP	1	41.250	5.000	5.500	5.500	5.50	1134.38	42.01
PEDESTALS	5	5.500	0.500	4.000	4.000	4.00	55.00	2.04
COLUMN	2	1.000	19.635	38.000	23.000	30.50	1197.74	44.36
FOOTING	2	13.000	4.500	10.500	10.500	10.50	1228.50	45.50
							Total =	133.91

Grand Total = 712.76 CY

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CLASS 47BD-4000 CONCRETE FOR APPROACHES

NEBRASKA APPROACH

SLAB

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
NEBRASKA APPROACH	1	50.000	1.167	42.667	42.667	42.67	2488.87	92.18
							Total =	92.18

CONCRETE RAILS

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
CONCRETE RAILS	2	30.000	1.000	2.520	2.520	2.52	151.20	5.60
			*Rail = 2.52 ft^3/LF				Total =	5.60

Grand Total = 97.8 CY

	Made by	Date	Job Number
NTB	jcf	11/12/2010	46482
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Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

EPOXY COATED REINFORCING STEEL

NEBRASKA APPROACH

SLAB

ITEM	NO	TOTAL CONCRETE	TYP. REINF/CY	TOTAL REINF.	QUANTITY
		(CY)	(LBS/CY)	(LBS)	(LBS)
NEBRASKA APPROACH	1	437	225.000	98,246	98,246
				Total =	98,246

CONCRETE RAILS

ITEM	NO	TOTAL CONCRETE	TYP. REINF/CY	TOTAL REINF.	QUANTITY
		(CY)	(LBS/CY)	(LBS)	(LBS)
NEBRASKA APPROACH	1	58	205.000	11,901	11,901
				Total =	11,901

PIERS

ITEM	NO	TOTAL CONCRETE	TYP. REINF/CY	TOTAL REINF.	QUANTITY
		(CY)	(LBS/CY)	(LBS)	(LBS)
NEBRASKA APPROACH	1	134	270.000	36,156	36,156
				Total =	36,156

ABUTMENT

ITEM	NO	TOTAL CONCRETE	TYP. REINF/CY	TOTAL REINF.	QUANTITY
		(CY)	(LBS/CY)	(LBS)	(LBS)
NEBRASKA APPROACH	1	84	150.000	12,622	12,622
				Total =	12,622

Grand Total = 158,925

	Made by	Date	Job Number
NTB	jcf	11/12/2010	46482
	Checked by	Date	
	SG	11/15/2010	Sheet Number
Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

EPOXY COATED REINFORCING STEEL-APPROACH SLAB

NEBRASKA APPROACH

APPROACH SLAB

ITEM	NO	TOTAL CONCRETE	TYP. REINF/CY	TOTAL REINF.	QUANTITY
		(CY)	(LBS/CY)	(LBS)	(LBS)
NEBRASKA APPROACH	1	92	225.000	20,741	20,741
				Total =	20,741

CONCRETE RAILS

ITEM	NO	TOTAL CONCRETE	TYP. REINF/CY	TOTAL REINF.	QUANTITY
		(CY)	(LBS/CY)	(LBS)	(LBS)
NEBRASKA APPROACH	1	6	205.000	1,148	1,148
				Total =	1,148

Grand Total = 21,889

	Made by	Date	Job Number
NTB	jcf	11/12/2010	46482
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Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

STRUCTURAL STEEL

NEBRASKA APPROACH

STRUCTURAL STEEL FOR SUBSTRUCTURE

ITEM	NO. SYSTEMS	LENGTH			WEIGHT		QUANTITY
	(#)	(FT)			(LBS)		(LBS)
ABUT. TIE BACK SYSTEM	1	35.000			5,000		5,000
						Total =	5,000

STEEL DIAPHRAGM

ITEM	NO. DIA./SPAN	SPANS			DIAPHRAGM		QUANTITY
	(#)	(#)			(EACH)		(EACH)
STEEL DIAPHRAGM	4	2			8		8
						Total =	8

STEEL EXPANSION DIAPHRAGM

ITEM	NO. DIA./SPAN	SPANS			DIAPHRAGM		QUANTITY
	(#)	(#)			(EACH)		(EACH)
STEEL EXP. DIAPHRAGM	4	1			4		4
						Total =	4

STEEL SHEET PILING

ITEM	AREA						QUANTITY
	(SQ. FT.)						(SQ. FT.)
ABUTMENT	1140						1,140
						Total =	1,140

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FOUNDATION ELEMENTS

NEBRASKA APPROACH

HP 14 X 79 STEEL PILING

ITEM	NO	LENGTH					QUANTITY	QUANTITY
		(FT)					(LF)	(LF)
ABUTMENT	15	100.000					1500.00	1500.00
PIER 1	18	100.000					1800.00	1800.00
						Total =		3300.00

	Made by	Date	Job Number
HNTB	jcf	11/12/2010	46482
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Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

PRESTRESSED CONCRETE BEAMS

NEBRASKA APPROACH

PRESTRESSED CONCRETE BEAMS

ITEM	NO BEAMS	LENGTH	AREA OF BEAMS	VOLUME		QUANTITY
	(#)	(FT)	(FT^2)	(FT^3)		(CY)
PRESTRESSED BEAMS	5	311.000	6.288	9,777		362
					Total =	362

	Made by	Date	Job Number
HNTB	jcf	11/12/2010	46482
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Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

MISCELLANEOUS

NEBRASKA APPROACH

EXPANSION BEARINGS

ITEM	NO							QUANTITY
								(EACH)
IOWA APPROACH	30							30.00
							Total =	10.00

FIXED BEARINGS

ITEM	NO							QUANTITY
								(EACH)
IOWA APPROACH	10							10.00
							Total =	10.00

1 1/2" CONDUIT IN BRIDGE

ITEM	NO	LENGTH						QUANTITY
		(FT)						(FT)
IOWA APPROACH	1	311.000						311.00
							Total =	311.00

STRIP SEAL

ITEM	NO	LENGTH						QUANTITY
		(FT)						(FT)
IOWA APPROACH	1	43.300						43.30
							Total =	43.30

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COST SUMMARY
IOWA APPROACH BRIDGE

	Made by	Date	Job Number
HNTB	jcf	11/12/2010	46482
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COST SUMMARY-IOWA APPROACH

Item No.	Item Description	Unit	Quantity	Unit Cost	Cost
1	ABUTMENT EXCAVATION	LS	1	$15,000	15,000
2	PIER EXCAVATION	LS	1	$50,000	50,000
3	CLASS 47BD-4000 CONCRETE FOR BRIDGE	CY	1588	$550	873,272
4	PRECAST/PRESTRESSED CONCRETE GIRDERS	CY	822	$925	760,380
5	EPOXY COATED REINFORCING STEEL	LBS	366379	$0.90	329,741
6	STEEL DIAPHRAGM	EACH	16	$750	12,000
7	STEEL EXPANSION DIAPHRAGM	EACH	4	$1,200	4,800
8	STRUCTURAL STEEL FOR SUBSTRUCTURE	EACH	5000	$3	15,000
9	HP 14X89 STEEL PILING	LF	6900	$50	345,000
10	TEST PILE	EACH	3	$5,000	15,000
11	EXPANSION BEARING, TFE TYPE	EACH	30	$1,200	36,000
12	FIXED BEARING DEVICE, TYPE 1	EACH	10	$1,200	12,000
13	GRANULAR BACKFILL	CY	230	$45	10,350
14	SUBSURFACE DRAINAGE MATTING	SQ. YD.	47	$45	2,115
15	1 1/2" CONDUIT IN BRIDGE	LF	706	$10	7,060
16	CLASS 47BD-4000 CONCRETE FOR APPROACHES	CY	98	$300	29,334
17	EPOXY COATED REINF. STEEL, APPROACHES	LBS	21889	$0.90	19,700
18	STRIP SEAL	LF	43	$300	12,990
19	ROCK RIPRAP, TYPE "B"	TONS	1145	$45	51,525
20	RIPRAP FILTER FABRIC	SQ. YD.	1320	$4	5,280
21	STEEL SHEET PILING	SQ. FT.	1140	$20	22,800
22	DRAINAGE SYSTEM	EACH	1	$5,000	5,000
				TOTAL=	***2,634,347***

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CLASS 47BD-4000 CONCRETE FOR BRIDGE

IOWA APPROACH

SLAB

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
IOWA APPROACH	1	706.000	0.625	42.667	42.667	42.67	18826.65	697.28
							Total =	697.28

HAUNCH & MISC

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
HAUNCH	5	706.000	0.250	4.021	4.021	4.02	3548.36	131.42
TURNDOWN AT 1ST PIER	1	42.666	2.333	1.000	1.583	1.29	128.59	4.76
TURNDOWN AT ABUT.	1	42.667	2.833	7.479	7.479	7.48	904.15	33.49
BEAM EMBED. TURN. ABUT	5	-1.333	1.000	6.288	6.288	6.29	-41.92	-1.55
PIER DIAPHRAGM	3	35.000	4.000	7.479	7.479	7.48	3141.25	116.34
BEAM EMBED. PIER DIAPH	30	-1.667	1.000	6.288	6.288	6.29	-314.37	-11.64
							Total =	272.82

CONCRETE RAILS

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
CONCRETE RAILS	2	706.000	1.000	2.520	2.520	2.52	3558.24	131.79
			*Rail = 2.52 ft^3/LF				Total =	131.79

ABUTMENT

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
MAIN BARREL	1	42.000	3.500	4.000	4.000	4.00	588.00	21.78
PEDESTALS	5	4.000	4.000	0.500	0.500	0.50	40.00	1.48
GRADE BEAM	1	42.667	2.500	3.000	3.000	3.00	320.00	11.85
ANCHOR BLOCK	1	34.000	5.500	3.000	3.000	3.00	561.00	20.78
WING FOOTING	2	16.500	3.500	4.000	4.000	4.00	462.00	17.11
WING WALL	2	20.500	1.167	5.833	6.750	6.29	300.95	11.15
							Total =	84.15

PIERS

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
CAP	3	41.250	5.000	5.500	5.500	5.50	3403.13	126.04
PEDESTALS	15	5.500	0.500	4.000	4.000	4.00	165.00	6.11
COLUMN	6	1.000	19.635	43.000	18.000	30.50	3593.21	133.08
FOOTING	6	13.000	4.500	10.500	10.500	10.50	3685.50	136.50
							Total =	401.73

Grand Total = 1,588 CY

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NTB	jcf	11/12/2010	46482
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CLASS 47BD-4000 CONCRETE FOR APPROACHES

IOWA APPROACH

SLAB

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
IOWA APPROACH	1	50.000	1.167	42.667	42.667	42.67	2488.87	92.18
							Total =	92.18

CONCRETE RAILS

ITEM	NO	LENGTH	HEIGHT	WIDTH		WIDTH AVG	QUANTITY	QUANTITY
				MAX	MIN			
		(FT)	(FT)	(FT)	(FT)	(FT)	(CU FT)	(CY)
CONCRETE RAILS	2	30.000	1.000	2.520	2.520	2.52	151.20	5.60
			*Rail = 2.52 ft^3/LF				Total =	5.60

Grand Total = 97.8 CY

	Made by	Date	Job Number
	jcf	11/12/2010	46482
	Checked by	Date	
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Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

EPOXY COATED REINFORCING STEEL

IOWA APPROACH

SLAB

ITEM	NO	TOTAL CONCRETE	TYP. REINF/CY	TOTAL REINF.	QUANTITY
		(CY)	(LBS/CY)	(LBS)	(LBS)
IOWA APPROACH	1	970	225.000	218,272	218,272
				Total =	218,272

CONCRETE RAILS

ITEM	NO	TOTAL CONCRETE	TYP. REINF/CY	TOTAL REINF.	QUANTITY
		(CY)	(LBS/CY)	(LBS)	(LBS)
IOWA APPROACH	1	132	205.000	27,016	27,016
				Total =	27,016

PIERS

ITEM	NO	TOTAL CONCRETE	TYP. REINF/CY	TOTAL REINF.	QUANTITY
		(CY)	(LBS/CY)	(LBS)	(LBS)
IOWA APPROACH	1	402	270.000	108,468	108,468
				Total =	108,468

ABUTMENT

ITEM	NO	TOTAL CONCRETE	TYP. REINF/CY	TOTAL REINF.	QUANTITY
		(CY)	(LBS/CY)	(LBS)	(LBS)
IOWA APPROACH	1	84	150.000	12,622	12,622
				Total =	12,622

Grand Total = 366,379

	Made by	Date	Job Number
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Calculations For **Future Bellevue Bridge**	Backchecked by	Date	

EPOXY COATED REINFORCING STEEL-APPROACH SLAB

IOWA APPROACH

APPROACH SLAB

ITEM	NO	TOTAL CONCRETE	TYP. REINF/CY	TOTAL REINF.	QUANTITY
		(CY)	(LBS/CY)	(LBS)	(LBS)
IOWA APPROACH	1	92	225.000	20,741	20,741
				Total =	20,741

CONCRETE RAILS

ITEM	NO	TOTAL CONCRETE	TYP. REINF/CY	TOTAL REINF.	QUANTITY
		(CY)	(LBS/CY)	(LBS)	(LBS)
IOWA APPROACH	1	6	205.000	1,148	1,148
				Total =	1,148

Grand Total = 21,889

	Made by	Date	Job Number
	jcf	11/12/2010	46482
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STRUCTURAL STEEL

IOWA APPROACH

STRUCTURAL STEEL FOR SUBSTRUCTURE

ITEM	NO. SYSTEMS	LENGTH			WEIGHT		QUANTITY
	(#)	(FT)			(LBS)		(LBS)
ABUT. TIE BACK SYSTEM	1	35.000			5,000		5,000
						Total =	5,000

STEEL DIAPHRAGM

ITEM	NO. DIA./SPAN	SPANS			DIAPHRAGM		QUANTITY
	(#)	(#)			(EACH)		(EACH)
STEEL DIAPHRAGM	4	4			16		16
						Total =	16

STEEL EXPANSION DIAPHRAGM

ITEM	NO. DIA./SPAN	SPANS			DIAPHRAGM		QUANTITY
	(#)	(#)			(EACH)		(EACH)
STEEL EXP. DIAPHRAGM	4	1			4		4
						Total =	4

STEEL SHEET PILING

ITEM	AREA						QUANTITY
	(SQ. FT.)						(SQ. FT.)
ABUTMENT	1140						1,140
						Total =	1,140

	Made by	Date	Job Number
	jcf	11/12/2010	46482
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FOUNDATION ELEMENTS

IOWA APPROACH

HP 14 X 79 STEEL PILING

ITEM	NO	LENGTH					QUANTITY	QUANTITY
		(FT)					(LF)	(LF)
ABUTMENT	15	100.000					1500.00	1500.00
PIER 1	18	100.000					1800.00	1800.00
PIER 2	18	100.000					1800.00	1800.00
PIER 3	18	100.000					1800.00	1800.00
							Total =	6900.00

	Made by	Date	Job Number
HNTB	jcf	11/12/2010	46482
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PRESTRESSED CONCRETE BEAMS

IOWA APPROACH

PRESTRESSED CONCRETE BEAMS

ITEM	NO BEAMS	LENGTH	AREA OF BEAMS	VOLUME		QUANTITY
	(#)	(FT)	(FT^2)	(FT^3)		(CY)
PRESTRESSED BEAMS	5	706.000	6.288	22,195		822
					Total =	822

	Made by	Date	Job Number
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MISCELLANEOUS

IOWA APPROACH

EXPANSION BEARINGS

ITEM	NO							QUANTITY
								(EACH)
IOWA APPROACH	30							30.00
							Total =	30.00

FIXED BEARINGS

ITEM	NO							QUANTITY
								(EACH)
IOWA APPROACH	10							10.00
							Total =	10.00

1 1/2" CONDUIT IN BRIDGE

ITEM	NO	LENGTH						QUANTITY
		(FT)						(FT)
IOWA APPROACH	1	706.000						706.00
							Total =	706.00

STRIP SEAL

ITEM	NO	LENGTH						QUANTITY
		(FT)						(FT)
IOWA APPROACH	1	43.300						43.30
							Total =	43.30