Technical Panel Meeting Agenda

Technical Panel
Tuesday, September 9, 2014 at 9:00 AM
Varner Hall - Board Room
3835 Holdrege Street
Lincoln, NE

Meeting Documents

9:00 AM	1. Roll Call, Meeting Notice & Open Meetings Act Information 2. Public Comment 3. Approval of Minutes* - July 8, 2014	Chair
9:05 AM	4. Enterprise Projects a. Project Status Dashboard	A. Weekly
9:20 AM	5. Standards and Guidelines a. Post for 30-Day Comment Period* 1. NITC 3-201: Geospatial Metadata Standard (Amendment) 2. NITC 3-203: Elevation Acquisition using LiDAR Standards (New) 3. NITC 3-204: Imagery Standards (New) 4. NITC 3-205: Street Centerline Standards (New) 5. NITC 3-206: Address Standards (New) b. Recommendations to the NITC 1. NITC 7-104: Web Domain Name Standard (Amendment)* c. Discussion: Questions regarding draft standard for external data hosting - Chris Hobbs	R. Becker
9:40 AM	6. Discussion Items a. 2015-2017 Biennial Budget – I.T. Project Review Timeline b. Cloud Computing c. Data Centers	Chair
9:55 AM	7. Work Group Updates and Other Business	Chair
10:00 AM	8. Adjourn (Next Meeting - October 14, 2014)	Chair

* Denotes action items

The Technical Panel will attempt to adhere to the sequence of the published agenda, but reserves the right to adjust the order of items if necessary and may elect to take action on any of the items listed.

Meeting notice was posted to the NITC website and Nebraska Public Meeting Calendar on August 5, 2014. The agenda was posted to the NITC website on September 5, 2014 and revised on September 7, 2014. Nebraska Open Meetings Act

TECHNICAL PANEL
Tuesday, July 8, 2014, 9:00 a.m.
Varner Hall - Board Room
3835 Holdrege Street
Lincoln, Nebraska
MINUTES

MEMBERS PRESENT:
Walter Weir, CIO, University of Nebraska, Chair
Brenda Decker, CIO, State of Nebraska
Christy Horn, University of Nebraska
Kirk Langer, Lincoln Public Schools
Michael Winkle, NET

ROLL CALL, MEETING NOTICE & OPEN MEETINGS ACT INFORMATION

Mr. Weir called the meeting to order at 9:05 a.m. A quorum existed to conduct official business. Meeting notice was posted to the NITC website and Nebraska Public Meeting Calendar on June 3, 2014. The agenda was posted to the NITC website on July 3, 2014. Nebraska Open Meetings Act was posted on the south wall of the room.

PUBLIC COMMENT

There was no public comment.

Ms. Horn left the meeting.

APPROVAL OF MAY 13, 2014 MINUTES*

Ms. Decker arrived to the meeting.

Mr. Langer moved to approve the May 13, 2014 meeting minutes as presented. Mr. Winkle seconded. Roll call vote: Decker-Yes, Langer-Yes, Weir-Yes, and Winkle-Abstained. Results: Yes-3, No-0, Abstained-1. Motion carried.

ENTERPRISE PROJECTS

Project Status Dashboard, Andy Weekly

Most projects are progressing without difficulties. There were a few that had "red" risk indicators:

- LINK-Procurement. The project is in a holding pattern with new administrators and may be in a longer holder pattern with a new Governor. Ms. Decker will contact the Administrative Services Director to get an official decision on the project.
- NeSA (Nebraska State Accountability). A new contract has been signed with NDE and Data Recognition Corporation. One of the contract changes was to have a full-time technical resource in-state.
- Nebraska Regional Interoperability Network (NRIN). The upcoming target dates might be missed. The Project is waiting for quotes from two contractors. Depending upon availability, the two contractors may work simultaneously on multiple sites.
- District Dashboard. The project is 3 months behind but project is sure that it will meet their target dates.

STANDARDS AND GUILDELINES - POST FOR 30-DAY COMMENT PERIOD

NITC 7-104: Web Domain Name Standard (Amendment)*
Purpose: The purpose of this standard is to provide for consistent domain names for state government websites.

The following sections now read as follows:
1.1
The official Nebraska state government domain names are nebraska.gov and ne.gov. The State CIO may also allow other domain names using the .gov top level domain.
1.2
All web domain name registrations, purchases, and renewals must be made by the Office of the CIO. Top level domain names other than .gov may be registered but cannot serve content or be publicly promoted. The domain state.ne.us is a supported legacy domain which may serve content but which should not be publicly promoted.
1.3
All registered domains must adhere to all federal .gov domain policies and guidelines.
1.4 Section has been omitted.

Mr. Winkle moved to post NITC 7-104: Web Domain Name Standard (Amendment)* for the 30-day comment period. Mr. Langer seconded. Roll call vote: Winkle-Yes, Weir-Yes, Langer-Yes and Decker-Yes. Results: Yes-4, No-0, Abstained-0. Motion carried.

Ms. Horn returned to the meeting.

STANDARDS AND GUIDELINES - RECOMMENDATIONS TO THE NITC

NITC 1-201: Agency Information Technology Plan - Attachment A (Amendment)*

Mr. Becker stated that these are bi-annual updates and the dates and years have been updated to reflect the 2015-2017 biennium. The GIS questionnaire section was also updated. After discussion, it was recommended to include a separate table for servers, including virtual servers and physical servers, in Section 1.3.2.

Ms. Decker moved to recommend approval of NITC 1-201: Agency Information Technology Plan - Attachment A (Amendment) with the changes recommended by the Technical Panel. Mr. Winkle seconded. Roll call vote: Roll call vote: Decker-Yes, Horn-Yes, Langer-Yes, Weir-Yes, and Winkle-Yes. Results: Yes-5, No-0, Abstained-0. Motion carried.

NITC 1-202: Project Review Process - Attachment B (Amendment)*

The dates have been changed to reflect the 2015-2017 biennium and section numbers have been omitted. There were no recommended changes from the panel.

Ms. Decker moved to recommend approval of NITC 1-202: Project Review Process - Attachment B (Amendment). Mr. Winkle seconded. Roll call vote: Winkle-Yes, Weir-Yes, Langer-Yes, Horn-Yes, and Decker-Yes. Results: Yes-5, No-0, Abstained-0. Motion carried.

NITC 3-203: Elevation Acquisition using LiDAR Standards (New)*
- **Comments**

NITC 3-205: Street Centerline Standards (New)*
NITC 3-206: Address Standards (New)*

Nathan Watermeier shared the following questions from the GIS Council:

> "GIS Council questions to the Technical Panel
>
> There are policy topics in the standards for address, street centerline, elevation, imagery, and places in metadata standards that have recently been put forward for clarification. The GIS Council would like some assistance from the technical panel on best direction for some of these items. The example given is from the address standards but is applicable to all the other standards as well to provide consistency.
>
> On the April 16, at the GIS Council meeting, the elevation, address and street centerline standards were approved with modifications. The motion was, *"Move to approve the Standard with the change to move the sections on stewardship, maintenance and distribution to an external document referenced in the document. The placement of this reference is to be determined by the Council Chair and GIS Coordinator."*
>
> The questions are:
>
> 1. How is the best way to represent these sections from a standards and policy view point?
>   a. Does maintenance need to be included in the standards? In addition, role of data stewards and reporting of errors and handling updates.
>   b. Does distribution need to be included in the standards? In other words, how much or should a description be provided on how data should be distributed?
> 2. Is it proper to reference other documents if they have not been completed or written?
> 3. Ownership and responsibilities – Is it needed, if so how much?"

After discussion, the Technical Panel's responses to the GIS questions were as follows:

1. How is the best way to represent these sections from a standards and policy view point?
   a. Does maintenance need to be included in the standards? In addition, role of data stewards and reporting of errors and handling updates.
      Technical Panel Response: Yes, it is recommended to include a section for maintenance.
   b. Does distribution need to be included in the standards? In other words, how much or should a description be provided on how data should be distributed?
      Technical Panel Response: No

2. Is it proper to reference other documents if they have not been completed or written?
   Technical Panel Response: No

3. Ownership and responsibilities – Is it needed, if so how much?
   Technical Panel Response: No, for "ownership"

Mr. Watermeier will take the panel's responses back to the GIS Council. The work group will modify the standard per the panel's recommendation for the GIS Council's approval.

Mr. Winkle moved to table NITC 3-203: Elevation Acquisition using LiDAR Standards, NITC 3-205: Street Centerline Standards and NITC 3-206: Address Standards until the GIS Council has had an opportunity to consider possible changes to these documents. Ms. Horn seconded.

Roll call vote: Decker-Yes, Horn-Yes, Langer-Yes, Weir-Yes, and Winkle-Yes. Results: Yes-5, No-0, Abstained-0. Motion carried.

STANDARDS AND GUIDELINES - REQUESTS FOR WAIVER

Collaborative Aggregation Partnership - Request for Waiver from the requirements of NITC 7-104*
Tom Rolfes, Education I.T. Manager, Office of the CIO

John Stritt and Deb Schroeder, co-chairs of the Network Nebraska Education Advisory Group, submitted a letter in support of the request for waiver.

Mr. Winkle moved to approve CAP's request for waiver from the requirements of NITC 7-104. Ms. Horn seconded. Roll call vote: Langer-Yes, Weir-Yes, Winkle-Yes, Decker-Abstained, and Horn-Yes. Results: Yes-4, No-0, Abstained-1. Motion carried.

WORK GROUP UPDATES AND OTHER BUSINESS

There were no reports.

Mr. Becker will have the biennial budget project review timeline available the next meeting.

ADJOURNMENT AND NEXT MEETING

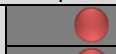
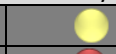
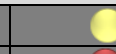
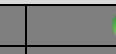
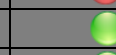
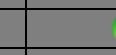
Mr. Weir requested that discussion on cloud computing and data centers be on the agenda for the next meeting.

Ms. Horn moved to adjourn. Ms. Decker seconded. All were in favor. Motion carried.

The meeting was adjourned at 10:22 a.m.

Meeting minutes were taken by Lori Lopez Urdiales and reviewed by Rick Becker of the Office of the CIO.

Nebraska Information Technology Commission
Enterprise Project Status Dashboard – as of September, 2014

Project: **LINK – Procurement**				Contact: **Bo Botelho**		
Start Date	01/14/2013	Orig. Completion Date	10/31/2013	Revised Completion Date		~~01/06/2014~~ Pending
	September	July	May	March	February	November
Overall Status						
Schedule						
Budget						
Scope						

Project Description

Workday Procurement standardizes business processes for procurement documents. Workday Procurement will be the data entry location for all procurement documents (requisitions, purchase orders and contracts). Approvals and printing of the documents will be processed in Workday. Selected supplier websites will be available for access to state contracted pricing through punch-out capability. Purchase Orders will be interfaced in to the State's financial system for encumbering, receipts, and accounts payable. Suppliers will be available for selection in Workday and their associated commodities and procurement contact information will be maintained within Workday.

Project Estimate: $1,895,800 ($1,621,121.77 has been expended)

Comments

September update:

The Workday solution is currently in the development and testing phase. However, development and implementation has been delayed by the Administrative Services HCM project as well as the current EnterpriseOne upgrade. Further, it has been determined that the Department does not have sufficient resources, staff or appropriations, to expand the original statement of work for this project enterprise wide, address the integration costs associated with the layering of Workday procurement onto the existing EnterpriseOne system, and sustain the integration costs on an ongoing operational basis. The Department will continue to prioritize the current upgrading of the EnterpriseOne financial system and ongoing support of the existing HCM solution.

Any further significant or future work or timelines related to the improvement or altering of the State's current EnterpriseOne based procurement process will be determined via the upcoming 2015-2017 biennial budget process; departmental request, Governor's recommendations, and legislative appropriations.

July update:

Revisions to implement software simultaneously to all agencies instead of Administrative Services and DHHS are pending review by Director's Office. Original scope indicated roll-out to all remaining agencies after initial implementation, recommendation from project team during recent phases of implementation support roll-out to all agencies at one-time. New target dates are pending due to potential scope changes. The change order and Project Scope are under review by the Director's Office due to change in Administrative Services and Materiel Division leadership.

Currently in the new P.1 Tenant validating Business Process design and functionality.

Additional Comments/Concerns:

None

Nebraska Information Technology Commission
Enterprise Project Status Dashboard – as of September, 2014

Project: **Network Nebraska Education**			Contact: **Tom Rolfes**			
Start Date	05/01/2006	Orig. Completion Date	06/30/2012	Revised Completion Date		~~08/01/2014~~ 08/01/2015
	September	July	May	March	February	November
Overall Status						
Schedule						
Budget						
Scope						

Project Description

Network Nebraska-Education is a statewide consortium of over 260 K-12 and higher education entities working together to provide a statewide backbone, commodity Internet, distance education, and other value-added services to its participants. Network Nebraska-Education is managed by the State Office of the CIO partnering with the University of Nebraska Computing Services Network (UNCSN).

Project Estimate: $675,968 ($587,752 has been expended)

Comments

September update:

Recapping the Summer 2014 network upgrade, 14 new K-12 entities in Southeast Nebraska were routed to Network Nebraska-Education over two new aggregation circuits, to ESU 6 (Milford) and a second aggregation circuit to ESU 5 (Beatrice). Over 40 school districts in central and south central Nebraska changed contracts to a new provider and are being directly routed to the Grand Island College Park aggregation point. Backbone bandwidth capacity will be purchased at 2Gbps on all main transport segments as per the current contract with NebraskaLink, but burstable to 5Gbps through the life of the backbone contract, 6/30/2016. UNCSN network engineers have gone live with the Internet2 Commercial Peering Service and are monitoring bandwidth demands. Work is continuing on the dark fiber project to Grand Island/Kearney. A second Internet provider, Windstream, was activated on 7/1/2014 with egress out of Lincoln-Nebraska Hall, with approximately 12.5Gbps of bandwidth. Looking ahead to the fall 2014 procurement, Omaha commodity Internet will be rebid, and possible rebid of some WAN circuits and some segments of the statewide backbone. A provider information meeting was held on 8/19/2014 at Varner Hall, informing them of public safety and Network Nebraska-Education developments.

July update:

Looking ahead to 7/1/2014, 14 new K-12 entities in Southeast Nebraska will be routed to Network Nebraska-Education over two new aggregation circuits, to ESU 6 (Milford) and a second aggregation circuit to ESU 5 (Beatrice. Backbone bandwidth capacity will be purchased at 2Gbps on all main transport segments as per the current contract with NebraskaLink, but burstable to 5Gbps through the life of the backbone contract, 6/30/2016. UNCSN network engineers have gone live with the Internet2 Commercial Peering Service and are monitoring bandwidth demands. Work is continuing on the roll out of the Intrusion Prevention Services, and a dark fiber project to Grand Island/Kearney. The Network Nebraska Advisory Group (NNAG) and the Collaborative Aggregation Partnership (CAP) have considered the 2014-15 Network Nebraska fees at their recent meetings and the annual Fee memo will be prepared for distribution. UNL/UNCSN bid commodity Internet during Summer 2013 and the new lower unit rates assisted the State in lowering its Internet costs. The Summer 2014 network upgrade project is proceeding as planned.

Additional Comments/Concerns:

The Network Nebraska-Education Participation Fee fund account received UNCSN's 4th quarter project invoice for expenses through 5/31/2014. Only Equipment Maintenance and Software Maintenance ran over budget, but a positive variance in excess of $80,000 is for the year. A total estimated positive variance of $320,000 has been accumulated toward the future core router upgrade expected in 2017.

Nebraska Information Technology Commission
Enterprise Project Status Dashboard – as of September, 2014

Project:	**Nebraska Statewide Radio System (formerly Public Safety Wireless)**	Contact:	**Mike Jeffres**

Start Date	06/01/2009	Orig. Completion Date	09/30/2013	Revised Completion Date	

	September	July	May	March	February	November
Overall Status						
Schedule						
Budget						
Scope						

Project Description

The Nebraska Statewide Radio System project is to establish a modern public safety communications system for state agencies. To improve coverage over 95% of the state, superior voice quality, and improved reliability, and to consolidate the state onto a common P25 digital radio standard.

Project Estimate: $11,038,000 ($10,158,000 has been expended)

Comments

September update:

System acceptance and project closeout in process.

Additional Comments/Concerns:

None

Nebraska Information Technology Commission
Enterprise Project Status Dashboard – as of September, 2014

Project:	**Nebraska State Accountability (NeSA) (formerly Statewide Online Assessment)**		Contact:	**John Moon**		
Start Date	07/01/2010	Orig. Completion Date	06/30/2011	Revised Completion Date		~~06/30/2014~~ 6/30/2015
	September	May	March	February	November	July
Overall Status						
Schedule						
Budget						
Scope						

Project Description

Legislative Bill 1157 passed by the 2008 Nebraska Legislature required a single statewide assessment of the Nebraska academic content standards for reading, mathematics, science, and writing in Nebraska's K-12 public schools. The new assessment system was named Nebraska State Accountability (NeSA), with NeSA-R for reading assessments, NeSA-M for mathematics, NeSA-S for science, and NeSA-W for writing. The assessments in reading and mathematics were administered in grades 3-8 and 11; science was administered in grades 5, 8, and 11; and writing was administered in grades 4, 8, and 11.

Project Estimate: $5,364,408 ($549,717 has been expended)

Comments

September update:

NeSA - Reading, Math, and Science (NeSA-RMS) reports for 2014 were reported to schools on July 16, 2014. The new contract was signed by Data Recognition Corporation (DRC) and Nebraska Department of Education (NDE) for the 2014-2015 school year, starting July 1, 2014 through June 30, 2015.

WebEx Training for N-TACs on INSIGHT and TSM (Testing Site Manager) Installation will be September 3-4 followed by INSIGHT and TSM Management and Capacity/Load Testing training on September 16-17. DRC INSIGHT and TSM software was released on August 29th.

Ryne Keel has joined DRC's Level II Technical Support Team and will work remotely for DRC in Lincoln, Ne. He will provide technical support and assist with technical training for NeSA and C4L online testing

NeSA Technology Trial to take place October 27 – November 7 will provide an opportunity for districts to vet their online testing systems, especially iPads and Chromebooks, using NeSA practice tests in the secure INSIGHT environment.

DRC has identified the following devices will be supported in Spring 2015 administration of NeSA-RMS.

- Chromebooks
- iPads
- Windows 8.1 Tablets (non-touch)

The following devices will be supported for all NeSA testing in Spring 2016.

- Windows 8.1 Tablets with touch
- Android

July update:

After reviewing over 7000 score resolutions to the reading, math, and science results, Nebraska Department of Education (NDE) contacted districts to resolve the last 125 records. Districts resolved score status by investigating individual student actions and supplying to NDE not tested codes for students with zero test scores. The 2014 NeSA – RMS reports with these resolutions will be reported to schools on July 16, 2014.

The new contract has been signed by Data Recognition Corporation (DRC) and NDE, staring July 1, 2014 through June 30, 2015. The planning meeting for 2014-2015 was completed on June 13 at the DRC headquarters in Minneapolis. Details for

the changes to original proposal were discussed. The following changes were discussed:

1. Full-time, in-state Technical Resource
2. Support for NeSA-RMS testing on iPads and Chromebooks
3. Real-time reporting of technology updates/incidents
4. User acceptance testing starting September 1, 2014
5. Removal of the Clear tool from NeSA-Writing tests
6. Changes to load/capacity testing and simulation
7. Assurances that all student responses are being captured
8. eDIRECT procedures and improvements
9. Sortable Electronic Individual Student Reports (ISR) (electronic)

DRC advised NDE that several enhancements have been made to the TSM to include enhancements to load simulation and a capacity calculator. These will be available on September 1, 2014 to facilitate earlier technology training including how to use the content and response caching settings. The load simulation reports average load time and submit time. DRC will use information received during simulations to identify and address any issues prior to testing. Better guidelines will be provided to districts regarding the ratio of TSMs to testers, but DRC cautioned that configurations can vary across districts.

DRC and NDE along with the right people will meet to discuss the requirements for co-locating DRC servers in Nebraska. The time and place has not been set.

Additional Comments/Concerns:
July 2014 - Nebraska State Accountability (NeSA) is a statewide assessment system mandated by Nebraska Statute. Nebraska Department of Education has contracted with Data Recognition Corporation (DRC) to continue the development of the assessment system including management, development, delivery, administration, scanning/imaging, scoring, analysis, reporting, and standard setting for the online and pencil/paper reading, science, writing, and mathematics tests (NeSA-RMS) for July 1, 2014 through June 30, 2015. DRC will facilitate the delivery, administration, scanning/imaging, scoring, analysis, and reporting for the alternate pencil/paper reading, science, and mathematics tests during the same assessment window. DRC will deliver the online writing assessment (NeSA-W) for grades 8 and 11 and the pencil/paper writing assessment for grade 4 as well.

Nebraska Information Technology Commission
Enterprise Project Status Dashboard – as of September, 2014

Project:	**Nebraska Regional Interoperability Network (NRIN)**		Contact:	**Sue Krogman**		
Start Date	10/01/2010	Orig. Completion Date	06/01/2013	Revised Completion Date		09/30/2015
	September	July	May	March	February	November
Overall Status						
Schedule						
Budget						
Scope						

Project Description

The Nebraska Regional Interoperability Network (NRIN) is a project that will connect a majority of the Public Safety Access Points (PSAP) across the State by means of a point to point microwave system. The network will be a true, secure means of transferring data, video and voice. Speed and stability are major expectations; therefore there is a required redundant technology base of no less than 100 mbps with 99.999% availability for each site. It is hoped that the network will be used as the main transfer mechanism for currently in-place items, thus imposing a cost-saving to local government. All equipment purchased for this project is compatible with the networking equipment of the OCIO.

Project Estimate: $9,354,009 ($8,175,337.50 has been expended)

Comments

NEMA is struggling with issues of governance and maintenance of the network. Governance would be needed at the local jurisdiction and not at the state agency (there is no state agency is heading the project, it's all run at the local jurisdiction). There is no formal governance heading the project.

September update:

Because of a Master Service Agreement with the State OCIO, we were able to hire two contractors that both have experience with Ceragon Radio's. The contractors are working in conjunction with each other, one doing the equipment install and the other doing the alignment and configuration of all racked items. The OCIO will be configuring the routers for each of the places and working alongside the other two contractors.

July update:

Waiting for quotes from two contractors that have current Master Contracts with the State of Nebraska. Depending upon availability, the two contractors will work simultaneously on multiple sites.

Additional Comments/Concerns:

It's possible that upcoming target dates might be missed. Based on the uncertainty of the infrastructure needed for the project and the time involved in obtaining the environmental approvals to proceed with the project, any target dates are fluid. Delays are inevitable due to the difficulty in locating adequate tower sites and negotiating leasing agreements and/or MOU's.

Nebraska Information Technology Commission
Enterprise Project Status Dashboard – as of September, 2014

Project: **MMIS**				Contact:		
Start Date	N/A	Orig. Completion Date	N/A	Revised Completion Date		N/A
	September	July	May	March	February	November
Overall Status						
Schedule						
Budget						
Scope						
Comments						

Project On Hold until renewed

Funding has been appropriated for a MMIS replacement in the current biennial budget starting July 1, 2014. Once the project moves forward (a RFP will be developed) DHHS will resume monthly reporting.

Nebraska Information Technology Commission
Enterprise Project Status Dashboard – as of September, 2014

Project: **District Dashboards**			Contact: **Dean Folkers**			
Start Date 07/01/2013	Orig. Completion Date 06/30/2015		Revised Completion Date			
	September	July	April	March	February	November
Overall Status						
Schedule						
Budget						
Scope						

Project Description

Made possible by a Statewide Longitudinal Data System (SLDS) grant from the United States Department of Education in 2012, the focus of the Nebraska Ed-Fi Dashboard initiative is to provide readily available data to the Nebraska classrooms to facilitate informed decision-making. Potential users include teachers, counselors, and administrators. NDE intends to leverage the Ed-Fi dashboard solution made available by the Michael & Susan Dell Foundation to provide Nebraska with an advanced student performance dashboard system to be customized for Nebraska needs. The Ed-Fi data standard will serve to define the initial data elements powering the Nebraska Ed-Fi dashboard.

Our Plan of Work for design, development, and piloting of the Nebraska Dashboards will commence in three phases, each to proceed subsequently upon successful completion of the previous phase, between the months of September 2013 and December 2014. The phases include: Phase I - Dashboard Readiness (September 2013-February 2014), Phase II – Dashboard Development (February 2014-June 2014), and Phase III – Dashboard Deployment (June 2014-December 2014).

Project Estimate: $466,623.75 has been expended, grant funds only

Comments

September update:

Dashboard Implementation

The pre-release version of the Early Warning System (EWS) was migrated to the Nebraska code base and 90% of the EWS functionality has passed unit and quality assurance (QA) testing. The migration of the Intervention Catalog (IC) is planned for September with some additional code changes targeted for late fall to improve long term sustainability. Both the EWS and IC will be available for pilot testing in the fall.

Development of the ETL code and unit testing for the MAP assessment (Optional list #1) was completed in August and is currently in QA. Development of the ETL for loading SAT/PSAT assessments has been deferred from fall pilot to the spring pilot. This change was made as part of the overall strategy for extended co-development with NDE and knowledge transfer to the NDE team.

The planned user interface changes for fall pilot are 90% complete and unit tested. The team has completed the development and unit testing of the Nebraska NeSA combined subject drill down (Optional list item #3). Additionally, the team plans to move forward with co-development of optional items #2 and #6 in September with optional items #5 and #7 targeted for spring pilot.

In August, the project team started efforts to migrate the dashboards from the Ed-Fi version 1.2 release to the Ed-Fi v.Next release. The development of Nebraska specific v.Next ODS extensions is complete and validated. The team is currently updating the infrastructure and build environment to support v.Next. The current target timeframe is to have v.Next development and staging environments configured by mid-September. Once the v.Next development environment has been deployed, the project team will work on migration of existing ETL packages from v1.2 to the v.Next release. Final user interface QA will be performed on a number of customizations which are dependent upon the v.Next release. These include most of the Nebraska specific student indicators and Nebraska specific data displays (e.g. new to district, Title1 school, state course codes, attended pre-school (#8), etc.).

SSO Integration

Planned integration of the Dashboard security with the ESUCC's Single Sign On (SSO) services was delayed due to

resource constraints and other conflicting priorities external to the project. ESUCC experienced changes in resource availability and conflicting priorities which has resulted in additional delays to planned SSO development and integration activities. DLP and ESUCC have a revised plan for integration activities in Sept with support for data staging in October.

Data Warehouse and Accountability Data Mart
The project team started the Data Warehouse and Accountability Data Mart analysis and requirements specification work in August. The team plans to complete the preliminary design by the end of September and start development in October. These deliverables are dependent upon the dashboard v.Next migration (DLP) and vendor support of Ed-Fi interfaces (Pearson). The team is still on target for having both a data warehouse and accountability data mart completed in 2014 with a staging/production system available for data validation at the start of 2015.

Infrastructure
DLP and ESUCC have been working on a revised plan and timeline for infrastructure implementation. The infrastructure setup planned for August is running about three to four weeks behind schedule. A revised timeline is to have a v.Next staging environment operational by middle to late September and the associated production environments operational by end of October. The delays are attributed to resource constraints within both the ESUCC and DLP.

Vendor Development
Pearson has experienced delays in their planned development of the v.Next interface. They are reporting a four to six week slip in development schedule which will push planned data staging and integration activities to mid-October. Pearson is still committed to supporting the pilot, however, it is most likely that data validation activities will run until the end of 2014 with formal pilot testing starting in early 2015.

Overall the project is running behind schedule by about three to four months for vendor implementation, SSO implementation, Ed-Fi v.Next on premise support and planned co-development/ knowledge transfer activities with NDE staff. The project team and sponsor are evaluating a revised timeline with a delay in the start of fall pilot testing until early 2015. The delay in co-development will not have an impact on planned staging activities with vendors nor the start of pilot testing. However, this delay could impact planned knowledge transfer and require a longer duration for planned co-development. NDE and DLP plan for extended period for co-development activities is being evaluated.

July update:
The development team has continued to make good progress in completing required pilot scope. From Table 9: Customizations included in Fall Pilot Scope, about 75% of the required customizations have been implemented and validated in the development environment. We expect the remaining items to be implemented in July. The team as also implemented the changes to limit the display of discipline data on teacher views. The team has started the design of an administrative interface (optional list item #16) to allow districts to enable/disable teacher views of discipline data and expects to complete this associated customization in July.

The team has implemented an Active Directory Federation Services (ADFS) server and interfaces to support single-sign on (SSO) services and security. Integration with the Educational Service Unit Coordination Council (ESUCC) Single Sign On and Identity Management solution has been delayed due to additional time required by the ESUCC to setup an integration environment and setup SSO support with pilot districts. Currently at least one pilot district South Sioux City has successfully modified their AD server to support SSO authentication for the dashboard pilot. The contractor, DLP (Double Line Partners), expects to start integration testing with ESUCC's ADFS environment in late July. DLP, NDE and ESUCC have proposed an approach for managing secure access for maintenance team staff which will be required for ongoing pilot support, statewide rollout and long term support.

Support for the Nebraska state assessment, NeSA, was completed in June. In May the team developed the interfaces to support loading reading/math/science data and displaying on the dashboards. In June the team completed the implementation for NeSA writing data and the NeSA dashboard displays have passed QA validation. The team developed a couple of designs for the Nebraska NeSA combined subject drill down (Optional list item #3) and presented to the pilots districts for vote. Currently about 50% of the pilot districts have responded with their preferred view and it is a tie. The team will plan to complete all NeSA implementation and testing for option item #3 in July.

Development of the ETL (extract, transform, load) for the MAP (measures of academic progress, an assessment from the Northwest Evaluation Association) assessment continued in June with completion of the data loads for metadata, objectives and student data. Validation of the data loads in the ODS (operational data store) are completed for metadata and

objectives. Validation of ODS data for student data will continue in July. Development of extension packages to populate the DDS (dashboard data store) and dashboard displays is targeted for July.

At the end of May, we completed reviews of the accountability data analysis with NDE. During June we implemented these ODS extensions for v.Next environment. A final review of the associated UDD (unified data dictionary) v1.2 deliverable is pending and is targeted to complete mid-July. DLP and NDE plan to accelerate the implementation activities for the Ed-Fi Data Warehouse and Accountability Data Mart with design activities starting in July.

Jill Aurand with NDE accepted a position as team lead for the Nebraska Dashboard project in May. Most of June was spent getting her development environment setup so she could start ramp up on user interface development. DLP provided a training course we use for internal ramp up to Jill and she has made good progress in her self-directed training activities. NDE has identified two developers for ETL development and they will be starting July 7th. NDE is still looking for a resource for co-development of the Ed-Fi Data Warehouse and Accountability Data Mart.

Overall the project is running behind schedule for planned co-development activities, which are running about 2.5 - 3 months behind schedule. The delay in co-development will not have an impact on planned staging activities with vendors nor the start of pilot testing. However, this delay could impact planned knowledge transfer and require a longer duration for planned co-development. NDE and DLP plan for extended period for co-development activities will be evaluated in July.

Additional Comments/Concerns:
None

Nebraska Information Technology Commission
Enterprise Project Status Dashboard – as of September, 2014

Project: **EnterpriseOne System Upgrade**				Contact: **Lacey Pentland**		
Start Date	10/01/2013	Orig. Completion Date	10/03/2014	Revised Completion Date		TBD
	September	July	May	March	February	November
Overall Status	🔴	🟢	🟢	🟢	🟢	🟢
Schedule	🔴	🟡	🟡	🟡	🟡	🟢
Budget	🟢	🟢	🟢	🟢	🟢	🟢
Scope	🟢	🟢	🟢	🟢	🟢	🟢

Project Description

The State of Nebraska has been using JD Edwards to support the State's agencies for over ten years. The current EnterpriseOne 9.0 system is relatively stable with a medium level of modifications. The program is planned, as much as possible, to be a technical upgrade with minimal impact on the existing business processes, interfaces and the related applications. The current applications landscape is proposed to be upgraded as follows:

- Upgrade from E1 9.0 to E1 9.1 to stay current with the JD Edwards technology stack
- Migrate/Retrofit required customizations to E1 9.1 based on the keep drop analysis
- Be on the latest stack
- Simplification of the existing ecosystem – minimize customization, expand usage of JDE application
- Leverage standard functionalities provided by new features of E1 9.1

Project Estimate: $2,250,000 ($917,449.60 has been expended)

Comments

September update:

The CNC (Configurable Network Computing, a term specific to JD Edwards architecture and methodology) work is behind to make sure EnterpriseOne is code current. Wipro has brought in additional resources starting August 11, 2014. There may be project delays to ensure all the objects to be retested based on the updated coded installed. Overall Project at risk in regards to development and retrofit, functional and UAT testing will be impacted to make the system code current.

Current work completed:

- Developed a plan to get EnterpriseOne 9.1 code current
- PD910 pathcode installation complete and is code current
- DV910 pathcode is complete (copy from PD910) and is code current

Next Steps:

- Validation of PD910 & DV910 by SON CNC team
- Update PY910 and PS910 (Pristine) to code current
- Retrofit of modifications by development (this work has to be completed again since DV910 has been reinstalled to get code current)
- Functional and UAT testing needs to be scheduled

July update:

Adjustment to dates will be needed to allow more time for testing.

Current work completed:

- Initial retrofit of objects completed in development
- Address Book UAT did not identify any new issues. Payroll UAT has raised one ticket today and is being followed by a developer for its resolution.
- Mock3 data conversion completed over weekend of 6/27/2014
- PD910 has been created and will be used for UAT testing going forward
- Navigation training guides have been created to provide to UAT users
- Expense Management - Workflow development in progress and the pending Find and Browse application also in progress.

- dcLINK Installed and updated from 4.2.4 to 4.2.5
- F5 Configured and webservers properly load balanced

Next Steps:

- Follow on the open rework tickets. Confirm on the changes applied to the BIP outputs.
- Support Payroll UAT and escalate the resolution of any pending issues
- Follow on the status of the functional testing for other modules, esp. PO and Finance related.
- Expense Management - testing of the last custom application and review progress on the workflow related changes
- dcLINK (barcode scanning software) testing at CSI (Corrections)
- Continue to update screenshots in training guides using UPK
- Continue to conduct UAT testing

Nebraska Information Technology Commission
Enterprise Project Status Dashboard – as of September, 2014

The project(s) listed below are reporting voluntarily and is not considered as an Enterprise Project by the NITC.

Project:	**NeSIS PeopleSoft Campus Solutions ADA Compliance**	Contact:	**Jim Zemke**

Start Date	08/01/2010	Orig. Completion Date	12/31/2011	Revised Completion Date	09/01/2014

	September	July	May	March	February	November
Overall Status						
Schedule						
Budget						
Scope						

Project Description
Requested

Project Estimate: TBD

Comments

September update:
No report for September

July update:
Work continues to clearly define UN institutional position concerning "reasonable accommodation". We have completed an initial evaluation of the current ADA compliance level of our Campus Solutions system. The results of this evaluation have been forwarded on to Oracle. Oracle has responded indicating they feel Campus Solutions is appropriately compliant. We have developed a strategy and plan to address compliance issues for in house developed Campus Solutions related application development. Additional staff has been added to the NeSIS project team to assist with compliance related activities. We have reviewed the additional applications related to Campus Solutions processing (e.g. the campus SIS portals, the Online Admissions application, etc) that we have implemented and we are working to make sure these applications comply with our ADA compliance standards.

The in-house developed faculty, student, advisor Dashboards are currently being tested by our UNO and UNK campuses and will be implemented for all UN campuses during the Spring 2014 term. The Dashboards will be implemented for the state colleges prior to the beginning of the Fall 2014 term.

A visually impaired student has been hired to assist in our ADA compliance testing. This student starts the week of May 12th, 2014. The visually impaired student worker has provided a great deal of valuable insight concerning ADA compliance which will help guide our efforts to enhance Campus Solutions compliance.

The in-house developed student and faculty Dashboards are running in production at UNK and UNO. UNL is utilizing the faculty Dashboard and will implement the student Dashboard for the Fall 2014 term. UNMC and the State Colleges continue testing and will implement the Dashboards for the Fall 2014 term also.

May update:
University of Nebraska is in the process of replacing the Oracle supplied Campus Solutions portal application with an in-house developed dashboard application that is being developed in accordance with these compliance standards. This dashboard application, which includes separate dashboards for faculty, students, and advisors, will be implemented for the University of Nebraska system campuses over the course of the next few months and for the state colleges for the fall term. Inclusion of these new compliance standards has added some development time to this effort but we believe the added time and effort is justified.

The University has hired a visually impaired student who will assist us in our ADA testing efforts. This student will start work the week of May 12th. This student has experience working with screen readers and other assistive technologies and will be able to provide real-world, hands-on testing and evaluation capability.

Additional Comments/Concerns:
The vendor has certified the Campus Solutions student information system was ADA compliant. However, subsequent analysis indicates that some accessibility issues do exist and the level of compliance provided may not be adequate. Also, additional functionality beyond that included in the base Campus Solutions system has also been implemented and those functional components will also have to be evaluated.

Color Legend		
	Red	**Project has significant risk to baseline cost, schedule, or project deliverables.** **Current status requires immediate escalation and management involvement.** Probable that item will **NOT** meet dates with acceptable quality without changes to schedule, resources, and/or scope.
	Yellow	**Project has a current or potential risk to baseline cost, schedule, or project deliverables.** **Project Manager will manage risks based on risk mitigation planning.** Good probability item will meet dates and acceptable quality. Schedule, resource, or scope changes may be needed.
	Green	**Project has no significant risk to baseline cost, schedule, or project deliverables.** Strong probability project will meet dates and acceptable quality.
	Gray	**No report for the reporting period or the project has not yet been activated.**

NITC 3-201
Geospatial Metadata Standard

Review Version 2.0
(Date 9.3.2014)

Category: Data and Information Architecture
Applicability: See Each Section of Standards
History: Adopted on June 23, 2005, URL links updated on June 27, 2013

NEBRASKA INFORMATION TECHNOLOGY COMMISSION GIS COUNCIL

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1.0 Standard

All state agencies and entities that receive state funding used, directly or indirectly, for geospatial data development or maintenance shall ensure that geospatial data it collects, produces, maintains, or purchases and which is used for policy development, implementation, or compliance review is documented with metadata compliant with the latest version of the ISO 19115:2003 group of metadata standards for geographic information. Metadata created for datasets using Federal Geographic Data Committee (FGDC) Content Standards for Digital Geospatial Metadata or other standards will need to be translated, updated, or recreated using the ISO 19115 standards.~~.~~

1.1 Steps/Timeline for Implementation

a. State agencies and other applicable state funded entities shall institute procedures for complying with standard for new geospatial data development or acquisition upon adoption of standard by the NITC.

b. State agencies shall complete initial listing of existing, applicable geospatial data holdings within three months of the adoption of standard by NITC.

c. State agencies shall complete metadata-lite documentation of existing, applicable geospatial data holdings within six months of the adoption of standard by NITC. More information about metadata-lite is identified in section 3.0 Definitions.

d. State agencies shall complete ~~FGDC~~ISO 19115-compliant metadata documentation of existing and applicable geospatial data holdings within 12 months of the adoption of standard by NITC.

1.2 Maintenance

The reporting of maintained metadata is important to assure correct documentation and support for intended uses of the data. Entities responsible for creating geospatial data will need to assure metadata is updated and maintained on an ongoing basis and in a timely manner. When modifications to the spatial or attribute data is completed the metadata information will also need to be updated. If necessary, these changes will need to be provided to the appropriate entity(s) responsible for performing quality control and maintenance of the metadata.

1.2.1 Reporting Errors and Handling Updates

The reporting of errors need to be directed to the primary contact identified in the metadata in a timely manner. Updated spatial and attribute information in the data will also need to be redistributed. The date field in the metadata when the last record was modified will also need to be updated to ensure proper records management and communication with others in the workflow.

2.0 Purpose and Objectives

The purposes of this standard is to preserve the public's investment in geospatial data, to save public resources by avoiding unnecessary duplication of expensive geospatial data acquisition, to minimize errors through inappropriate application of geospatial data, and to facilitate harmonious trans-agency public policy decision-making and implementation through the use of shared geospatial data.

2.1 Background

Broadly defined, geospatial data is any data that includes locational or positional information about features in the dataset. Geospatial data provides the data foundation for applications of Geographic Information System (GIS) technology.

The development and maintenance of geospatial data is usually the most expensive component in the implementation of GIS technology. In most cases, this high initial investment is justifiable because of the powerful capabilities of the technology and the fact that, if appropriately maintained, the data will be useful for a very long period, and in many cases, for a wide range of applications.

Most geospatial datasets include numerous attributes and parameters that relate to data variables, methodologies and assumptions. Knowledge and understanding of the implications of these variables is a key to the appropriate utilization of that data. Without appropriate documentation, this specialized knowledge usually resides only in the memory of the GIS specialist(s) who developed the original data. Because of the power of the GIS technology, geo-spatial analysis is increasingly being used to develop and implement a wide range of public policy. In many cases, these public policy applications endure long past the availability of the GIS-specialist(s) who developed one or more of the original geospatial datasets upon which the public policy and its subsequent implementation are based. Without appropriate documentation of attributes and parameters of a geospatial dataset assumptions and variables, it may be difficult for an agency to determine the appropriate use of a dataset after the GIS specialist who originally created the data is no longer available. Without this documentation, it may also be difficult to appropriately maintain the dataset and therefore maintain the value of the original public investment in the data. In the case of a legal challenge to a public policy or its implementation, for which geospatial data application is integral, it may be difficult to defend that application if the original data developer is no longer available and the dataset was not appropriately documented.

Due to the relatively high costs of developing and maintaining many geospatial datasets, it is important that public investments in this data are undertaken in a manner to maximize the long-term return on these public investments. Appropriately documenting a dataset is one way to ensure a dataset's long-term usability. It is also a key to enabling the use of that dataset for multiple applications by multiple users. Without documentation, it is difficult for other users within the same agency, in other state agencies, or other public entities at various levels of government to be confident they are appropriately utilizing a geospatial dataset.

One of the great strengths of GIS technology is the ability to integrate and analyze disparate data based on its common or adjacent location. GIS has evolved to be a mainstream technology, used for a very wide range of applications, highly integrated with other information technology, and employed by users with a wide range of technical expertise and knowledge. As GIS has evolved, users now routinely access geospatial data, via the Internet, from multiple sources and integrate that data with other geospatial data and make public policy decisions based on analysis of the interaction of those datasets. Only when a geospatial dataset is adequately documented is it prudent to incorporate that data into a GIS analysis.

To address this wide range of concerns and needs for geospatial data documentation, the Federal Geographic Data Committee (FGDC) has worked with a wide spectrum of geospatial data users to develop a national standard for documenting geospatial data. ~~This standard is~~The FGDC has endorsed and are transitioning users from the ~~known as the~~ Content Standard for Digital Geospatial Metadata (CSDGM) to the ISO Metadata Standards. ~~This standard has gone through a couple revisions and will be reviewed and updated as necessary.~~

2.2 Objectives

This standard requiring the documentation of geospatial data with standardized metadata has the following objectives:

2.2.1 Preserve public investment in data collection/development beyond the tenure or availability of the original data developer.

2.2.2 Preserve the background geospatial information used to justify and make public policy decisions and preserve the information needed to guide appropriate implementation of those decisions beyond the tenure of a particular data developer.

2.2.3 Save public resources by facilitating the sharing of expensive geospatial data among public agencies or sub-divisions of agencies and avoid the costly duplication of developing similar geospatial datasets.

2.2.4 Minimize problems and potential liability ~~the~~ that might be caused by the inappropriate use of undocumented geospatial data.

2.2.5 Facilitate harmonious, trans-agency public policy decision-making and implementation by enabling multiple agencies and levels of government to access and appropriately use common geospatial datasets and thereby make it more likely that intersecting public policy decisions, across levels of government, will be based on the same information.

3.0 Definitions

Content Standard for Digital Geospatial Metadata - A comprehensive national metadata standard developed and adopted by the Federal Geographic Data Committee (FGDC) under the authority of Executive Order 12906, "Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure," which was signed on April 11, 1994, by President William Clinton. Section 3, Development of a National Geospatial Data Clearinghouse, paragraph (b) states: "Standardized Documentation of Data, ... each agency shall document all new geospatial data it collects or produces, either directly or indirectly, using the standard under development by the FGDC, and make that standardized documentation electronically accessible to the Clearinghouse network." This standard is the data documentation standard referenced in the executive order. Since its initial development, this metadata content standard has undergone revision as deemed necessary by the FGDC, and will like undergo further revisions in the future.

Geospatial Data **-** A term used to describe a class of data that has a geographic or spatial nature. The data will usually include locational information (latitude/longitude or other mapping coordinates) for at least some of the features within the database/dataset.

ISO 19115:2003 **–** International Standards Organization (ISO) defines the schema required for describing geographic information and services. It provides information about the identification, the extent, the quality, the spatial and temporal schema, spatial reference, and distribution of digital geographic data. It is applicable to: the cataloguing of datasets, clearinghouse activities, and the full description of datasets; and geographic datasets, dataset series, and individual geographic features and feature properties. It defines: mandatory and conditional metadata sections, metadata entities, and metadata elements; the minimum set of metadata required to serve the full range of metadata applications (data discovery, determining data fitness for use, data access, data transfer, and use of digital data); optional metadata elements - to allow for a more extensive standard description of geographic data, if required; and a method for extending metadata to fit specialized needs. It is applicable to digital data, its principles can be extended to many other forms of geographic data such as maps, charts, and textual documents as well as non-geographic data.

Metadata - Data describing a GIS database or data set including, but not limited to, a description of a data transfer mediums, format, and contents, source lineage data, and any other applicable data processing algorithms or procedures.

Metadata-lite - A subset of the full FGDC-compliant metadata (data title, data subject matter, map projection, geographic extent, data owner and access information, etc.) used primarily for the purposes of cataloging and enabling the use of automated search tools to find and access available geospatial data. Does not fully document the dataset's variables, assumptions or development process that is commonly needed to guide appropriate use. ~~An online metadata-lite development tool is available through the Nebraska Department of Natural Resources website.~~

~~Content Standard for Digital Geospatial Metadata – A comprehensive national metadata standard developed and adopted by the Federal Geographic Data Committee (FGDC) under the authority of Executive Order 12906, "Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure," which was signed on April 11, 1994, by President William Clinton. Section 3, Development of a National Geospatial Data Clearinghouse, paragraph (b) states: "Standardized Documentation of Data, ... each agency shall document all new geospatial data it collects or produces, either directly or indirectly, using the standard under development by the FGDC, and make that standardized documentation electronically accessible to the Clearinghouse network." This standard is the data documentation standard referenced in the executive order. Since its initial development, this metadata content standard has undergone revision as deemed necessary by the FGDC, and will like undergo further revisions in the future.~~

4.0 Applicability

4.1 State Government Agencies

~~All State agencies are required to comply with this standard.~~State agencies that have the primary responsibility for geospatial data development, maintenance, or purchasing data which is used for policy development, implementation, or compliance review for a particular jurisdiction(s) or geographic area (e.g. for counties for which it has assumed the primary role) are required to comply with the standards as described in this standard. Those state agencies with oversight responsibilities in this area are required to ensure that their oversight guidelines, rules, and regulations are consistent with these standards.

4.2 State Funded Entities

Entities that are not State agencies but receive State funding, directly or indirectly, for geospatial data development (i.e. Legislative appropriations, Enhanced Wireless 911 Fund, Infrastructure Fund, etc.) are required to comply with this standard.

4.3 ~~Exemption~~Other

Other entities, such as city and local government agencies that receive state funds for geospatial data development, maintenance, or purchasing geospatial data which is used for policy development, implementation, or compliance review are required to comply with this standard.

~~Exemptions may be granted by the NITC Technical Panel upon request by an agency.~~

~~4.3.1 Exemption Process~~

~~Any agency may request an exemption from this standard by submitting a "Request for Exemption" to the NITC Technical Panel. Requests should state the reason for the exemption. Reasons for an exemption include, but are not limited to: statutory exclusion; federal government requirements; or financial hardship. Requests may be submitted to the Office of the NITC via e-mail or letter (Office of the NITC, 521 S 14th Street, Suite 301, Lincoln, NE 68508). The NITC Technical Panel will consider, in consultation with representatives of the Nebraska GIS Steering Committee, the request and grant or deny the exemption. A denial of an exemption by the NITC Technical Panel may be appealed to the NITC.~~

5.0 Responsibility

5.1 NITC

The NITC shall be responsible for adopting minimum technical standards, guidelines, and architectures upon recommendation by the technical panel. Neb. Rev. Stat. § 86-516(6)

5.2 State Agencies

Each state agency will be responsible for ensuring that geospatial data developed, maintained, or purchased and which is used for policy development, implementation, or compliance review ~~with~~ will be documented consistent with this standard. The State of Nebraska, Office of the CIO (OCIO) GIS Shared Services will be responsible for assuring that metadata is completed and the data is registered and available for distribution through NebraskaMAP.

5.3 Granting Agencies and Entities

State granting or fund disbursement entities or agencies will be responsible for ensuring geospatial metadata documentation requirements are included in requirements and regulations related to fund disbursements.

5.4 Other

Local government agencies that have the primary responsibility and authority for developing geospatial datasets with state appropriated funds will be responsible for ensuring that those sub-sections defined in Section 1 will be incorporated in the overall data development efforts and publishing of metadata prior to distribution.

6.0 Authority

6.1 NITC GIS Council

According to Neb. Rev. Stat. § 86-572(2), the GIS Council shall: Establish guidelines and policies for statewide Geographic Information Systems operations and management (a) The acquisition, development, maintenance, quality assurance such as standards, access, ownership, cost recovery, and priorities of data bases; (b) The compatibility, acquisition, and communications of hardware and software; (c) The assessment of needs, identification of scope, setting of standards, and determination of an appropriate enforcement mechanism; (d) The fostering of training programs and promoting education and information about the Geographic Information Systems; and (e) The promoting of the Geographic Information Systems development in the State of Nebraska and providing or coordinating additional support to address Geographic Information Systems issues as such issues arise.

~~6~~7.0 Related Documents

7.1 Federal Geographic Data Committee (FGDC) Content Standards for Digital Geospatial Metadata (FGDC-STD-001-1998). http://www.fgdc.gov/standards/projects/FGDC-standards-projects/metadata/base-metadata/index_html

7.2 Federal Geographic Data Committee (FGDC) Geospatial ISO Metadata Standards Transition. http://www.fgdc.gov/metadata/geospatial-metadata-standards

7.3 ISO 19115:2003(E) North American Profile (NAP) Metadata Standards. National Oceanic and Atmospheric Administration (NOAA). January 2012.

7.4 International Standards Organization (ISO). ISO 19115:2003. http://www.iso.org

7.5 Technical Support Guides at NebraskaMAP.gov. Guides to translate existing metadata to the new standard, required core elements, and workbook for ISO standards.

NITC 3-203
Elevation Acquisition using LiDAR Standards

Review Version 7
(Date 9.3.2014)

Category: Data and Information Architecture
Applicability: See Each Section of Standards
History: Adopted on [Month Day, Year]

NEBRASKA INFORMATION TECHNOLOGY COMMISSION GIS COUNCIL

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1.0 Standards

These standards are intended for entities participating in collaborative efforts to acquire airborne LiDAR (Light Detection and Ranging) elevations that may contribute to a comprehensive statewide elevation dataset in Nebraska. The standards provide a consistent structure for data producers and users to ensure compatibility of datasets within the same framework layer and among other framework layers.

1.1 Federal Connection

At the national level, the 3D Elevation Program (3DEP) initiative is being developed to respond to growing needs for high-quality topographic data and for a wide range of other three-dimensional representations of the Nation's natural and constructed features. The primary goal of 3DEP is to systematically collect enhanced elevation data in the form of high-quality LiDAR data over the conterminous United States, Hawaii, and the U.S. territories, with data acquired over an 8-year period.

The U.S. Geological Survey (USGS) National Geospatial Program's (NGP) has published LiDAR Base Specification Version 1.0 to create consistency across NGP and partner funded LiDAR collections. The intent of Nebraska's standards is also to facilitate participation in collaborative efforts to acquire airborne LiDAR elevations and thus the LiDAR Base Specification Version 1.0 is adopted as the basis of the standards, guidelines, and recommendations in this document. The following Technical and Operation section provides additional detail to the Base Specification where Nebraska's requirements depart from the specifications in the document or where additional clarity is necessary. All such standards/guidelines, not specifically addressed in the body of this document are subject to the specifications in the LiDAR Base Specification Version 1.0.

1.2 Technical and Operation

The following standards are intended to provide additional detail specifically related to LiDAR projects in Nebraska:

1.2.1 Collection

1.2.1.1 Nominal Pulse Spacing (NPS)

a) Required: An NPS of 1.4 meters or less
b) Recommended: An NPS of 0.7 meters

1.2.1.2 Vertical Accuracy

a) Required: Fundamental Vertical Accuracy <= 24.5 centimeters (cm) AccuracyZ(Acc_z), 95 percent (12.5 cm Root Mean Square Error ($RMSE)_z$) for LiDAR acquired at a NPS greater than one meter.
b) Required: Fundamental Vertical Accuracy <= 18.2 centimeters (cm) AccuracyZ(Acc_z), 95 percent (9.25 cm Root Mean Square Error ($RMSE)_z$) for LiDAR acquired at a NPS of 1.0 meters or less.

1.2.1.3 Data Processing and Handling

a) Recommended: Coordinate Reference System - Nebraska State Plane, NAD83 HARN, NAVD88, U.S. Survey feet.
b) Optional: Hydro-Flattening – Optional (USGS required).

c) Optional: Hydro-Enforced – The state of Nebraska recommends collection of breaklines for the development of a *Hydro-enforced*, Bare-earth Digital Elevation Model (DEM).

1.2.1.4 Deliverables—In addition to the raw and classified point cloud and the metadata, deliverables will include:

a) Required: Bare-Earth DEM
   i. Cell size 2 meters for LiDAR acquired at greater than 1.0 meter NPS
   ii. Cell size 1 meter for LiDAR acquired at 1.0 meter or less NPS
b) Recommended: Hydro-Enforced, Bare-Earth DEM
   i. Cell size 2 meters for LiDAR acquired at greater than 1.0 meter NPS
   ii. Cell size 1 meter for LiDAR acquired at 1.0 meter or less NPS
   iii. Breaklines used for Hydro-Enforcement (required if hydro-enforced)

1.3 Maintenance

Entities responsible for data acquisition and deliverables will need to assure data meets standards and are updated and maintained in a timely manner. After spatial and attribute updates and/or modifications are performed to the data it shall be submitted to the appropriate entity(s) responsible for performing quality control and maintenance of the data acquisition.

Maintenance of elevation data determines the suitability to support the greatest range of applications. Many projects require up-to-date, accurate and consistent elevation data and maintenance of this data is necessary to provide the maximum return on investment.

1.3.1 Reporting Errors and Handling Updates

The reporting of errors need to be directed to the appropriate entity in a timely manner. Updated spatial and attribute information in the data will also need to be redistributed. The date field in the metadata when the last record was modified will also need to be updated to ensure proper records management and communication with others in the workflow.

2.0 Purpose and Objectives

2.1 Purpose

The primary purpose of these standards/guidelines is to realize the maximum long-term benefit of elevation data acquisitions, and in doing so, help protect the public's investment in Nebraska's geospatial infrastructure. These standards will help ensure that elevation data acquisitions are current, consistent, accurate, high-resolution, accessible, and cost-effective.

Background

Elevation data is foundational to the development of the Nebraska Spatial Data Infrastructure (NESDI). First, it is required for the rectification of imagery which is the foundation for most of the other geospatial data layers in the NESDI and is a valuable base map in its own right. The accuracy of infrastructure data layers, in part, determines the extent to which they can be integrated and ultimately their suitability to support the greatest range of applications. Additionally, many projects and programs in Nebraska require up-to-date, accurate and consistent elevation data.

LiDAR has been collected for approximately 59% of the state on a project by project basis. Applications that require high-quality elevation data have been limited in that the data is not always consistent across project boundaries, and the fact that LiDAR elevations are not available for the whole state, thus falling short of the maximum return on investment. A statewide elevation dataset would provide instantaneous access to accurate elevation data, reducing costs and time required to merge together projects, or worse, to acquire missing data via less cost-effective methods. A sample of applications that rely on high quality elevation data in Nebraska include:

2.1.1 Hydrology and hydraulics

a) Base Flood Elevation (BFE) determinations
b) Floodplain and flood inundation mapping
c) Dam breach analysis and hazard potential classification

2.1.2 Engineering design and design reviews

a) Bridge and roadway design
b) Siting of transmission lines, power lines, cell towers, pipelines
c) Flood control structures
d) Conservation structures

2.1.3 Emergency Management

2.1.3.1 The Hazards U.S. Multi-Hazard (HAZUS-MH) estimates of potential dollars lost during flood disasters

2.1.4 Natural resources applications

2.1.4.1 Sediment erosion and transport

2.1.4.2 Watershed delineation and flow analyses

2.1.4.3 Suitability analyses for plants, animals and other species

2.1.5 Conservation planning

2.1.5.1 Modeling of landforms, habitat, vegetation, etc.

2.1.5.2 Channel topography

2.1.5.3 Vegetation and land cover studies

2.1.5.4 Precision agriculture

2.1.6 Cartographic applications

2.1.6.1 Soil survey

2.1.6.2 Imagery rectification

2.1.6.3 Building and other structural footprints

2.1.7 Fire Modeling

2.1.7.1 Vegetative density and their placement in the landscape

2.2 Objectives

These standards and guidelines to guide the acquisition and development of LiDAR data in Nebraska have the following objectives.

2.2.1 Provide guidance to state and local officials as they work, either in-house or with private contractors, to develop and/or acquire LiDAR elevation data and thereby increase the likelihood that the data acquired and/or developed will be suitable for the range of intended applications and likely future applications. The maintenance of elevation data is necessary for the data to be current and accurate. The requirements of maintenance involving stewardship and reporting of errors and handling updates is located in the NESDI Governance Plan and current Elevation Business Plan. These plans are currently in draft and are forthcoming.

2.2.2 Improve public policy development and implementation by helping to make elevation data more current and readily accessible.

2.2.3 Enhance coordination and program management across jurisdictional boundaries by insuring that elevation data can be horizontally integrated across jurisdictional and/or project boundaries for regional or statewide applications.2.2.4 Save public resources by facilitating the sharing of elevation data among public agencies or sub-divisions of agencies by incorporating data standards and following guidelines which will make it more likely that the elevation data developed by one entity will also be suitable to serve the multiple needs of other entities and thereby avoid the costly duplication of developing and maintaining similar elevation data.

2.2.5 Make elevation data more readily accessible to the wide range of potential users.

2.2.6 Facilitate harmonious, trans-agency public policy decision-making and implementation by enabling multiple agencies and levels of government to access and appropriately use common geospatial datasets and thereby make it more likely that intersecting public policy decisions, across levels of government, will be based on the same information.

2.2.7 Lay the foundation for facilitating intergovernmental partnerships for the acquisition and development of high-quality elevation data by defining standards and guidelines that increase the likelihood that the elevation data will meet the needs of multiple users.

2.2.8 Establish and promote the integration and interrelationships of elevation data with related NESDI framework layers through geometric placement and attributes.

3.0 Definitions

Refer to the LiDAR Base Specification Version 1.0 glossary for a more complete set of definitions.

3.1 $Accuracy_z$ (ACCz) (Vertical Accuracy) - The NSSDA reporting standard in the vertical component that equals the linear uncertainty value, such that the true or theoretical vertical location of the point falls within that linear uncertainty value 95 percent of the time. ACCz = 1.9600x RMSEz.

3.2 Bare earth - Digital elevation data of the terrain, free from vegetation, buildings and other man-made structures. Elevations of the ground.

3.3 Breakline - linear feature that describes a change in the smoothness or continuity of a surface.

3.4 Contour - Lines of equal elevation on a surface. An imaginary line on the ground, all points of which are at the same elevation above or below a specified vertical datum. (FEMA's Definition)

3.5 Digital Elevation Model (DEM) - the digital cartographic representation of the elevation of the land at regularly spaced intervals in x and y directions, using z-values referenced to a common vertical datum.

3.6 Digital Surface Model (DSM) - Similar to Digital Elevation Models (DEMs) or digital terrain models (DTMs), except that they may depict the elevations of the top surfaces of buildings, trees, towers, and other features elevated above the bare earth.

3.7 Fundamental Vertical Accuracy (FVA) - The value by which vertical accuracy of LiDAR can be equitably assessed and compared among datasets. The fundamental vertical accuracy of a dataset must be determined with well-distributed checkpoints located only in open terrain, free of vegetation, where there is a high probability that the sensor will have detected the ground surface. It is obtained using standard tests for Root Mean Square Error (RMSE), where FVA = ACCz = RMSEz x 1.9600.

3.8 Hydrologically-conditioned (hydro-conditioned) - Processing of a DEM or Triangulated Irregular Network (TIN) so that the flow of water is continuous across the entire terrain surface, including the removal of all spurious sinks or pits.

3.9 Hydrologically-enforced (hydro-enforced) - Processing of water bodies so that lakes and reservoirs are level and streams flow downhill. For example, a DEM, TIN or topographic contour dataset with elevations removed from the tops of selected drainage structures (bridges and culverts) so as to depict the terrain under those structures. Hydro-enforcement enables hydrologic and hydraulic models to depict water flowing under these structures, rather than appearing in the computer model to be dammed by them because of road deck elevations higher than the water levels. Hydro-enforced TINs also use breaklines along shorelines and stream centerlines. An example of this is where breaklines form the edges of TIN triangles along the alignment of drainage features. Shore breaklines for streams would be 3-D breaklines with elevations that decrease as the stream flows downstream; however, shore breaklines for lakes or reservoirs would have the same elevation for the entire shoreline if the water surface is known or assumed to be level throughout.

3.10 Hydrologically-flattened (hydro-flattened) - Processing of a LiDAR-derived surface DEM or TIN Model so that mapped water bodies, rivers, reservoirs, and other cartographically polygonal water surfaces are flat, and where appropriate, level from bank-to-bank.

3.11 LiDAR - An instrument that measures distance to a reflecting object by emitting timed pulses of light and measuring the time difference between the emission of a laser pulse and the reception of the pulse's reflection(s). The measured time interval for each reflection is converted to distance, which when combined with position and altitude information from Global Positioning System (GPS), Inertial Measurement Unit (IMU), and the instrument itself, allows the derivation of the 3-dimensional point location of the reflecting target's location.

3.12 Nebraska Spatial Data Infrastructure - A framework of geospatial data layers that have multiple applications, used by a vast majority of stakeholders, meet quality standards and

have data stewards to maintain and improve the data on an ongoing basis. These layers are also consistent with the Federal National Spatial Data Infrastructure (NSDI).

3.13 Nominal Point Spacing (NPS) - A common measure of the density of a LiDAR dataset, it is the typical or average lateral distance between points in a LiDAR dataset, most often expressed in meters. Often it is simply calculated as the square root of the average area per point. This value is predicted in mission planning and empirically calculated from the collected data. In high-density collections (<1 meter NPS), this may be directly expressed as Points per Square Meter (PPSM). PPSM = $1/NPS^2$.

3.14 Points – In the context for elevation, points are geospatial objects that represent spot elevations of randomly intersected features. Attributes are X, Y, and Z coordinates at a minimum, but may also include pulse number, return number, intensity, flight line number, scan angle, GPS time and feature class.

4.0 Applicability

4.1 State Government Agencies

State agencies that are involved in the acquisition of elevation data are required to comply with the standards as described in Section 1.

4.2 State Funded Entities

Entities that are not state agencies but receive direct or indirect state funding for acquisition of elevation data are also required to comply with the standards as described in Section 1.

4.3 Other

Other entities, such as local government agencies (e.g. County Offices, Natural Resources Districts, municipalities) involved in the acquisition of elevation data are required to comply with the standards as described in Section 1.

5.0 Responsibility

5.1 NITC

The NITC shall be responsible for adopting minimum technical standards, guidelines, and architectures upon recommendation by the technical panel. Neb. Rev. Stat. § 86-516(6)

5.2 State Agencies

The OCIO GIS Shared Services will be responsible for assuring that metadata is completed and the data is registered and available for distribution through NebraskaMAP.

5.3 Granting Agencies and Entities

State granting or fund disbursement entities or agencies will be responsible for ensuring that these standards are included in requirements and regulations related to fund disbursements as they relate to LiDAR acquisition.

5.4 Other

Local government agencies will be responsible for ensuring that these standards are included in requirements and regulations related to fund disbursements as they relate to LiDAR acquisition.

6.0 Authority

6.1 NITC GIS Council

According to Neb. Rev. Stat. § 86-572(2), the GIS Council shall: Establish guidelines and policies for statewide Geographic Information Systems operations and management (a) The acquisition, development, maintenance, quality assurance such as standards, access, ownership, cost recovery, and priorities of data bases; (b) The compatibility, acquisition, and communications of hardware and software; (c) The assessment of needs, identification of scope, setting of standards, and determination of an appropriate enforcement mechanism; (d) The fostering of training programs and promoting education and information about the Geographic Information Systems; and (e) The promoting of the Geographic Information Systems development in the State of Nebraska and providing or coordinating additional support to address Geographic Information Systems issues as such issues arise.

7.0 Related Documents

7.1 United State Geological Survey (USGS) National Geospatial Program (NGP) LiDAR Base Specification Version 1.0: http://pubs.usgs.gov/tm/11b4/

7.2 American Society for Photogrammetry and Remote Sensing (ASPRS) LAS Specification Version 1.4. November 2011.

8.0 Appendices

8.1 Nebraska LiDAR Base Specifications

The following is an adaptation of the LiDAR Base Specification Version 1.0 specific to Nebraska LiDAR acquisitions. Specific differences between the LiDAR Base Specification Version 1.0 and Nebraska specifications include:

Collection

- Nebraska requires a NPS of 1.4 meters or less.
- Nebraska projects typically collect LiDAR points at 1 of 2 Nominal Pulse Spacings, 0.7 and 1.4 meters. Each has specific accuracy requirements.

Data Processing and Handling

- Preferred CRS is Nebraska State Plane, NAD83, Feet, NAVD88, Feet
- Nebraska does not require Hydro-Flattening of DEMs

Deliverables

- Recommends 2 DEMs,
  - Bare-Earth topographic DEM (Required. Hydro-flattening not required)
  - Bare-Earth Hydro-conditioned DEM (Optional)

Collection

Multiple Discrete Returns
Data collection must be capable of at least three returns per pulse. Full waveform collection is acceptable.

Intensity Values
Intensity values are required for each return. The values are to be recorded in the .las files in their native radiometric resolution.

Nominal Pulse Spacing (NPS)
An NPS of **1.4** meters or less is required. Assessment of the NPS will be made against single swath, first-return only data, located within the geometrically usable center portion (typically 90 percent) of each swath, acceptable data voids excluded. NPS will be calculated as the square root of the average area per point. Average along-track and cross-track point spacing should be comparable (within 10 percent).
In general, the target NPS for a project should not be achieved through swath overlap or multiple passes. Such collection techniques may be permitted with prior approval.

Data Voids
Data voids within a single swath are not acceptable, except in the following circumstances:

- Where caused by water bodies,
- Where caused by areas of low near infra-red (NIR) reflectivity such as asphalt or composition roofing, or
- Where appropriately filled-in by another swath.

Spatial Distribution
The spatial distribution of geometrically usable points is expected to be uniform. Although it is understood that LiDAR instruments do not produce regularly gridded points, collections should be planned and executed to produce a first-return point cloud that approaches a regular lattice of points, rather than a collection of widely spaced high density profiles of the terrain. The uniformity of the point density throughout the dataset is important and will be assessed using the following steps:

- Generating a density grid from the data with cell sizes equal to the design NPS times 2, using a radius equal to the design NPS.

- Ensuring at least 90 percent of the cells in the grid contain at least one LiDAR point.
- The assessment is to be made against individual (single) swaths, using only the first-return points located within the geometrically usable center portion (typically 90 percent) of each swath.
- Excluding acceptable data voids previously identified in this specification.

  Note: This requirement may be relaxed in areas of substantial relief where it is impractical to maintain a consistent and uniform distribution.
  Note: The process described in this section relates only to the uniformity of the point distribution. It in no way relates to, nor can it be used for the assessment of point density or NPS.

Scan Angle
Scan angle will support horizontal and vertical accuracy within the requirements as specified in the next two sections. Note: This requirement primarily is applicable to oscillating mirror LiDAR systems. Other instrument technologies may be exempt from this requirement.

Vertical Accuracy
Vertical accuracy of the LiDAR data will be assessed and reported in accordance with the guidelines developed by the National Digital Elevation Program (NDEP) and subsequently adopted by the American Society for Photogrammetry and Remote Sensing (ASPRS). Complete definitions for vertical accuracy assessments are in Section 1.5 of the NDEP Elevation Guidelines (NDEP, 2004). The minimum vertical accuracy requirement for the unclassified LiDAR point cloud, using the NDEP/ASPRS methodology, is listed below:

- Fundamental Vertical Accuracy (FVA) <= 24.5 centimeters (cm) Accuracyz (ACCz), 95 percent (12.5 cm Root Mean Square Error (RMSE)z).
- The minimum vertical accuracy requirements for the derived DEM, using the NDEP/ASPRS methodology are listed below:
- Fundamental Vertical Accuracy (FVA) <= 24.5 cm ACCz, 95 percent (12.5cm RMSEz);
- Consolidated Vertical Accuracy (CVA) <= 36.3cm, 95th percentile, and
- Supplemental Vertical Accuracy (SVA) <= 36.3 cm, 95th percentile.
- The minimum vertical accuracy requirement for the unclassified LiDAR point cloud for LIDAR collected at 0,7 m NPS, using the NDEP/ASPRS methodology, is listed below:
- Fundamental Vertical Accuracy (FVA) <= 18.5 centimeters (cm) Accuracyz (ACCz), 95 percent (9.25 cm Root Mean Square Error (RMSE)z).
- The minimum vertical accuracy requirements for the derived DEM, using the NDEP/ASPRS methodology are listed below:
- Fundamental Vertical Accuracy (FVA) <= 18.5 cm ACCz, 95 percent (9.255cm RMSEz);
- Consolidated Vertical Accuracy (CVA) <= 27.7 cm, 95th percentile, and
- Supplemental Vertical Accuracy (SVA) <= 27.7 cm, 95th percentile**.**

Point cloud data accuracy is to be tested against a Triangulated Irregular Network (TIN) constructed from LiDAR points in clear and open areas. A clear and open area can be characterized with respect to topographic and ground cover variation such that a minimum of 5 times the NPS exists with less than 1/3 of the RMSEz deviation from a low-slope plane. Slopes that exceed 10 percent should be avoided. Ground that has been plowed or otherwise disturbed is not acceptable. All tested locations should be photographed showing the position of the tripod and the surrounding area ground condition.

Each land cover type representing 10 percent or more of the total project area must be tested and reported with an SVA.

In areas where a land cover category is something other than forested or dense urban, the tested point should not have any obstructions 45 degrees above the horizon to ensure a sufficient TIN surface. Additionally, tested areas should not be in proximity to low NIR reflective surfaces such as asphalt or composition roofing materials.

The SVA value is provided as a target. It is understood that in areas of dense vegetation, swamps, or extremely difficult terrain, this value may be exceeded.

The CVA value is a requirement that must be met, regardless of any allowed “busts” in the SVA(s) for individual land cover types within the project.

Checkpoints for each assessment (FVA, CVA, and all SVAs) are required to be well-distributed throughout the land cover type, for the entire project area. See Glossary for definition of well-distributed.

Exceptions: These requirements may be relaxed in cases:

- Where there exists a demonstrable and substantial increase in cost to obtain this accuracy.
- Where an alternate specification is needed to conform to previously contracted phases of a single larger overall collection effort, for example, multi-year statewide collections.
- Where the USGS agrees that it is reasonable and in the best interest of all stakeholders to use an alternate specification.

Relative Accuracy

The requirements for relative accuracy are listed below:

- Within individual swaths: <= 7 cm RMSEz
- Within overlap between adjacent swaths: <=10 cm RMSEz

Flightline Overlap

Flightline overlap of 10 percent or greater is required to ensure there are no data gaps between the usable portions of the swaths. Collections in high relief terrain are expected to require greater overlap. Any data with gaps between the geometrically usable portions of the swaths will be rejected.

Collection Area

- Data collection for the Defined Project Area, buffered by a minimum of 100 meters, is required. The buffered boundary is the Buffered Project Area.
- In order that all products are consistent to the edge of the Defined Project Area, all products must be generated to the limit of the Buffered Project Area. Since these areas are being generated, they shall also be delivered.

Collection Conditions

- Atmospheric conditions must be cloud and fog-free between the aircraft and ground during all collection operations.
- Ground conditions must be snow free. Very light, undrifted snow may be acceptable in special cases, with prior approval.
- Water conditions must be free of any unusual flooding or inundation, except in cases where the goal of the collection is to map the inundation.
- Leaf-off vegetation conditions are preferred, however, as numerous factors beyond human control may affect the vegetative condition at the time of any collection, the USGS NGP only requires that penetration to the ground must be adequate to produce an accurate and reliable bare-earth surface suitable for incorporation into the 1/9 (3-meter) NED. Collections for specific scientific research projects may be exempted from this requirement, with prior approval.

Data Processing and Handling

ASPRS LAS File Format

All processing should be carried out with the understanding that all point deliverables are required to be in fully compliant LAS format, either v1.2 or v1.3. The version selected must be used for all LAS deliverables in the project. Data producers are encouraged to review the LAS specification in detail (ASPRS, 2011).

Full Waveform
If full waveform data are collected, delivery of the waveform packets is required. LAS v1.3 deliverables with waveform data are to use external auxiliary files with the extension .wdp for the storage of waveform packet data. See the LAS v1.3 Specification for additional information (ASPRS, 2011).

Global Positioning System (GPS) Times
GPS times are to be recorded as Adjusted GPS Time, at a precision sufficient to allow unique timestamps for each pulse.

Adjusted GPS Time is defined to be Standard (or satellite) GPS time minus $1x10^9$. See the LAS v1.4 Specification for more detail (ASPRS, 2011).

Datums
All data collected must be tied to the datums listed below:

- Horizontal datum reference to the North American Datum of 1983/HARN adjustment (NAD83 HARN) is required.
- Vertical datum reference to the North American Vertical Datum of 1988 (NAVD 88) is required.
- The most recent National Geodetic Survey (NGS)-approved geoid model is required to perform conversions from ellipsoidal heights to orthometric heights.

Coordinate Reference System

- The Nebraska preferred Coordinate Reference System for projects conducted within the state is Nebraska State Plane, NAD83 HARN, Feet; NAVD88, Feet.
- The USGS preferred Coordinate Reference System for the Conterminous United States (CONUS) is Universal Transverse Mercator UTM, NAD83 HARN, Meters; NAVD88, Meters and this Coordinate Reference System may be used. Each discrete project is to be processed using the single predominant UTM zone for the overall collection area.

Units of Reference
All references to the unit of measure “Feet” and “Foot” must specify “International”, “Intl”, “U.S. Survey”, or “US”.

Swath Identification
Each swath will be assigned a unique File Source ID. It is required that the Point Source ID field for each point within each LAS swath file be set equal to the File Source ID before any processing of the data. See the LAS v1.3 Specification (ASPRS, 2011).

Point Families
Point families (multiple return “children” of a single “parent” pulse) shall be maintained intact through all processing before tiling. Multiple returns from a given pulse will be stored in sequential (collected) order.

Swath Size and Segmentation
Swath files will be 2 gigabytes (GB) in size or less. Long swaths (those which result in a LAS file larger than 2 GB) will be split into segments no greater than 2 GB each.

- Each sub-swath will retain the original File Source ID of the original complete swath.
- Points within each sub-swath will retain the Point Source ID of the original complete swath.
- Each sub-swath file will be named identically to the original complete swath, with the addition of an ordered alphabetic suffix to the name (“-a”, “-b” … “-n”). The order of the named sub-swaths shall be consistent with the collection order of the points (“-a” will be the chronological beginning of the swath; “-n” will be the chronological end of the swath).
- Point families shall be maintained intact within each sub-swath.
- Sub-swaths should be broken at the edge of the scan line.
- Other swath segmentation approaches may be acceptable, with prior approval.

Scope of Collection

- All collected swaths are to be delivered as part of the Raw Data Deliverable. This includes calibration swaths and crossties.
- This in no way requires or implies that calibration swath data are to be included in product generation. All collected points are to be delivered. No points are to be deleted from the swath LAS files. Excepted from this are extraneous data outside of the buffered project area (aircraft turns, transit between the collection area and airport, transit between fill-in areas, and the like).
- These points may be permanently removed. Busted swaths that are being completely discarded by the vendor and re-flown do not need to be delivered.

Use of the LAS Withheld Flag

- Outliers, blunders, noise points, geometrically unreliable points near the extreme edge of the swath, and other points the vendor deems unusable are to be identified using the Withheld flag, as defined in the LAS specification.
- This applies primarily to points that are identified during pre-processing or through automated post-processing routines.
- If processing software is not capable of populating the Withheld bit, these points may be identified using Class=11.
- Noise points subsequently identified during manual Classification and Quality Assurance/Quality Control (QA/QC) may be assigned the standard LAS classification value for Noise (Class=7), regardless of whether the noise is “low” or “high” relative to the ground surface.

Point Classification

- ALL points not identified as Withheld are to be classified.
- No points in the Classified LAS deliverable will be assigned Class=0.
- Use of the ASPRS/LAS Overlap classification (Class=12) is prohibited.
- If overlap points are required to be differentiated by the data producer or cooperating partner, they must be identified using a method that does not interfere with their classification:
- Overlap points are tagged using Bit:0 of the User Data byte, as defined in the LAS specification. (SET=Overlap).
- Overlap points are classified using the Standard Class values + 16.
- Other techniques as agreed upon in advance.

The technique used to identify overlap must be clearly described in the project metadata files.
Note: A standard bit flag for identification of overlap points has been included in LAS v1.4, released on November 14, 2011.

Positional Accuracy Validation

Before classification of and development of derivative products from the point cloud, verification of the vertical accuracy of the point cloud, absolute and relative, is required. The Fundamental Vertical Accuracy (absolute) is to be assessed in clear, open areas as described in the section called Vertical Accuracy above. Swath-to-swath and within swath accuracies (relative) are to be documented. A detailed report of this validation process is a required deliverable.

Classification Accuracy

It is required that due diligence in the classification process will produce data that meet the following tests:

- Following classification processing, no non-withheld points should remain in Class 0.
- Within any 1 kilometer (km) x 1 km area, no more than 2 percent of non-withheld points will possess a demonstrably erroneous classification value.
- Points remaining in Class 1 that should be classified in any other required Class are subject to these accuracy requirements and will be counted towards the 2 percent threshold.

Note: These requirements may be relaxed to accommodate collections in areas where the USGS agrees classification to be particularly difficult.

Classification Consistency
Point classification is to be consistent across the entire project. Noticeable variations in the character, texture, or quality of the classification between tiles, swaths, lifts, or other non-natural divisions will be cause for rejection of the entire deliverable.

Tiles
Note: This section assumes a projected coordinate reference system.

A single non-overlapped tiling scheme (the Project Tiling Scheme) will be established and agreed upon by the data producer and the USGS before collection. This scheme will be used for ALL tiled deliverables.

- Tile size is required to be an integer multiple of the cell size of raster deliverables.
- Tiles are required to be sized using the same units as the coordinate system of the data.
- Tiles are required to be indexed in X and Y to an integer multiple of the tile's X-Y dimensions.
- All tiled deliverables will conform to the Project Tiling Scheme, without added overlap.
- Tiled deliverables will edge-match seamlessly and without gaps.

Hydro-Enforcement
Processing of mapped water bodies so that streams flow downhill. Specifically, Nebraska Digital Elevation Models (DEMs) are derived with elevations removed from the tops of selected drainage structures (bridges and culverts) so as to depict the terrain under those structures. Hydro-enforcement enables hydrologic and hydraulic models to depict water flowing under these structures, rather than appearing in the computer model to be dammed by them because of road deck elevations higher than the water levels.

Hydro-Flattening
Note: Hydro-Flattening is not required for any known Nebraska application and imposes a significant increase in costs. This section applies only to LiDAR acquisitions in which USGS participation covers this cost increase in its entirety.

Hydro-flattening pertains only to the creation of derived DEMs. No manipulation of or changes to originally computed LiDAR point elevations are to be made. Breaklines may be used to help classify the point data. The goal of the NGP is for the delivered DEMs to represent water bodies in a cartographically and aesthetically pleasing manner. It is not the goal of the NGP to accurately map water surface elevations within the NED. The requirements for hydro-flattening are listed below.

Inland Ponds and Lakes

- 2 acres or greater surface area (approximately equal to a round pond 350 feet in diameter) at the time of collection.
- Flat and level water bodies (single elevation for every bank vertex defining a given water body).
- The entire water surface edge must be at or below the immediately surrounding terrain. The presence of floating water bodies will be cause for rejection of the deliverable.
- Long impoundments such as reservoirs, inlets, and fjords, whose water surface elevations drop when moving downstream, are required to be treated as rivers.

Inland Streams and Rivers

- 100 feet nominal width: This should not unnecessarily break a stream or river into multiple segments. At times it may squeeze slightly below 100 feet for short segments. Data producers should use their best professional cartographic judgment.
- Flat and level bank-to-bank (perpendicular to the apparent flow centerline); gradient to follow the immediately surrounding terrain. In cases of sharp turns of rapidly moving water, where the natural water surface is notably not level bank- to- bank, it is appropriate to represent the water surface as it exists in nature, while maintaining an aesthetic cartographic appearance.
- The entire water surface edge must be at or below the immediately surrounding terrain.

- Stream channels are required to break at road crossings (culvert locations). The roadway over a culvert should be continuous.
- A culvert, regardless of size, is defined as having earth between the road surface and the top of the structure.
- Bridges are required to be removed from the DEM. Streams and rivers should be continuous at bridge locations. Bridges are defined as having an elevated deck structure that does not rest on earth.
- When the identification of a structure such as a bridge or culvert cannot be made reliably, the feature should be regarded as a culvert.

Non-Tidal Boundary Waters

- Represented only as an edge or edges within the project area; collection does not include the opposing shore.
- Water surface is to be flat and level, as appropriate for the type of water body (level for lakes; gradient for rivers)
- The entire water surface edge must be at or below the immediately surrounding terrain.

Tidal Waters

- Tidal water bodies are defined as water bodies such as oceans, seas, gulfs, bays, inlets, salt marshes, large lakes, and the like. This includes any water body that is affected by tidal variations.
- Tidal variations over the course of a collection or between different collections will result in lateral and vertical discontinuities along shorelines. This is considered normal and these anomalies should be retained. The final DEM is required to represent as much ground as the collected data permits.
- Water surface is to be flat and level, to the degree allowed by the irregularities noted above.
- Scientific research projects in coastal areas often have specific requirements with regard to how tidal land-water boundaries are to be handled. For such projects, the requirements of the research will take precedence.

Islands

- Permanent islands 1 acre or larger shall be delineated within all water bodies.

Single-Line Streams

Cooperating partners may require collection and integration of single-line streams within their LiDAR projects. Although the USGS does not require these breaklines be collected or integrated, it does require that if used and incorporated into the DEMs, the following guidelines are met:

- All vertices along single-line stream breaklines are at or below the immediately surrounding terrain.
- Single-line stream breaklines are not to be used to introduce cuts into the DEM at road crossings (culverts), dams, or other such features. This is hydro-enforcement and as discussed in appendix 3 will create a non-topographic DEM that is unsuitable for integration into the NED.
- All breaklines used to modify the surface are to be delivered to the USGS with the DEMs.

Deliverables

The USGS requires unrestricted rights to all delivered data and reports, which will be placed in the public domain. This specification places no restrictions on the data provider's rights to resell data or derivative products as they see fit.

Metadata

The term "metadata" refers to all descriptive information about the project. This includes textual reports, graphics, supporting shapefiles, and Federal Geographic Data Committee (FGDC)-compliant metadata files. Metadata deliverables include the following items:

- Collection report detailing mission planning and flight logs.

- Survey report detailing the collection of control and reference points used for calibration and QA/QC.
- Processing report detailing calibration, classification, and product generation procedures including methodology used for breakline collection and hydro-flattening.
- QA/QC Reports (detailing the analysis, accuracy assessment and validation of the following:
- Point data (absolute, within swath, and between swath)
- Bare-earth surface (absolute)
- Other optional deliverables as appropriate
- Control and calibration points: All control and reference points used to calibrate, control, process, and validate the LiDAR point data or any derivative products that are to be delivered.
- Georeferenced, digital spatial representation of the precise extents of each delivered dataset. This should reflect the extents of the actual LiDAR source or derived product data, exclusive of TIN artifacts or raster NODATA areas. A union of tile boundaries or minimum bounding rectangles is not acceptable. ESRI Polygon shapefile or geodatabase is preferred.
- Product metadata [FGDC compliant, eXtensible Markup Language (XML) format metadata]. Metadata files for individual files are not required. One XML file is required for the following examples:
- The Overall Project: Describing the project boundary, the intent of the project, the types of data collected as part of the project, the various deliverables for the project, and other project-wide information.
- Each Lift: Describing the extents of the lift, the swaths included in the lift, locations of GPS base stations and control for the lift, preprocessing and calibration details for the lift, adjustment and fitting processes applied to the lift in relation to other lifts, and other lift-specific information.
- Each tiled deliverable product group:
- Classified point data
- Bare-earth DEMs
- Breaklines (if used)
- Other datasets delivered under the contract (Digital Surface Models (DSM), intensity images, height surfaces, and others)
- FGDC compliant metadata must pass the USGS metadata parser (mp) with no errors.

Raw Point Cloud

Delivery of the raw point cloud is a standard requirement for USGS NGP LiDAR projects. Raw point cloud deliverables include the following items:

- All swaths, returns, and collected points, fully calibrated and adjusted to ground, by swath.
- Fully compliant LAS v1.2 or v1.3, Point Data Record Format 1, 3, 4, or 5.
- LAS v1.3 deliverables with waveform data are to use external auxiliary files with the extension .wdp for the storage of waveform packet data. See the LAS v1.3 Specification for additional information.
- Correct and properly formatted georeference information must be included in all LAS file headers.
- GPS times are to be recorded as Adjusted GPS Time, at a precision sufficient to allow unique timestamps for each pulse.
- Intensity values (native radiometric resolution).
- One file per swath, one swath per file, file size not to exceed 2 GB, as described under the section called Swath Size and Segmentation above.
- Vertical accuracy of the LiDAR point data will be assessed and reported in accordance with the guidelines developed by the NDEP and subsequently adopted by the ASPRS. The complete guidelines on vertical accuracy are in Section 1.5 of the NDEP Guidelines (NDEP, 2004).
- Vertical accuracy requirements using the NDEP/ASPRS methodology for the point cloud are FVA<= 24.5 cm ACCz, 95-percent confidence level (12.5 cm RMSEz) or, 18.5 cm ACC_z 95-percent confidence level (9.25cm $RMSE_z$) for LiDAR collected at 0.7m NPS

Classified Point Cloud
Delivery of a classified point cloud is a standard requirement for USGS NGP LiDAR projects. Specific scientific research projects may be exempted from this requirement. Classified point cloud deliverables include the following items:

- All project swaths, returns, and collected points, fully calibrated, adjusted to ground, and classified, by tiles. Project swaths exclude calibration swaths, cross-ties, and other swaths not used, or intended to be used, in product generation.
- Fully compliant LAS v1.2 or v1.3, Point Data Record Format 1, 3, 4, or 5.
- LAS v1.3 deliverables with waveform data are to use external auxiliary files with the extension .wdp for the storage of waveform packet data. See the LAS v1.3 Specification for additional information.
- Correct and properly formatted georeference information must be included in all LAS file headers.
- GPS times are to be recorded as Adjusted GPS Time, at a precision sufficient to allow unique timestamps for each pulse.
- Intensity values (native radiometric resolution).
- Tiled delivery, without overlap, using Project Tiling Scheme.
- Classification Scheme (minimum) as listed in table 1.

Bare-Earth Surface (Raster DEM)
Delivery of a bare-earth DEM is a standard requirement for USGS NGP and Nebraska LiDAR projects. Specific scientific research projects may be exempted from this requirement. Bare-earth surface deliverables include the following items:

- Bare-earth DEM, generated to the limits of the Buffered Project Area.
- Cell size no greater than 2 meters or 6 feet, and no less than the design Nominal Pulse Spacing (NPS).
- Delivery in an industry-standard, GIS-compatible, 32-bit floating point raster format (ERDAS .IMG preferred).
- Delivery of a hydro-enforced, bare-earth DEM is a requirement for Nebraska LiDAR projects. Bare-earth surface deliverables include the following items:
- Bare-earth DEM, generated to the limits of the Buffered Project Area.
- Cell size no greater than 2 meters or 6 feet, and no less than the design Nominal Pulse Spacing (NPS).
- Delivery in an industry-standard, GIS-compatible, 32-bit floating point raster format (ERDAS .IMG preferred).

Table 1. Minimum Classified Point Cloud Classification Scheme.

Code Description
1 Processed, but unclassified
2 Bare-earth ground
7a Noise (low or high; manually identified; if needed)
9 Water
10b Ignored Ground (Breakline proximity)
11 Withheld (if the Withheld bit is not implemented in processing software)

a. Class 7, Noise, is included as an adjunct to the Withheld bit. All noise points are to be identified using one of these two methods.
b. Class 10, Ignored Ground, is for points previously classified as bare-earth but whose proximity to a subsequently added breakline requires that it be excluded during Digital Elevation Model (DEM) generation.
    - Georeference information shall be included in each raster file.
    - Tiled delivery, without overlap.
    - DEM tiles will show no edge artifacts or mismatch. A quilted appearance in the overall project DEM surface, whether caused by differences in processing quality or character between tiles, swaths, lifts, or other non-natural divisions, will be cause for rejection of the entire deliverable.

- Void areas (for example, areas outside the Buffered Project Area but within the tiling scheme) shall be coded using a unique NODATA value. This value shall be identified in the appropriate location within the raster file header or external support files (for example, .aux).
- Vertical accuracy of the bare-earth surface will be assessed and reported in accordance with the guidelines developed by the NDEP and subsequently adopted by the ASPRS. The complete guidelines are in Section 1.5 of the NDEP Guidelines (NDEP, 2004).
- The following thresholds represent the minimum vertical accuracy requirements using the NDEP/ASPRS methodology:
- For LiDAR collected at 1.4 meter NPS:
    - FVA<= 24.5 cm ACCz, 95 percent Confidence Level (12.5 cm RMSEz)
    - CVA<= 36.3 cm, 95th percentile
    - SVA<= 36.3 cm, 95th percentile
- For LiDAR collected at 0.7 meter NPS:
    - FVA<= 18.5 cm ACCz, 95 percent Confidence Level (9.255 cm RMSEz) for LiDAR collected at 0.7M NPS
    - CVA<= 27.7 cm, 95th percentile
    - SVA<= 27.7 cm, 95th percentile
- All QA/QC analysis materials and results are to be delivered to the USGS.
- Depressions (sinks), natural or man-made, are not to be filled (as in hydro-conditioning and hydro-enforcement).
- Water bodies (ponds and lakes), wide streams and rivers (double-line), and other non-tidal water bodies as defined in the section called Hydro-flattening are to be hydro-flattened within the DEM. Hydro-flattening shall be applied to all water impoundments, natural or man-made, that are larger than 2 acres in area (approximately equal to a round pond 350 feet in diameter), to all streams that are nominally wider than 100 feet, and to all non-tidal boundary waters bordering the project area regardless of size. The methodology used for hydro-flattening is at the discretion of the data producer.

Note: Please refer to the section called Hydro-Flattening and appendix 3 for detailed discussions of hydro-flattening.

Breaklines

Breaklines are not required to meet the Nebraska LiDAR standards. Delivery of the breaklines used in hydro-flattening is a standard requirement for USGS NGP LiDAR projects. If LiDAR is collected as part of a USGS NGP LiDAR project and hydro-flattened with breaklines, breakline deliverables include the following items:

- Breaklines shall be developed to the limit of the Buffered Project Area.
- All breaklines developed for use in hydro-flattening shall be delivered as an ESRI feature class (PolylineZ or PolygonZ format, as appropriate to the type of feature represented and the methodology used by the data producer). Shapefile or geodatabase is required.
- Each feature class or shapefile will include properly formatted and accurate georeference information in the standard location. All shapefiles must include a correct and properly formatted *.prj file.
- Breaklines must use the same coordinate reference system (horizontal and vertical) and units as the LiDAR point delivery.
- Breakline delivery may be as a continuous layer or in tiles, at the discretion of the data producer. In the case of tiled deliveries, all features must edge-match exactly across tile boundaries in both the horizontal (*X*-*Y*) and vertical (*Z*) spatial locations.

NITC 3-204
Imagery Standards

Review Version 2
(Date 9.3.2014)

Category: Data and Information Architecture
Applicability: See Each Section of Standards
History: Adopted on [Month Day, Year]

NEBRASKA INFORMATION TECHNOLOGY COMMISSION GIS COUNCIL

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1.0 Standard

1.1 Description

This standard provides requirements necessary for the creation, development, delivery, and maintenance of aerial imagery acquisition to support a statewide Nebraska Imagery Program. There are multiple uses for imagery and data acquisition is expensive and requires preplanning. These standards are set at a minimum such that the majority of applications and needs are met across the state.

It is important to collect ortho-rectified imagery so that ground features can be measured and other data layers can be created from the data source which has a strong relationship to ground control. The data required for ortho-rectification include orientation parameters for the source image(s) and a digital elevation model (DEM) of the geographic area to be covered by the imagery. Ortho-rectification corrects for tip and tilt of the aircraft and displacement in the photograph caused by changes in the ground elevation.

Generally, the development of ortho-rectified imagery requires the acquisition of overlapping photography of the same geography and some combination of surveyed ground control and airborne (Global Positioning System) GPS collection at the time of photography. A photogrammetrist performs image correlation techniques and aero-triangulation on the resulting block of photographs to establish the orientation parameters of the individual image. Using a most recent DEM source or new LiDAR DEM provides the base for which the new imagery is rectified. These operations make ortho-rectified imagery more expensive than uncorrected aerial photography, but also make it far more accurate and useful.

Ultimately, accurate base maps can be derived from ortho-rectified imagery because the image has been geometrically corrected such that the scale is uniform. Streets and roads, curbs, manholes, water edge, tree inventories, fire hydrants, and numerous other features can be accurately mapped from the imagery. This also allows for accurate measurements of features and relationships between features, directly on the photograph.

The standard provides a consistent structure for data producers and users to ensure compatibility of datasets within the same framework layer and when used between other Nebraska Spatial Data Infrastructure (NESDI) framework layers such as survey and geodetic control and LiDAR.

This standard does not restrict or limit additional buy-ups of imagery data and services. These standards are meant to be a minimum set of standards and are subject to be updated based on technology enhancements, necessary workflow changes, and other data requirements. Other imagery data that is available at specifications that are above the minimum standard will be evaluated on a case-by-case basis.

The standard is not intended to be a substitute for an implementation design. These standards can be used at local, state and federal level to ensure interdisciplinary compatibility and interoperability with other framework layers. These standards integrate with existing standards such as the American Society for Photogrammetry and Remote Sensing (ASPRS) and other NITC related standards.

1.2 Acquisition and Processing

1.2.1 Flight Specifications

Proper planning and pre-flight requirements are necessary steps prior to acquiring imagery. This includes consideration of temporal requirements, proper flight planning, and ensuring that the characteristics of the sensors used in acquisition of imagery meet these requirements.

1.2.1.1 Temporal Requirements

Time of Day: Imagery will need to be acquired during minimal shadow conditions. Image acquisition shall occur when the sun angle is equal to or greater than 30-degrees.

Time of Year: All imagery shall be collected during the late-Winter / early-Spring flying season during leaf-off conditions for deciduous vegetation in Nebraska. Exceptions can be made on a case-by-case basis for certain applications requiring leaf-on imagery.

1.2.1.2 Flight Plans

Flight line orientation for all flight lines shall be in a cardinal direction, either north-south or east-west orientation when feasible. Flight plans must be approved prior to imagery acquisition. Information will need to be provided including project boundary, flight line numbers, flight line locations, and recommended ground control locations. If a frame sensor is used, exposure numbers should be included as well. For quality assurance purposes, the vendor shall submit copies of flight logs as part of the preliminary imagery deliverables.

1.2.1.3 Sensor Characteristics

The entire mission in a given year must be flown with sensors having the same specifications. The system shall use square pixels (ground footprint) at all times during processing. The technique of using aggregated detectors resulting in a rectangular pixel before blending with other channels shall not be used. The aerial camera shall be a precision aerial mapping camera equipped with a low distortion, high resolution lens. Camera characteristics shall be such that the aerial photographs taken can be satisfactorily used with the vendor’s proposed photogrammetric compilation equipment and environment. Calibration certificates for all systems to be used for acquisition will need to be provided.

1.2.1.4 Sun Angle

The images should be acquired only during the portion of the day when the sun angle exceeds the minimum of 30 degrees. To expedite acquisition within the photo periods, different sun angles may be permitted, provided the image does not have excessive shadows that preclude interpretation and data collection.

1.2.2 Ground Control

Ground control needs to be established of sufficient density and accuracy to meet the accuracy requirements of the ortho-rectified imagery.

Ground controls points used for aerial triangulation should be at least three times better than the expected accuracy of aerial triangulation solution. For example, in order to produce an orthophoto with an $RMSE_r$ of 15cm, the aerotriangulation results should have an $RMSE_{xyz}$ of 7.5 cm and the ground control used should have $RMSE_{xyz}$ of 2.5 cm. The control shall be sufficient to supplement the airborne GPS and Inertial Measurement Unit (IMU) in order to meet the required product accuracies.

For all photogrammetric data sets, the accuracy of the aerial triangulation or INS orientation (if used for direct orientation of the camera) should be at least twice the accuracy of derived products, as evaluated at higher accuracy check points using stereo photogrammetric measurements. Ground control and blind quality control points shall be required for softcopy aero- triangulation and ortho-photography generation to meet the accuracies specified.

Both ground control and quality control points will be based on a county or project area size depending on the scope of the project to be flown. The control diagrams, indicating the anticipated vertical and horizontal accuracies, will be reviewed before imagery collection begins.

The availability and/or quality of any existing ground control will need to be determined prior to flight acquisition. Any new control established for a project area will be delivered including sketches, pictures of control locations, and an ISO 19115 compliant metadata file. Those responsible for evaluating ground control should not assume that control exists, but it could be beneficial to use existing control if possible.

1.2.2.1 Global Positioning Systems (GPS)

If additional ground control needs to be established, the ground control shall be established with survey grade instrumentation. The GPS control survey needs to be conducted with a licensed surveyor or engineer representing the quality control process. A plan will need to be provided to recommend and coordinate the placement of ground control target locations of a sufficient quantity and size to control the photogrammetric accuracy specifications. Any new ground control established must be tied to the Nebraska NAD83 horizontal datum. All ground control points must be documented as such so that they are easily located by other surveyors throughout the duration of the project.

The horizontal root-mean-square error (RMSE) of the airborne GPS control data shall not exceed 0.2m. The vertical RMSE of the Airborne GPS control shall not exceed 0.3m.

1.2.2.2 Digital Elevation Model (DEM)

Elevation data is necessary for ortho-rectifying imagery. A digital elevation model (DEM) shall be developed at a density level necessary to support the imagery ortho-rectification process.

The elevation data may come from various sources to build a DEM. Elevation data may be derived from LiDAR, photogrammetry or autocorrelation as long as it provides sufficient accuracy and precision to support imagery horizontal accuracy requirements. Preference is to use LiDAR where it is available in the state. The DEM shall consist of points spaced at regular intervals along a grid, points of significant high or low elevations, and ortho-photography specific breaklines at all significant terrain breaks. In cases, where breaklines are not available suitable breaklines will need to be created to support an elevation dataset. It is not necessary to capture break lines at all curbs, ditches, stream banks, or other similar minor terrain breaks. The DEM shall be free of artifacts and data voids. The vertical accuracy of the DEMs developed to support production of the ortho-rectified imagery shall be sufficient to guarantee the horizontal accuracy specified in these standards.

The U.S. Geological Survey's National Elevation Dataset (NED) has 1/3 arc-second digital elevation model (DEM) data. Unless an area is very flat, the NED should not be used for less than 12 inch resolution data where higher accuracy is required.

There is no guarantee that the available DEM will be adequate to meet the final product accuracy specifications. An updated DEM is necessary in order to support the ortho-rectification production specifications and accuracy standards. This may require the acquisition of LiDAR to complete this task.

Updates to the existing DEM need only support the ortho-rectification process and are not required to support contour modeling or other applications. The DEM data is not to be stored as a record (Z component) for each pixel of the ortho-rectified image.

1.2.3 Ground (Spatial) Resolution

The final imagery output needs to be at a minimum of 12 inch ground sample distance (GSD). GSD is referred to as spatial resolution. This orthoimagery should meet ASPRS Class II horizontal accuracy standards for digital Orthoimagery and 1:2,400 Digital Planimetric Data.

A scale that equivalents higher resolutions (i.e., 6 inch) can be acquired as long as it meets the respective scales and horizontal accuracies associated to its desired spatial resolution found in section 1.2.6.

1.2.4 Spectral Resolution

Imagery will need to be provided in four primary spectral bands at 12 bit including Red (R), Green (G) and Blue (B) and Infrared (IR). All color imagery shall be the equivalent of natural true color, to include 256 levels of value for each color band for RGB. The sensor or camera shall save the bands in the following order: Red, Green, Blue, and infrared.

1.2.5 Radiometric Resolution

The digital aerial images shall be clear and sharp in detail and of high radiometric quality. The sensor shall capture the images in an uncompressed “lossless” image format. The

sensor shall, at minimum, utilize 12 bits per pixel radiometric resolution. Up-sampling from a lower bit depth to a higher bit depth is not allowed (e.g. resampling 8 bit data to 12 bit data). Color balancing shall result in colors which appear natural to a human observer. Image contract and brightness shall be adjusted to minimize perceptible differences within and between adjacent images.

1.2.6 Horizontal Accuracy

Horizontal accuracy assessment will be required for both in absolute and relative conditions. The pixel size of the final digital orthoimagery is being considered for this assessment not the GSD of the raw image that is used to establish the horizontal accuracy class.

- Absolute requires the use of ground control points for testing purposes. These points, found in the image and coordinates from the ortho-rectified image, are compared to the published coordinates.
- Relative horizontal accuracy assessment involves the visual inspection of adjacent images for edge matching, and the comparison of the ortho-rectified image to planimetric data. The relative displacement would be quantified.
- Recommendations for achieving the horizontal accuracy assessment shall be provided prior to acquisition including the number of and the distribution of check points within the project. QC points should be included in flight and control layout prior to acquisition.

The final imagery output needs to meet horizontal accuracy requirements established by ASPRS Class II accuracy for a minimum 12 inch GSD as defined in the following table.

Horizontal Data Accuracy Class	**RMSEx and RMSEy**	**Orthophoto Mosaic Seamline Maximum Mismatch**	**Aerial Triangulation or INS-based RMSEx RMSEy and RMSEz**
I	Pixel size x 1.0	Pixel size x 2.0	Pixel size x 0.5
II	Pixel size x 2.0	Pixel size x 4.0	Pixel size x 1.0
III	Pixel size x 3.0	Pixel size x 6.0	Pixel size x 1.5
…			
N	Pixel size x N	Pixel size x 2N	Pixel size x 0.5N

When producing digital orthoimagery, the GSD as acquired by the sensor (and as computed at mean average terrain) should not be more than 95% of the final orthoimagery pixel size. In extremely steep terrain, additional consideration may need to be given to the variation of the GSD across low lying areas in order to ensure that the variation in GSD across the entire image does not significantly exceed the target pixel size.

The following table serves as a guide for three common ASPRS horizontal accuracy standards for planimetric maps intended for use at common map scales.

Orthophoto Pixel Size	Horizontal Data Accuracy Class	RMSEx or RMSEy (cm)	RMSEr (cm)	Orthophoto Mosaic Seamline Maximum Mismatch (cm)	Horizontal Accuracy at the 95% Confidence Level (cm)
7.5-cm (~3 in)	I	7.5	10.6	15.0	18.4
	II	15.0	21.2	30.0	36.7
	III	22.5	31.8	45.0	55.1
15-cm (~6 in)	I	15.0	21.2	30.0	36.7
	II	30.0	42.4	60.0	73.4
	III	45.0	63.6	90.0	110.1
30-cm (~12 in)	I	30.0	42.4	60.0	73.4
	II	60.0	84.9	120.0	146.9
	III	90.0	127.3	180.0	220.3

1.2.7 Projection and Datum

Imagery for the project will be referenced to the North American Datum of 1983 (NAD83) using the 2007 HARN adjustment, and the North American Vertical Datum of 1988 (NAVD 88) with the latest ellipsoid and Geoid09 adjustments. Imagery shall be oriented to the appropriate Nebraska State Plane using U.S. Feet.

1.2.8 Pixel Clarity

Pixel clarity is defined by pixel size and relation to the ground sample distance (GSD) of the specified pixel size. It is not recommended to resample from a coarser image to obtain a finer image resolution. The image can be resampled from a sharper image for a coarser image (i.e., obtaining an 18-inch pixel resolution from one foot).

1.2.9 Image Quality

Images shall be tonally balanced and image mosaics shall be uniform in contrast without abrupt variations between image tiles. Imagery shall be free of blemishes, and artifacts that obscure ground feature detail. Pixel resolution shall not be degraded by excessive image smear. Imagery shall have a tonal range that prevents the clipping of highlights or shadow detail from the image.

1.3.0 Environmental Conditions and Obstructions

To the extent possible, no clouds, snow, fog, haze, smoke, or other ground obscuring conditions shall be present at the time of the flights. Ground conditions are free of snow, flooding and excessive soil moisture. Streams and rivers should be within their normal banks, unless otherwise negotiated. Spectral reflectance from water must be minimized and should not obscure shoreline features. In no case will the maximum cloud cover exceed 5% per image.

1.3.1 Edge Effects

Sufficient end and side laps need to be taken into consideration to prevent any gaps in coverage and to provide all necessary coverage for accurate ortho-rectification and visual

interpretation. The crab shall not be in excess of three (3) degrees; and, tilt of the camera from verticality at the instant of exposure shall not exceed three (3) degrees.

1.3.2 Building Lean

Additional supplemental flight lines should be acquired in areas of tall buildings to limit building lean in city blocks. Recommended supplemental flight lines should be provided in preliminary flight layout for prior review and approval.

1.3 Data Format

The data format provided will need to be in uncompressed tiles in a GeoTIFF format that can be interpreted by commercial imagery and GIS software. Tile schemes will need to be provided at 5,000 feet x 5,000 feet. If mosaic imagery is suggested, the area of interest (AOI) or collection area (i.e., county, quadrangle, city, etc) will need to be provided. The mosaic imagery need to be compressed and provided as JPEG2000 with a compression ratio of 20:1.

1.4 Maintenance

Entities responsible for data acquisition and deliverables will need to assure data meets standards and are updated and maintained in a timely manner. After spatial and attribute updates and/or modifications are performed to the data it shall be submitted to the appropriate entity(s) responsible for performing quality control and maintenance of the data acquisition.

Maintenance of elevation data determines the suitability to support the greatest range of applications. Many projects require up-to-date, accurate and consistent elevation data and maintenance of this data is necessary to provide the maximum return on investment.

1.4.1 Reporting Errors and Handling Updates

The reporting of errors need to be directed to the appropriate entity in a timely manner. Updated spatial and attribute information in the data will also need to be redistributed. The date field in the metadata when the last record was modified will also need to be updated to ensure proper records management and communication with others in the workflow.

1.5 Quality Control

A quality control process is required by a third-party to ensure the delivery of an image product that satisfies the requirements as defined by these standards. The quality of imagery acquisition is evaluated based on the overall functional correctness and completeness of the technical requirements that also include a horizontal accuracy test. In the event that data does not meet specific requirements of these standards, the imagery will be rejected and the vendor will be required to either reacquire or re-process data appropriately to meet these standards.

1.5.1 Horizontal Accuracy Test

A number of check points will need to be collected within each area of interest to verify the horizontal accuracy of the ortho-rectified production process. The check points must be completely independent of ground control used during aero-triangulation and data

production. The recommended number of check points based on the size of area will follow ASPRS guidelines.

1.5.2 Re-Flights

A plan for re-flights of areas will need to be provided in the event of image rejection during the quality control process, or where original imagery could not be collected because weather or ground cover conditions, or other factors outside the control of the vendor precluded collection at the scheduled time of the flyover. Mechanical or technical problems shall not be considered a legitimate reason for non-collection.

1.6 Integration with other Standards

1.6.1 Street Centerline Standards (NITC 3-205)

These minimum standards for imagery acquisition are designed to ensure the acquisition of imagery sufficient to meet the requirements for digitizing street centerlines as required in the Street Centerline Standards NITC 3-205.

1.6.2 Address Standards (NITC 3-206)

These minimum standards for imagery acquisition are designed to ensure the acquisition of imagery sufficient to meet the requirements for digitizing street centerlines as required in the Address Standards NITC 3-206.

1.7 Metadata

Complete and comprehensive metadata is required for the acquired imagery. The metadata will require detailing the characteristics and quality of submitted imagery files. Information needs to be provided to allow the user sufficient information so they can determine the data's intended purpose as well as how to access the data. The metadata requires a process description summarizing collection parameters such as: contact information, data source, scale, accuracy, projection, use restrictions, and imagery acquisition dates. The process description will also need to be included to describe methodology towards the deliverable products.

1.7.1 Federal Metadata

The ISO 19115:2003(E) North American Profile (NAP) Metadata Standards should be used when feasible and in every effort possible to assure high quality rigorous standards. Metadata will need to be supplied for each tile and be provided in an XML format. All imagery datasets, and their associated attribute databases should be documented with ISO 19115 compliant metadata. Supplemental metadata information includes the following: (1) tested horizontal accuracy statement, (2) lineage, including, but not limited to: flight height, photo acquisition dates (and re-flights if any), overlap, sidelap, number of flight lines, number of exposures, direction of flight lines, control, resolution, tiling scheme, file sizes, description of the process used to create digital orthophotos, source of DEM, and (3) spatial reference information: projection, ellipsoid, horizontal and vertical datum, and horizontal and vertical units.

1.7.2 State Metadata

These standards need to apply to Nebraska's metadata standards located within NITC 3-201 Geospatial Metadata Standard. All metadata from imagery files will need to be registered through the metadata portal at NebraskaMAP (http://NebraskaMAP.gov). All developers of Nebraska-related geospatial data are encouraged to use the site to either

upload existing metadata and/or use the online tools available on the site to create the metadata for imagery.

2.0 Purpose and Objectives

2.1 Purpose

The purpose of this standard is to provide the necessary requirements for the creation, development, delivery, and maintenance of aerial imagery data and services to support the Nebraska Spatial Data Infrastructure (NESDI). These standards will help ensure that imagery acquisition is consistent, accurate, publicly accessible, and cost-effective.

2.2 Objectives

These standards will guide the statewide imagery program having the following objectives:

2.2.1 Provide guidance and necessary workflows to state and local officials as they work, either in-house or with private vendors, to create, develop and maintain aerial imagery data and services. This can increase the likelihood that the data created will be suitable for the range of intended applications and likely future applications. The maintenance of aerial imagery data is necessary for the data to be current and accurate.

2.2.2 Enhance coordination and program management across jurisdictional boundaries by insuring that aerial imagery data can be horizontally integrated across jurisdictional and/or project boundaries, and other framework data layers for regional or statewide applications.

2.2.3 Save public resources by facilitating the sharing of aerial imagery data among public agencies or sub-divisions of agencies by incorporating data standards and following guidelines. Data that is developed by one entity can be done in a way that is suitable to serve the multiple needs of other entities. This avoids the costly duplication of developing and maintaining similar data in the state.

2.2.4 Make aerial imagery data current and readily accessible to the wide range of potential users through NebraskaMAP and other necessary resources.

2.2.5 Facilitate harmonious, trans-agency and public policy decision-making and implementation by enabling multiple agencies and levels of government to access and appropriately use current aerial imagery data. This can make it more likely that intersecting public policy decisions, across levels of government, will be based on the same information.

2.2.6 Lay the foundation for facilitating intergovernmental partnerships for the acquisition and development of high-quality aerial imagery data by defining standards that increase the likelihood that this data will meet the needs of multiple users.

2.2.7 Establish and promote the integration and interrelationships of aerial imagery data with related NESDI framework layers through geometric placement and attributes.

3.0 Definitions

Accuracy

Absolute - A measure of the location of features on a map compared to their true position on the face of the earth.

Relative - A measure of the accuracy of individual features on a map when compared to other features on the same map.

Band - A range of wavelengths of electromagnetic radiation.

Check Point – One of the surveyed points in the sample used to estimate the positional accuracy of the data set against an independent source of higher accuracy.

Confidence Level – The percentage of points within a data set that are estimated to meet the stated accuracy; i.e., accuracy reported at the 95% confidence level means that 95% of the positions in the data set will have an error with respect to true ground position that are equal to or smaller than the reported accuracy value.

Datum – A set of values used to define a specific geodetic system.

Digital Elevation Model - A digital cartographic representation of the elevation of the land at regularly spaced intervals in x and y directions, using z-values referenced to a common vertical datum. A DEM also assumes bare-earth terrain, void of vegetation and manmade features. The USGS DEMs archived in the National Elevation Dataset (NED) have different formats based on 1-arc-second, 1/3-arc-second, and 1/9-arc-second grid spacing.

Forward Lap or End Lap - The extent to which sequential exposures in a flight line overlap

Ground Sample Distance (GSD) – The linear dimension of a sample pixel's footprint on the ground. Within these standards GSD is used when referring to the collection GSD of the raw image, assuming near-vertical imagery. The actual GSD of each pixel is not uniform throughout the raw image and varies significantly with terrain height and other factors. The GSD is assumed to be the value computed using the camera focal length and camera height above average mean terrain.

Ground (spatial) resolution or pixel size – As used within these standards, pixel size is the ground size of a pixel in a digital ortho-rectified imagery product, after all rectifications and resampling procedures.

Horizontal Accuracy - The horizontal component of the positional accuracy of a data set with respect to a horizontal datum, defined at the 95% confidence level.

Image Correlation – Directly comparing hardcopy or softcopy images, or patches of pixels on conjugate digital images, or indirectly comparing information derived from the stereo images, to determine that points on stereo images (viewed from different perspectives) represent the same points on the imaged surface. Automated image correlation is a computerized technique to match the similarities of pixels in one digital image with comparable pixels in its digital stereo image in order to automate or semi-automate photogrammetric compilation. Automated image correlation provides an efficient method for generating DEMs photogrammetrically, but automated correlation normally results in Digital Surface Models (DSMs) instead of DEMs because such correlation generates elevations of rooftops, treetops and other surface features as imaged on the stereo photographs.

Inertial Measurement Unit (IMU) - An electronic device that measures and reports velocity, orientation, and gravitational forces, using a combination of accelerometers and gyroscopes, sometimes also magnetometers. IMUs work to detect changes in pitch, roll, and yaw of an aircraft. IMUs are typically used to maneuver aircraft, including unmanned aerial vehicles (UAVs), among many others, and spacecraft, including satellites and landers.

Leaf-Off / Leaf-On - Leaf-off and leaf-on refer to the presence or lack of the foliage of woody species. Leaf-off means that there is no foliage or a reduced amount of foliage on the tree or shrub species. Leaf-on imagery means that there is foliage on the tree or shrub species (or the species of interest). Sometimes it is beneficial to have leaf-off imagery so that you can see ground features more distinctly. This is helpful for mapping features such as buildings and roads, which may be obscured by tree foliage during the growing season. Leaf-off imagery is also used in forestry applications because the lack of leaves on some trees facilitates the classification of tree types. There are times when you might want leaf-on imagery, especially if the tree or shrub species has a distinctive spectral reflectance that can be distinguished from other vegetation. Leaf-on imagery is also used in agricultural applications to measure the quantity and health of crops. Many woody species may have similar spectral reflectance or structure that may benefit from either a leaf-off or leaf-on flyover.

Map or Cartographic Scale - The relationship between a given distance on the ground and the corresponding distance on a photograph or image. Scale is expressed in at least two different ways. Both are ratios. In the first, commonly used measuring systems are compared; for example 1" = 200' (one inch on the map equals 200 feet on the earth). In the second, the map unit is arbitrary; for example, 1:200 means that one of anything (an inch, a foot, a centimeter, etc.) on the map equals 200 of that same unit on the earth. (1"=200' is the same scale as 1:2400). Scale is presented in several ways: as a bar at the bottom of the map, as a ratio (1:200), or as an equation (1"=200').

Nebraska Spatial Data Infrastructure (NESDI) - A framework of geospatial data layers that have multiple applications, used by a vast majority of stakeholders, meet quality standards and have data stewards to maintain and improve the data on an ongoing basis. These layers are also consistent with the Federal National Spatial Data Infrastructure (NSDI).

Ortho-rectification - The process by which a photograph is prepared from a perspective photograph by removing displacements of points caused by tilt, relief and perspective.

Planimetric - Data about non topographic features on the earth surface that are represented only by their horizontal position.

Projection – A map projection flattens the earth, allowing for locations to be systematically assigned new positions so that a curved surface can be represented on a flat map.

Resolution – The smallest unit a sensor can detect or the smallest unit an ortho-rectified image depicts. The degree of fineness to which a measurement can be made.

Root Mean Square Error (RMSE) – The square root of the average of the set of squared differences between data set coordinate values and coordinate values from an independent source of higher accuracy for identical points.

RMSEr – The horizontal linear RMSE in the radial direction that includes both x- and y-coordinate errors.

RMSEx – The horizontal linear RMSE in the X direction (easting).

RMSEy - The horizontal linear RMSE in the Y direction (northing).

RMSEz - The vertical linear RMSE in the Z direction (elevation).

Side Lap **-** The extent to which the exposures of adjacent flight lines overlap, typical side lap for a block of aerial photography is 30%.

State Plane Coordinate System - The State Plane Coordinate System is a set of 124 geographic zones or coordinate systems designed for specific regions of the United States. It uses a simple Cartesian coordinate system to specify locations rather than a more complex spherical coordinate system (the geographic coordinate system of latitude and longitude). By thus ignoring the curvature of the Earth, "plane surveying" methods can be used, speeding up and simplifying calculations. The system is highly accurate within each zone (error less than 1:10,000). Outside a specific state plane zone, accuracy rapidly declines, thus the system is not useful for regional or national mapping.

4.0 Applicability

4.1 State Government Agencies

State agencies that have the primary responsibility for developing and maintaining aerial imagery data for a particular jurisdiction(s) or geographic area (e.g. for counties for which it has assumed the primary role) are required to comply with the standards as described in Section 1. Those state agencies with oversight responsibilities in this area are required to ensure that their oversight guidelines, rules, and regulations are consistent with these standards. The Nebraska Department of Roads has other imagery acquisition requirements for wetland and reconnaissance projects. They will continue to adhere to their independent photogrammetry requirements as suggested in the NDOR On-Call Digital Aerial Photography, Photogrammetric and Airborne LiDAR Services.

4.2 State Funded Entities

Entities that are not State agencies but receive State funding, directly or indirectly, for aerial imagery development and maintenance for a particular jurisdiction or geographic area are required to comply with the standards as described in Section 1.

4.3 Other

Other entities, such as city and local government agencies (e.g. County Engineer, assessors, and municipalities) that receive state funds have the primary responsibility for developing and maintaining aerial imagery data are required to comply with the standards as described in Section 1.

5.0 Responsibility

5.1 NITC

The NITC shall be responsible for adopting minimum technical standards, guidelines, and architectures upon recommendation by the technical panel. Neb. Rev. Stat. § 86-516(6)

5.2 State Agencies

The State of Nebraska, Office of the CIO (OCIO) GIS Shared Services will be responsible for assuring that metadata is completed and the data is registered and available for distribution through NebraskaMAP.

5.3 Granting Agencies and Entities

State granting or fund disbursement entities or agencies will be responsible for ensuring that these standards are included in requirements related to fund disbursements as they relate to aerial imagery.

5.4 Other

Local government agencies that have the primary responsibility and authority for aerial imagery acquisition will be responsible for ensuring that those sub-sections defined in Section 1 will be incorporated in the overall NSCD data development efforts and contracts.

6.0 Authority

6.1 NITC GIS Council

According to Neb. Rev. Stat. § 86-572(2), the GIS Council shall: Establish guidelines and policies for statewide Geographic Information Systems operations and management (a) The acquisition, development, maintenance, quality assurance such as standards, access, ownership, cost recovery, and priorities of data bases; (b) The compatibility, acquisition, and communications of hardware and software; (c) The assessment of needs, identification of scope, setting of standards, and determination of an appropriate enforcement mechanism; (d) The fostering of training programs and promoting education and information about the Geographic Information Systems; and (e) The promoting of the Geographic Information Systems development in the State of Nebraska and providing or coordinating additional support to address Geographic Information Systems issues as such issues arise.

7.0 Related Documents

7.1 American Society for Photogrammetry and Remote Sensing (ASPRS), ASPRS Accuracy Standards for Digital Geospatial Data (2014).

7.2 FGDC Content Standard for Digital Geospatial Data Version 2 (FGDC-STD-001-1998).

7.3 ISO 19115:2003(E) North American Profile (NAP) Metadata Standards. National Oceanic and Atmospheric Administration (NOAA). January 2012.

NITC 3-205
Street Centerline Standards

Review Version 4.0
(Date 9.3.2014)

Category: Data and Information Architecture
Applicability: See Each Section of Standards
History: Adopted on [Month Day, Year]

NEBRASKA INFORMATION TECHNOLOGY COMMISSION GIS COUNCIL

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1.0 Standard

1.1 Description

This standard provides requirements necessary for the creation, development, delivery, and maintenance of street centerline data to support a statewide Nebraska Street Centerline Database (NSCD). The database provides spatial location of a seamless road network including information tied to that location with appropriate attribute data. The standard provides a consistent structure for data producers and users to ensure compatibility of datasets within the same framework layer and when used between other Nebraska Spatial Data Infrastructure (NESDI) framework layers such as address points, parcels and administrative/political boundaries.

There are multiple uses for street centerline data. These requirements will enable the data to be integrated not only with Next Generation 9-1-1 (NG9-1-1) but with existing state road network databases, routing services, emergency management, and public safety. Furthermore, this standard will serve as a guideline for future maintenance activity data requirements.

This standard does not restrict or limit additional information collected and stored in a particular database. The specific requirements for street naming and road conditions are primarily the responsibility of the local jurisdiction. These standards are meant to be a minimum set of standards and are subject to be updated based on technology enhancements, necessary workflow changes, and other data requirements.

The standard is not intended to be a substitute for an implementation design. These standards can be used at local, state and federal level to ensure interdisciplinary compatibility and interoperability with other databases. These standards integrate with existing standards such as the US Federal Highways, National Emergency Number Association (NENA), U.S. Postal Service (USPS) Addressing Standard, and other NITC related standards.

1.2 Spatial Representation

1.2.1 Geometric Placement

The methodology for proper geometric placement of street centerlines will vary based on the application. Street centerlines can be placed either manually or by calculated placement. The calculated placement of the street centerline is completed by automated software techniques, typically in CAD or GIS. Calculations or manual placement methods can be made from the physical footprint referenced from imagery, LiDAR or from mapping grade GPS.

Providing an adequate seamless street centerline database to support public safety and emergency response is the primary focus and will need to support NG9-1-1 standards identified by NENA.

1.2.2 Data Development

All data will consist of visual and verifiable street centerline with address ranges and other information corresponding to some level of ground control. The geometric placement of street centerlines can be derived from digitizing and using field GPS data collection.

1.2.2.1 Digitizing

The data source used to digitize or place street centerlines must meet the following minimum requirements.

Capture Scale for digitizing: 1:2400
Projection: Nebraska State Plane Coordinate System
Datum: North American Datum of 1983 (NAD83)
Source: Using aerial imagery that meets verified horizontal accuracy requirements for spatial resolution (12 inch minimum), preferably leaf-off. In cases where tree cover or other obstructions are identified in imagery, it will be necessary to conduct field verification of that location with a mapping grade GPS unit. The NAIP imagery therefore does not meet these accuracy standards.

LiDAR can also be used as a guide to support spatial accuracy placement of certain aspects of roads.

Imagery, LiDAR, or other source document that was used to digitize street centerlines that is newly acquired or not made available for public access will need to be provided to entity conducting quality control of the data.

1.2.2.2 Global Positioning Systems (GPS)

The development of street centerlines can be utilized using field observation and data collection techniques using mapping grade stationary and vehicle equipped GPS. Data collected using a mapping grade GPS will need to meet spatial accuracy requirements in section 1.2.3. Additional post processing of GPS data may be necessary to meet these spatial requirements.

1.2.3 Spatial Accuracy

1.2.3.1 Minimum Horizontal Accuracy Standard

Data that has been collected through digitization or visual representation methods must have an accuracy level of 3.28 to 9.84 feet (1-3 meters) or better.

When using mapping grade GPS, data will need to be collected at 3.28 feet (1 meter) or better. Additional requirements and suggestions for acquiring data by field GPS is located in the NENA GIS Data Collection and Maintenance Standards.

1.2.3.2 Minimum Vertical Accuracy Standard

There are no vertical accuracy requirements at this time.

1.2.4 Feature Type and Tables

1.2.4.1 Lines (Polylines)

A line represents the estimated center of a street or road and is not the legal right of way. Attribute data consists of four address range fields representing low to high on odd and even side of road segments necessary for geocoding. Address range values represent the actual address ranges for the line segment and stored in the feature attribute table of the data set.

1.2.4.2 Centerline Points

These are points used to create and reference particular information on street centerlines useful for assisting topology, addressing, and routing. These include point features considered as nodes to represent intersections, changes in street names, crossings, bridges, and jurisdictional boundary changes. Corresponding attribute information tied to each point is further defined in Section 1.3.6 Data Schema and Descriptions.

1.2.4.3 Tables

Corresponding tables for representing alternative street names can be further represented in tabular format. See Section 1.3.6 Data Schema and Descriptions for description on information for tables.

1.2.5 Projection and Datum

For data to be made available for NG9-1-1 operations, the data will need to be in a geographic coordinate system and not projected. This is necessary for the Emergency Call Routing Function (ECRF) or the Location Validation Function (LVF) uses for display.

EPSG:	4326 WGS84 / Latlong
Projection:	Geographic Coordinates, Plate Carrée, Equidistant Cylindrical, Equirectangular
Latitude of the origin:	0°
Longitude of the origin:	0°
Scaling factor:	1
False easting:	0°
False northing:	0°
Ellipsoid:	WGS84
Horizontal Datum:	WGS84
Vertical Datum:	WGS84 Geoid
Units:	decimal degrees
Global extent:	-180, -90, 180, 90

The NSCD will also be projected and delivered in Nebraska (State) Plane Coordinate System projection and datum for North American Datum of 1983 (NAD83). The plane coordinate values for a point on the earth's surface should be expressed in feet. The data will also be made available as Web Mercator with WGS 1984 horizontal datum for use among other needed web services.

1.3 Address Attributes

1.3.1 General Address Components

There are several components that make up a street address. Many are required to accurately define a specific address and location. When an address is matched against other address database files or for the purpose of generating an address it must be broken down into the individual components separated by a single space between the components. These standards follow the FGDC United State Thoroughfare, Landmark and Postal Address Data standard for address components. The minimum components required to accurately define an address are:

Primary Address Number:	123
Prefix Directional Street:	W
Street Name:	Main

Street Type:	ST
Street Direction:	NW
Unit Address Identifiers:	STE
Unit Number:	5
City:	Lincoln
State:	NE
Zip Code:	68509

Not all of the elements are required to be filled out for an address to be valid. However, the placeholders need to be present in the attribute table to accurately represent the accepted USPS standards. The USPS uses a parsing logic to enter address information into their appropriate fields. When parsing an address into the individual components, start from the right element of the address and work toward the left. Place each element in the appropriate field until all address components are isolated. This process facilitates matching files and produces the correct format for standardized output as well as isolating the mismatches to the closest possible fit before failing.

Associated attributes pertain to formatting and storing of address data within attribute tables that are external to and associated with feature attribute tables of geospatial datasets. For example, a city's master address database could be associated with and address matched against a city-wide geospatial dataset of points.

Each jurisdiction shall develop a master address database that can be referenced when new street names are being created or assigned so that duplications are avoided. All street names and address numbers shall be kept consistent with geospatial datasets.

1.3.2 Unique Identification Code

A unique identifier is required for the statewide street centerline database. This unique identifier allows the data to be tied or joined to other spatial data sets having the same identifier. The field name for this unique code in NSCD is "NEStreetID."

1.3.3 Directional Prefixes and Suffixes

The street address directional prefixes and suffixes shall always be abbreviated and capitalized, and shall not include periods. For example, North should be abbreviated as N. A complete set of directional prefix and suffix abbreviations are listed in Appendix 8.1.

1.3.4 Street Name

The NENA and FGDC United State Thoroughfare, Landmark and Postal Address Data standards will be followed for numbering streets. Street names will use capital and lower case letters. Street names should not be abbreviated unless it is common practice. For example, Doctor (DR) or Junior (JR) could be abbreviated.

Numeric streets shall be written using numbers rather than spelled out. For example, using "1^{ST}" rather than "FIRST". The numeric street names should use "TH", "RD", "ST" or "ND" characters as part of the street name.

Vanity street names and numbers shall not be used as the primary street name or address range component.

For classifying new street names, a standard method of assigning numeric and character street names shall be developed and adopted for a jurisdiction. The primary objective is to establish a grid within each jurisdiction regardless of the detailed pattern of the individual grid. Streets that run primarily east and west would use a numeric street name

grid, while those that run primarily north and south would be based on names from a master street name grid, or vice versa. The spacing of numeric street names should be based on a standard increment. A numeric street name should not be used outside of its proper location and sequence as established by the grid. The spacing of character streets should be based on a similar pattern. A character street name that is part of the grid should not be used outside of its proper location and sequence as established by the grid.

1.3.5 Street Type

Street type is signified by Street (ST), Boulevard (BLVD), Court (CT), and Road (RD) to give you an example. A complete set of street type domains are listed in Appendix 8.1. Each street address will have only one street type based on a logical pattern of street types. The street type names used follow USPS Postal Addressing Standards Publication 28 and other standards through the NENA Civic Location Data Exchange Format (CLDXF). An exception to this rule would be where two streets in the same area have the same name (e.g., Destination Dr and Destination Ct).

1.3.6 Odd/Even Numbering (Address Parity)

Parity shall remain consistent within the system adopted by the local jurisdiction. Address ranges are sets of numbers, usually comprised of four (4) distinct values, representing a range of addresses along the sides of the street centerlines by addresses at either end of a street centerline segment. Two numbers of the range represent the lowest addresses, and the other two represent the highest. The numbers are further distinguished as being on either the left or the right side of the segment. In topological terms, the lower numbers are associates with the FROM node of the segment, while the high numbers are associated with the TO node. Likewise, left and right are determined by the direction of the segment, as defined by the FROM and TO nodes. Topology is critical when a set of addressed centerlines are developed. Implementation of the address parity (e.g., odd versus even) is usually determined by the addressing software.

1.3.7 Sequential Direction

Address ranges shall increase as you travel in the direction adopted by the jurisdiction. The direction of each line segment shall follow the sequence direction of the address ranges. Typically this is accomplished by controlling from-node and to-node topology. One-way streets are NOT an exception to this rule. Curvilinear streets may violate this standard for short stretches provided that they are in compliance with respect to the general direction of the full street segment. Where compliance with this standard is difficult or impossible, it may warrant considering a change in the street name at the point where it changes direction.

1.3.8 Consistency with Distance-Based Address Grid

Depending on the preference of the jurisdiction there must be a defined standard interval based grid system. Whether it is hundred blocks as in a city, a potential 1000 addresses per mile, (a possible address every 5.28 feet), or another variation the jurisdictions accepted standards should be adhered to as close as possible. In rural areas addresses can be assigned based on the distance south or west from the nearest section line. This standard is particularly useful in areas that are largely undeveloped (and thus don't have many cross streets) or in areas that have existing streets that are not in the standard street name grid. This standard should generally be considered to be less important, however, than staying consistent with the address designations of cross streets.

1.3.9 Use of Characters

Street addresses shall not contain characters such as hyphens, dashes, +, #, & or other non-alpha-characters or symbols. An alpha-character added to the address as a sub-number is preferable to a fraction (e.g., 123 A is preferable to 123 1/2).

1.3.10 Data Schema and Descriptions

The following are feature layers necessary for a comprehensive street centerline database. The data schema and descriptions table is provided for each of the features. Each table provides the minimum requirements for each feature type.

Feature	Type	Description
Street Centerlines	Line Layer	Contains street centerline segments
Alternate Street Names	Table/Value	Contains alternate street names
Centerline Points	Point Layer	Point locations used to create road centerlines and assisting with topology, addressing, and routing.

Street Centerlines

The minimum required fields for these standards are represented by the following identifiers: "**R**" – required, "**RC**" –Recommended, and "**O**" – Optional.

Field Name	Field Type	Field Length	Field Description	Domain Name	Required Level
NEStreetID	Number	20	Unique ID of corresponding street centerline segment	N/A	R
PreModifier	String	15	Prefix directional component of segment name	PreModifier	R
PreDirectional	String	2	A street direction that precedes the street name (i.e., N, S, E, W, NE, NW, SE, SW)	Direction	R
PreType	String	20	A street type that precedes the street name (i.e., AVE, RD, ST, CIR, PL, PKWY, LN, DR, BLVD, ALY)	StreetType	R
StreetName	String	30	Legal authoritative street name component of segment name	N/A	R
PostType	String	4	A street type that follows the street name (i.e., AVE, RD, ST, CIR, PL, PKWY, LN, DR, BLVD, ALY)	StreetType	R
PostDirectional	String	2	A street direction that follows the street name (i.e., N, S, E, W, NE, NW, SE, SW)	Direction	R
PostModifier	String	12	A descriptor that follows the street name and is not a suffix or a direction (i.e., Access,	PostModifier	R

			Central, Crossover, Scenic, Terminal, Underpass)		
LFrom	Number	6	Left low address range	N/A	R
LTo	Number	6	Left high address range	N/A	R
RFrom	Number	6	Right low address range	N/A	R
RTo	Number	6	Right high address range	N/A	R
ParityLeft	String	1	Parity of address range on the left side of the road. E, O, B, Z for even, Odd, Both or Zero.	N/A	R
ParityRight	String	1	Parity of address range on the right side of the road. E, O, B, Z for even, Odd, Both or Zero.	N/A	R
LCityPostal	String	7	5-digit postal code on the left side of the road segment.	N/A	R
RCityPostal	String	7	5-digit postal code on the right side of the road segment.	N/A	R
FIPS_LCity	String	5	City FIPS code of left side of segment	N/A	R
FIPS_RCity	String	5	City FIPS code of right side of segment	N/A	R
FIPS_LCOUNTY	String	3	County FIPS code of left side of segment	CountyFIPS	R
FIPS_RCOUNTY	String	3	County FIPS code of right side of segment	CountyFIPS	R
FIPS_LSTATE	String	2	State FIPS code for left side of segment	StateFIPS	R
FIPS_RSTATE	String	2	State FIPS code for right side of segment	StateFIPS	R
ESNLeft	String	5	Emergency Service Number on left side of road segment	N/A	R
ESNRight	String	5	Emergency Service Number on right side of road segment	N/A	R
MSAGLeft	String	30	MSAG on left side of road segment	N/A	R
MSAGRight	String	30	MSAG on right side of road segment	N/A	R
StreetOwner	String	25	Current local entity responsible for creation of physical street segment	N/A	R
StreetMaint	String	25	Current local entity responsible for maintenance of street segment data	N/A	R
Create_DT	Date	26	Date/time stamp when data was first created	N/A	R

Update_DT	Date	26	Date/time stamp when data segment geometry/attribution last modified	N/A	R
SourceOfData	String	30	Entity that provided the data	N/A	R
Street_Status_CD	String	1	Status code indicating operational condition of street (1=open, 2=retired, 3=temporarily closed, 4=under construction)	StreetStatus	O
Interstate_Num	Number	2	Interstate Highway number of road segment, if appropriate	N/A	RC
US_Hwy_Num	Number	2	US Highway number of road segment, if appropriate	N/A	RC
State_Hwy_Num	Number	2	State Highway number of road segment, if appropriate	N/A	RC
Local_Rd_Num	Number	2	Local road number of road segment, if appropriate	N/A	RC
Alias1*	String	50	Alias name of road segment	N/A	RC
LZIP	String	10	Area descriptor to aid in geocoding, left side of centerline	N/A	R
RZIP	String	10	Area descriptor to aid in geocoding, right side of centerline	N/A	R
LOCAL_FUNC_CLASS	String	2	Functional Class assigned by road owner with possible suggestions guidelines for possible local classification schema	N/A	RC
STATE_FUNC_CLASS	String	2	Functional Class with classification schema define by standards TWG	N/A	RC
LRS_ID	String	20	ID associated to the road segment found in the NDOR Linear Referencing System	N/A	R
Length	Number	12	Calculated length in US Survey Feet	N/A	R
SpeedLimit	Number	2	The speed limit of the road segment in miles per hour (mph)	N/A	R

*Can have multiple Alias numbers relationship table to infinite number.

Alternate Street Names

Field Name	Field Type	Field Length	Field Description	Domain Name	Required Level
NEStreetID	Number	20	Unique ID of corresponding street	N/A	R

			centerline segment		
PreModifier	Alpha	15	Alternate street prefix type	PreModifier	R
AltStreetName	Alpha	30	Alternate street name. Example: Main, 2nd, Country Creek, Third	N/A	R
PostType	String	4	A street type that follows the street name (i.e., AVE, RD, ST, CIR, PL, PKWY, LN, DR, BLVD, ALY)	StreetType	R
PostDirectional	Alpha	2	Alternate street directional suffice. Example: N, S, E, W, NW, NE, SW, and SE	Direction	R
ASN	Alpha	75	Concatenated Alternate Street Name (STR_PRE+STR_NAME+STR_TYPE+STR_DIR)	N/A	O

Centerline Points

Field Name	Field Type	Field Length	Field Description	Domain Name	Required Level
Unique_ID	Number	9	Framework unique sequential identifier (generated by Framework data steward)	N/A	O
CPType	String	20	Type of point or node (intersection, bridge, railroad crossing, low water crossing, under pass, over pass, change of lane, change of street name in linear path)	N/A	O
X_COORD	Number	15	Points X coordinate	N/A	O
Y_COORD	Number	15	Points Y coordinate	N/A	O
Z_COORD	Number	6	Points Z elevation coordinate in feet	N/A	O
Agree_PT_IND	String	7	Indicator if point is or is not an agreement point.	AgreePoint	O
Create_DT	Date	26	Date/time stamp when that point geometry/attribution was first created	N/A	O
Update_DT	Date	26	Date/time stamp when geometry/attribution last modified	N/A	O
Status_CD	String	1	Code indicating operational condition of road segment point	N/A	O
Local_ID	Number	9	Local road centerline segment feature identifier, unique and permanent to the segment at the local level (generated by road authority/data custodian)	N/A	O

1.4 Data Format

The data format provided will need to be in an Esri enterprise geodatabase format that can be interpreted by commercial GIS software. A geodatabase schema including domains can be provided by contacting the State of Nebraska, Office of the CIO GIS Shared Services.

Tabular data will need to be provided in MS ACCESS, DBF, or MS SQL formats.

1.5 Maintenance

Authorities need to be identified for approval and assuring the data is implemented towards the database. This will ensure that the database is updated and maintained in a timely manner. After spatial and attribute updates and/or modifications are performed to the database it shall be submitted to the appropriate entity(s) responsible for performing quality control.

Maintenance of street centerline data determines the suitability to support the greatest range of applications. Spatial location of a seamless road network, including appropriate attribute data, is essential for many projects. Therefore, maintenance of this data is necessary to provide the maximum return on investment.

1.5.1 Reporting Errors and Handling Updates

The reporting of errors need to be directed to the appropriate entity in a timely manner. Updated spatial and attribute information in the database will also need to be redistributed. The date field in the database when the last record was modified will also need to be updated to ensure proper records management and communication with others in the workflow.

1.6 Quality Control

The quality of the NSCD is evaluated based on the overall functional correctness and completeness of the attribute and spatial data. The FGDC and NENA have adopted nationally recognized standards for accuracy testing of GIS data. NENA recommends that street centerline address data for use in data exchanges associated with NG-911 call processing be based on the FGDC compliant database. Refer to the FGDC United State Thoroughfare, Landmark and Postal Address Data standard and the NENA Civic Location Data Exchange Format (CLDXF) Standard for these data exchange standards.

1.6.1 Attribute Accuracy

a) Attribute fields are complete compared to source data having valid data elements, domain or range values.
b) Correct spelling in comparison of source data.
c) Standard first letter capitalized of every word and USPS capitalization of the State abbreviation.
d) Not to contain duplicate road segments, each road segment should be uniquely identifiable by the attributes.
e) Assure that the address range and information on the left or right of the street centerline are consistently either odd or even addresses.
f) For NG9-1-1 applications, the address ranges need to qualify and meet certain thresholds for the MSAG and ALI databases. For MSAG and ALI databases, the address for each point will need to be valid at a rate of 98 percent or better. For areas without an MSAG, the addresses will meet USPS Publication 28 standards. For the ALI database, this is determined by geocoding the addresses in the ALI database to the road layer with addresses developed for that area. Overall, the address data is consistent with source information from MSAG and ALI.

g) The correct formatting of street centerline attributes are used in these standards and are also included in the NENA standards and abbreviations as they are found in USPS Publication 28.
h) The temporal quality is met by being current through updating appropriate attributes and indicating the time the changes were made in the date updated field. Street centerlines that change due to add-on's from new construction or changes to the existing road structures will need to be updated frequently.
i) Quality checks for allowable domain values, summary statistics and record counts.

1.6.2 Physical Location

The quality of the physical location will be evaluated based on:
a) The placement of the street centerline representing it's real location and if it meets horizontal accuracy requirements. The National Standard for Spatial Data Accuracy (NSSDA) outlines a methodology for measuring positional accuracy. If additional testing is required, the NSSDA procedures outline the statistical procedures.
b) The geometric placement of the street centerline is consistently logical to the context of other features such as parcels and administrative/political boundaries.

1.6.3 Connectivity Validation (99% acceptance required with 1 foot tolerance)

a) Undershoots - Condition when the end of a linear geometry falls short of intersecting with another linear geometry
b) Overshoots - Condition when the end of a linear geometry extends beyond the point at which it should intersect and stop at another linear geometry
c) Node Mismatch - Condition when the end of a linear geometry falls short of intersecting with the end of another linear geometry
d) Non-coincident Intersecting Geometry - Condition when features intersect one another without creating corresponding vertices at the intersecting points
e) Nearly Coincident Geometry - Condition when a vertex of one geometry falls within the tolerance of a vertex of another geometry

1.6.4 Linear Referencing System (LRS) Validation (99% acceptance required)

a) Missing LRS Keys - Condition when records are missing required LRS keys: NLF_ID, Begin measure and/or End Measure
b) Begin Distance >= End Distance - Condition when begin distance measure greater than or equal to end distance measure
c) Overlapping Distances - Condition when records have the same NLF_ID and that contain overlapping distances between the end measure of one record and the begin measure of another record
d) Linear Measure/Geometry Ratio - Condition when the user-defined linear measure (end distance minus begin distance) compared to the measured map distance for each records exceeds specified tolerance (90-120 percent)
e) Geometry sequence/direction problems - Condition when the digitized direction of geometry is not consistent with direction of increasing measures.
f) Gaps between geometries - Condition when gaps exist between geometry of records with the same NLF_ID exceed specified tolerance (10 ft.).

1.7 Integration with other Standards

1.7.1 Address Standards (NITC 3-206)

The street centerline and address elements identified in these standards shall meet the same address related field names found in the Address Standards NITC 3-206. This is to

assure the connection of street addresses and routing to address points having the same address information.

1.8 Metadata

A requirement for street centerline and address range data is creating and maintaining its metadata. The metadata for street centerline data will require detailing the characteristics and quality of submitted street centerline data. Information needs to be provided to allow the user sufficient information so they can determine the data's intended purpose as well as how to access the data. The metadata requires a process description summarizing collection parameters such as: contact information, data source, scale, accuracy, projection, use restrictions, and date associated to each street centerline segment. The process description will also need to be included to describe methodology towards the deliverable products.

1.8.1 Federal Metadata

The Federal Metadata Content Standard from FGDC should be used when feasible and in every effort possible to assure high quality rigorous standards. All geospatial street centerline geodatabases, and their associated attribute databases should be documented with FGDC compliant metadata outlining how the data was derived, attribute field definitions and values, map projections, appropriate map scale, contact information, access and use restrictions, to name a few.

1.8.2 State Metadata

These standards need to apply to Nebraska's metadata standards located within NITC 3-201 Geospatial Metadata Standard. All metadata from street centerline data will need to be registered through the metadata portal at NebraskaMAP (http://NebraskaMAP.gov). All developers of Nebraska-related geospatial data are encouraged to use the site to either upload existing metadata and/or use the online tools available on the site to create the metadata for street centerline data.

2.0 Purpose and Objectives

2.1 Purpose

The purpose of this standard is to provide the necessary requirements for the creation, development, delivery, and maintenance of street centerline and address range data to support a statewide NSCD. These standards will help ensure that street centerline and address range data creation and development are current, consistent, accurate, publicly accessible, and cost-effective.

2.2 Objectives

These standards will guide the statewide NSCD having the following objectives:

2.2.1 Provide guidance, street centerline schema, and necessary workflows to state and local officials as they work, either in-house or with private contractors, to create, develop and maintain street centerline and address range data. This can increase the likelihood that the data created will be suitable for the range of intended applications and likely future applications. The maintenance of street centerline and address range data is necessary for the data to be current and accurate.

2.2.2 Enhance coordination and program management across jurisdictional boundaries by insuring that street centerline and address range data can be horizontally integrated across jurisdictional and/or project boundaries, and other framework data layers for

regional or statewide applications.

2.2.3 Save public resources by facilitating the sharing of street centerline and address range data among public agencies or sub-divisions of agencies by incorporating data standards and following guidelines. Data that is developed by one entity can be done in a way that is suitable to serve the multiple needs of other entities. This avoids the costly duplication of developing and maintaining similar street centerline and address range data in the state.

2.2.4 Make street centerline and address range data current and readily accessible to the wide range of potential users through NebraskaMAP and other necessary resources.

2.2.5 Facilitate harmonious, trans-agency and public policy decision-making and implementation by enabling multiple agencies and levels of government to access and appropriately use current street centerline and address range data. This can make it more likely that intersecting public policy decisions, across levels of government, will be based on the same information.

2.2.6 Lay the foundation for facilitating intergovernmental partnerships for the acquisition and development of high-quality street centerline and address range data by defining standards that increase the likelihood that this data will meet the needs of multiple users.

2.2.7 Establish and promote the integration and interrelationships of street centerline and address range data with related NESDI framework layers through geometric placement and attributes.

3.0 Definitions

Accuracy

Absolute - A measure of the location of features on a map compared to their true position on the face of the earth.

Relative - A measure of the accuracy of individual features on a map when compared to other features on the same map.

Address

Actual or Real - The simple, everyday element that designates a specific, situs location, such as a house number or an office suite.

Range - Numbers associated with segments of a digital street centerline file that represent the actual high and low addresses at either end of each segment.

Theoretical - A location that can be interpolated along a street centerline file through geocoding software.

Vanity - A special address that is inconsistent with or an exception to the standard addressing schema.

Address matching – See Geocoding

Automatic Location Identification (ALI) - The automatic display at the PSAP of the caller's phone number, the address/location of the telephone and supplementary emergency services information of the location from which a call originates.

Attribute - Attributes are the properties and characteristics of entities.

Data Stewardship – Entity(s) responsible for developing and maintaining the data.

Datum – A set of values used to define a specific geodetic system.

Emergency Call Routing Function (ECRF) - A functional element in an ESInet which is a LoST protocol server where location information (either civic address or geo-coordinates) and a Service URN serve as input to a mapping function that returns a URI used to route an emergency call toward the appropriate PSAP for the caller's location or towards a responder agency.

Entity - A data entity is any object about which an organization chooses to collect data.

Geocoding – A mechanism for building a database relationship between addresses and geospatial features. When an address is matched to the geospatial features, geographic coordinates are assigned to the address.

Line - A linear feature built of straight line segments made up of two or more coordinates.

Location Validation Function (LVF) - A real time database that allows authorized service providers to validate a subscriber's location in real time using a pre-defined interface.

Master Street Address Guide (MSAG) - A listing of streets and house number hich describes the exact spelling of streets, street number ranges, and other address elements.

National Emergency Number Association (NENA) – A professional association consisting of emergency number agencies and telephone company personnel responsible for the planning, implementation, establishing national standards, management, and administration of emergency number systems.

Nebraska Spatial Data Infrastructure (NESDI) - A framework of geospatial data layers that have multiple applications, used by a vast majority of stakeholders, meet quality standards and have data stewards to maintain and improve the data on an ongoing basis. These layers are also consistent with the Federal National Spatial Data Infrastructure (NSDI).

Point - A geospatial feature that is stored as a single X-Y coordinate pair. Some data systems store X-Y-Z coordinates, where Z represents elevation of the point above a given surface (or datum).

Projection – A map projection flattens the earth, allowing for locations to by systematically assigned new positions so that a curved surface can be represented on a flat map

Public Safety Answering Point (PSAP) - An entity operating under common management which receives 9-1-1 calls from a defined geographic area and processes those calls according to a specific operational policy.

Road - Generally, this is the physical real-world feature that can be used for vehicular travel. However, this general definition is subject to the road owner's authority to define its accessibility (thus, while navigable by a vehicle, some linear features may be "trails" and thus excluded from the ORCDS). The federal definition used by ODOT for their purposes is appended below.

State Plane Coordinate System - The State Plane Coordinate System is a set of 124 geographic zones or coordinate systems designed for specific regions of the United States. It uses a simple Cartesian coordinate system to specify locations rather than a more complex spherical coordinate system (the geographic coordinate system of latitude and longitude). By thus ignoring the curvature of the Earth, "plane surveying" methods can be used, speeding up and simplifying calculations. The system is highly accurate within each zone (error less than 1:10,000). Outside a specific state plane zone, accuracy rapidly declines, thus the system is not useful for regional or national mapping

Topology – Spatial relationships and connectivity among graphic GIS features, such as points, lines and polygons. These relationships allow display and analysis of “intelligent” data in GIS. Many topological structures incorporate begin and end relationships, direction and right / left identification

Unique Identification Code - Every element is assigned an identification code, making it unique from other elements.

USGS United States Geological Survey - is a scientific agency of the United States government. The scientists of the USGS study the landscape of the United States and its natural resources.

4.0 Applicability

4.1 State Government Agencies

State agencies that have the primary responsibility for developing and maintaining street centerline and address range data for a particular jurisdiction(s) or geographic area (e.g. for counties for which it has assumed the primary role) are required to comply with the standards as described in Section 1. Those state agencies with oversight responsibilities in this area are required to ensure that their oversight guidelines, rules, and regulations are consistent with these standards.

4.2 State Funded Entities

Entities that are not State agencies but receive State funding, directly or indirectly, for street centerline, street naming, and address range development and maintenance for a particular jurisdiction or geographic area are required to comply with the standards as described in Section 1.

4.3 Other

Other entities, such as city and local government agencies (e.g. County Engineer, PSAPs, and municipalities) that receive state funds have the primary responsibility for developing and maintaining street centerline, street naming, and address range data are required to comply with the standards as described in Section 1.

5.0 Responsibility

5.1 NITC

The NITC shall be responsible for adopting minimum technical standards, guidelines, and architectures upon recommendation by the technical panel. Neb. Rev. Stat. § 86-516(6)

5.2 State Agencies

The State of Nebraska, Office of the CIO (OCIO) GIS Shared Services will be responsible for assuring that metadata is completed and the data is registered and available for distribution through NebraskaMAP.

5.3 Granting Agencies and Entities

State granting or fund disbursement entities or agencies will be responsible for ensuring that these standards are included in requirements related to fund disbursements as they relate to street centerlines and address range data.

5.4 Other

Local government agencies that have the primary responsibility and authority for street naming and street centerline placement will be responsible for ensuring that those sub-sections defined in Section 1 will be incorporated in the overall NSCD data development efforts and contracts.

6.0 Authority

6.1 NITC GIS Council

According to Neb. Rev. Stat. § 86-572(2), the GIS Council shall: Establish guidelines and policies for statewide Geographic Information Systems operations and management (a) The acquisition, development, maintenance, quality assurance such as standards, access, ownership, cost recovery, and priorities of data bases; (b) The compatibility, acquisition, and communications of hardware and software; (c) The assessment of needs, identification of scope, setting of standards, and determination of an appropriate enforcement mechanism; (d) The fostering of training programs and promoting education and information about the Geographic Information Systems; and (e) The promoting of the Geographic Information Systems development in the State of Nebraska and providing or coordinating additional support to address Geographic Information Systems issues as such issues arise.

7.0 Related Documents

7.1 NENA."NENA Next Generation 9-1-1 (NG9-1-1) Civic Location Data Exchange Format (CLDXF) Standard." NENA-STA-004. March 23, 2014. NENA Joint Data Technical/Next Generation Integration Committees, Next Generation Data Development Working Group.

7.2 National Emergency Number Association. “NENA Standard for NG9-1-1 GIS Data Model.”NENA-STA-XXX (Currently in Development),

7.3 NENA GIS Data Collection and Maintenance Standards, NENA 02-014, July 17, 2007

7.4 NENA Information Document for Synchronizing Geographic Information System databases with MSAG & ALI, NENA 71-501, Version 1.1, September 8, 2009

7.5 Federal Geographic Data Committee (FGDC) United States Thoroughfare, Landmark and Postal Address Data Standard. FGDC Document Number FGDC-STD-016-2011. February 2011.

7.6 NITC 3-201 Geospatial Metadata Standard – http://nitc.ne.gov/standards/3-201.html

7.7 NITC 3-206 Address Standards (Waiting Review and Approval)

7.8 United States Postal Service Publication 28. “Postal Addressing Standards.”

8.0 Appendices

8.1 Domains

Domains are provided for street centerline, alternate street names, and centerline points. This information provides consistency in reporting of data across multiple data sets.

SuffixAddressNumber

Domain	Description
A	A
B	B
C	C
D	D
E	E
F	F
G	G
H	H
I	I
J	J
K	K
L	L
M	M
N	N
O	O
P	P
Q	Q
R	R
S	S
T	T
U	U
V	V
W	W
X	X
Y	Y
Z	Z

PreModifier

Domain	Description
Alternate	Alternate
Archway	Archway
Behind	Behind
Business	Business
Bypass	Bypass
Center	Center
De	De
Del	Del
Drive	Drive
Entrance	Entrance
Extended	Extended
Head	Head
Historic	Historic
La	La
Le	Le
Loop	Loop
New	New
Old	Old
Olde	Olde
Our	Our
Out	Out
Private	Private
Public	Public
Spur	Spur
The	The
To	To

Direction

Domain	Description
N	North
S	South
E	East
W	West
NE	Northeast
NW	Northwest
SE	Southeast
SW	Southwest

SeperatorElement

Domain	Description
And	And
At	At
By The	By The
Con	Con
De Las	De Las
For	For
For The	For The
In The	In The
Of	Of
Of The	Of The
On The	On The
The	The
To	To
Y	Y

PostModifier

Domain	Description
Access	Access
Alternate	Alternate
Approach	Approach
Business	Business
Bypass	Bypass
Center	Center
Central	Central
Centre	Centre
Company	Company
Concourse	Concourse
Connector	Connector
Crossing	Crossing
Crossover	Crossover
Cut Off	Cut Off
Cutoff	Cutoff
Dock	Dock
End	End
Entrance	Entrance
Executive	Executive
Exit	Exit
Extended	Extended
Extension	Extension
Industrial	Industrial
Interior	Interior
Loop	Loop
Overpass	Overpass
Private	Private
Public	Public
Ramp	Ramp
Scenic	Scenic
Service	Service
Spur	Spur
Terminal	Terminal
Transverse	Transverse
Underpass	Underpass

State

Domain	Description
NE	Nebraska
CO	Colorado
WY	Wyoming
SD	South Dakota
IA	Iowa
MO	Missouri
KS	Kansas

StateFIPS

Domain	Description
31	Nebraska
08	Colorado
56	Wyoming
46	South Dakota
19	Iowa
28	Missouri
20	Kansas

StreetSource

Domain	Description
PSC	Public Service Commission street centerlines
CountySC	County street centerlines
MunicipalSC	Municipal street centerlines
StateSC	State street centerlines
Other	Other

StreetStatus

Domain	Description
1	Open
2	Retired
3	Temporarily closed
4	Under Construction

StreetType (for both PreType and PostType) Additional commonly used street suffixes and abbreviations are located within the USPS Publication 28.

Domain	Description
Acrs	Acres
Aly	Alley
Anx	Annex
Arc	Arcade
Ave	Avenue
Bay	Bay
Bch	Beach
Bg	Burg
Bgs	Burgs
Blf	Bluff
Blfs	Bluffs
Blvd	Boulevard
Bnd	Bend
Br	Branch
Brg	Bridge
Brk	Brook
Brks	Brooks
Btm	Bottom
Byp	Bypass
Byu	Bayou
Chas	Chase
Cir	Circle
Cirs	Circles
Clb	Club
Clf	Cliff
Clfs	Cliffs
Clos	Close
Cmn	Common
Cmns	Commons
Cnrs	Corners
Cor	Corner
Cors	Corners
County Hwy	County Road
County Rte	County Touring Route
Cp	Camp
Cpe	Cape

StreetType, continued

Cres	Crescent
Crk	Creek
Crse	Course
Crst	Crest
Cswy	Causeway
Ct	Court
Ctr	Center
Ctrs	Centers
Cts	Courts
Curv	Curve
Cv	Cove
Cvs	Coves
Cyn	Canyon
Dl	Dale
Dm	Dam
Dr	Drive
Drs	Drives
Drwy	Driveway
Dv	Divide
End	End
Est	Estate
Ests	Estates
Expy	Expressway
Ext	Extension
Exts	Extensions
Fall	Fall
Farm	Farm
Fld	Field
Flds	Fields
Fls	Falls
Flt	Flat
Flts	Flats
Frd	Ford
Frds	Fords
Frg	Forge
Frgs	Forges
Frk	Fork
Frks	Forks
Frst	Forest
Fry	Ferry
Ft	Fort
Fwy	Freeway
Gate	Gate
Gdn	Garden
Gdns	Gardens
Gln	Glen
Glns	Glens
Grds	Grounds
Grn	Green
Grns	Greens
Grv	Grove
Grvs	Groves
Gtwy	Gateway
Hbr	Harbor
Hbrs	Harbors
Hl	Hill
Hls	Hills
Holw	Hollow
Hrbr	Harbor
Hts	Heights
Hvn	Haven
Hwy	Highway
I	Interstate
Inlt	Inlet
Is	Island
Isle	Isle
Iss	Islands
Jct	Junction
Jcts	Junctions
Knl	Knoll
Knls	Knolls
Ky	Key
Kys	Keys
Land	Land
Lck	Lock
Lcks	Locks
Ldg	Lodge
Lf	Loaf
Lgt	Light
Lgts	Lights
Lk	Lake
Lks	Lakes
Ln	Lane
Lndg	Landing
Loop	Loop
Mall	Mall
Mdw	Meadow
Mdws	Meadows
Mews	Mews
Ml	Mill
Mls	Mills
Mnr	Manor
Mnrs	Manors
Msn	Mission
Mt	Mount
Mtn	Mountain
Mtns	Mountains
Mtwy	Motorway
Nck	Neck
Opas	Overpass
Orch	Orchard
Otlk	Outlook
Oval	Oval
Ovlk	Overlook
Park	Park
Pass	Pass
Path	Path
Pike	Pike
Pkwy	Parkway
Pl	Place
Pln	Plain
Plns	Plains
Plz	Plaza
Pne	Pine
Pnes	Pines
Pr	Prairie
Prom	Promenade
Prt	Port
Prts	Ports
Psge	Passage
Pt	Point
Pts	Points

StreetType, continued

Radl	Radial
Ramp	Ramp
Rd	Road
Rdg	Ridge
Rdgs	Ridges
Rds	Roads
Rdwy	Roadway
Rise	Rise
Riv	River
Rnch	Ranch
Row	Row
Rpd	Rapid
Rpds	Rapids
Rst	Rest
Rte	Route
Rue	Rue
Run	Run
Shls	Shoals
Sho	Shoal
Shr	Shore
Shrs	Shores
Skwy	Skyway
Smt	Summit
Spg	Spring
Spgs	Springs
Spur	Spur
Sq	Square
Sqs	Squares
St	Street
Sta	Station
State Hwy	State Touring Highway
State Pkwy	State Parkway
State Rte	State Route
Stra	Stravenue
Strm	Stream
Sts	Streets
Ter	Terrace
Tlpk	Trailer Park
Tpke	Turnpike
Trak	Track
Trce	Trace
Trfy	Trafficway
TrkTrl	Truck Trail
Trl	Trail
Trlr	Trailer
Trwy	Thruway
Tunl	Tunnel
Turn	Turn
Twrs	Towers
Un	Union
Uns	Unions
Upass	Underpass
US Hwy	Federal Highway
US Rte	US Route
Vale	Vale
Via	Viaduct
Vis	Vista
Vl	Ville
Vlg	Village
Vlgs	Villages
Vls	Villas
Vly	Valley
Vlys	Valleys
Vw	View
Vws	Views
Walk	Walk
Wall	Wall
Way	Way
Ways	Ways
Wds	Woods
Wels	Wells
Wl	Well
Wood	Wood
Xing	Crossing
Xrd	Crossroad
Xrds	Crossroads

UnitType

Domain	Description
APT	Apartment
BSMT	Basement
	Blank, unable to determine
BLDG	Building
DEPT	Department
FL	Floor
FRNT	Front
HNGR	Hanger
KEY	Key
LBBY	Lobby
LOT	Lot
LOWR	Lower
OFC	Office
PH	Penthouse
PIER	Pier
REAR	Rear
RM	Room
SIDE	Side
SLIP	Slip
SPC	Space
STOP	Stop
STE	Suite
TRLR	Trailer
UNIT	Unit
UPPR	Upper

AgreePoint

Domain	Description
Y	Yes
N	No

CountyFIPS

Domain	Description	Domain	Description	Domain	Description
1	Adams	63	Frontier	125	Nance
3	Antelope	65	Furnas	127	Nemaha
5	Arthur	67	Gage	129	Nuckolls
7	Banner	69	Garden	131	Otoe
9	Blaine	71	Garfield	133	Pawnee
11	Boone	73	Gosper	135	Perkins
13	Box Butte	75	Grant	137	Phelps
15	Boyd	77	Greeley	139	Pierce
17	Brown	79	Hall	141	Platte
19	Buffalo	81	Hamilton	143	Polk
21	Burt	83	Harlan	145	Red Willow
23	Butler	85	Hayes	147	Richardson
25	Cass	87	Hitchcock	149	Rock
27	Cedar	89	Holt	151	Saline
29	Chase	91	Hooker	153	Sarpy
31	Cherry	93	Howard	155	Saunders
33	Cheyenne	95	Jefferson	157	Scotts Bluff
35	Clay	97	Johnson	159	Seward
37	Colfax	99	Kearney	161	Sheridan
39	Cuming	101	Keith	163	Sherman
41	Custer	103	Keya Paha	165	Sioux
43	Dakota	105	Kimball	167	Stanton
45	Dawes	107	Knox	169	Thayer
47	Dawson	109	Lancaster	171	Thomas
49	Deuel	111	Lincoln	173	Thurston
51	Dixon	113	Logan	175	Valley
53	Dodge	115	Loup	177	Washington
55	Douglas	117	McPherson	179	Wayne
57	Dundy	119	Madison	181	Webster
59	Fillmore	121	Merrick	183	Wheeler
61	Franklin	123	Morrill	185	York

NITC 3-206
Address Standards

Review Version 4.0
(Date 9.3.2014)

Category: Data and Information Architecture
Applicability: See Each Section of Standards
History: Adopted on [Month Day, Year]

NEBRASKA INFORMATION TECHNOLOGY COMMISSION GIS COUNCIL

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1.0 Standard

1.1 Description

This standard provides requirements necessary for the creation, development, delivery, and maintenance of address point data to support a statewide Nebraska Address Database (NAD). The address database provides the spatial location and information tied to that location with appropriate attribute data. The standard provides a consistent structure for data producers and users to ensure compatibility of datasets within the same framework layer and when used between other Nebraska Spatial Data Infrastructure (NESDI) framework layers such as street centerlines and parcels.

There are multiple uses for address point data. These requirements will enable the data to be integrated not only with Next Generation 9-1-1 (NG9-1-1) but with existing state address databases, routing services, emergency management, public safety, tax assessment, and the state's enterprise geocoding application databases. Furthermore, this standard will serve as a guideline for future maintenance activity data requirements.

This standard does not restrict or limit additional information collected and stored in a particular database. The specific requirements for address naming and point placement are primarily the responsibility of the local jurisdiction. These standards are meant to be a minimum set of standards and are subject to be updated based on technology enhancements, necessary workflow changes, and other data requirements.

The standard is not intended to be a substitute for an implementation design. These standards can be used at local, state and federal level to ensure interdisciplinary compatibility and interoperability with other databases. These standards integrate with existing standards such as the National Emergency Number Association (NENA), Federal Geographic Data Committee (FGDC), U.S. Postal Service (USPS) Addressing Standard, and other NITC related standards.

1.2 Spatial Representation

1.2.1 Geometric Placement

The methodology for proper geometric placement of address points will vary based on the application. Address points can be placed either manually or by calculated placement. The calculated placement is completed by automated software techniques, typically in GIS. Calculations or manual placement methods can be made from the structure's visual footprint seen in imagery, LiDAR or a determined boundary. Site or structures that have an address assigned to it would be considered an address point.

Providing adequate address point locations to support public safety and emergency response is the primary focus and will need to support NG9-1-1 standards identified by NENA. At a minimum, one address point placed per address is suggested by these standards. For NG9-1-1 applications, there will be one address point provided for dispatching as to not create conflict in interpretation among other address point locations tied to the same street address when responding to emergencies. For other applications, additional address points can be created as long as they are notated in the attribute table for purpose of the point type. The following suggestions are recommended in priority of address point placement. If a primary structure is not addressable on the property parcel then a property access point is placed within the property driveway or access location. In cases where the primary structure is not visible from the addressable road, an additional access point will need to be placed in the middle of the entrance or access location within that property parcel. Additional address points are required for public safety at entrance locations for public structures such as schools, hospitals, and government offices.

Specific requirements for the placement of entrance locations are located within NENA standards source located in section 7.0.

There are additional standards and best practices for the placement of address points within structures outlined by NENA. This includes single address with multiple structures or entrances, single structure or entrances with multiple addresses, multiple addresses with one structure or entrance. In addition, there are address point placement recommendations for exterior and interior entrance locations within a structure.

1.2.1.1 Primary Structure

The primary address point should be placed within every principal address structure's location or footprint. Placement can be achieved either manually or calculated. When placed manually, the point should reflect the center or entrance to the addressed structure as long as it is within the structure's footprint (Figure 1). When calculated, it typically refers to placement of a centroid in the middle of the building footprint or polygon. Either of these two placement techniques assign the address with that structure.

Figure 1. Placement of address point within structure's footprint.

If a structure is not visible on aerial imagery or LiDAR, but it's physical location is represented by other supplemental resources, the point can be placed according to the supplement resources and needs to be confirmed with field verification.

For multiple units within a structure, there does not need to be additional address points placed for each unit. The single point can relate to a table having multiple listings of addresses for each unit. Consider using this method when addresses are relatively within 10 feet of each other.

1.2.1.2 Property Access

This is the placement of the address point to accessing the property of interest. This typically is a driveway, access road, or other entrance path to a property that is connected to a named road or other path from a different

property. Address points should be located at the primary driveway entrance within a parcel boundary. This point is placed only after the primary structure address point has been identified and placed or if there is no primary addressable structure on the property parcel. If parcel data exists to the property, then the point should fall within the parcel boundary in the middle of the driveway or other access area.

Figure 2. Placement of address point on primary entrance path within a parcel boundary as shown on the left address point for 7909. The illustration also shows the placement of the address point on the primary structure footprint. This is helpful in cases where the primary building is difficult to see from the primary entrance path off an addressed road.

Interim placement of address points can exist if a site or structure is not available at the time of recording. This can include conditions where site or building is under construction or new developments that may have future sub-addresses. The expectation is that these interim locations are noted during time of creation and future modifications can occur to both the geometric placement and attributes.

1.2.1.3 Other Placement Options

After the primary and/or secondary address points have been placed or in special cases where the primary and secondary conditions are not able to be met, then there are other address point placement options. Specific requirements for these placement options are located within NENA standards source located in section 7.0. The following are a few descriptions for other placement options.

a) Parcels

This section addresses the placement of the address point within a parcel boundary when there are no addressed structures or visible access road to the property. The address point can either be placed in the center of the parcel, within a parcel where an internal road or main structures are located, within a parcel at the center of the parcel frontage next to the road that

references the address, and within and front of a parcel using address ranges to guide placement. Parcels that do not have an addressable structure present will have the address point at the centroid within the boundary of the parcel. If there is discrepancy in the placement accuracy of the parcel itself, it is best to have the point located in the middle of the parcel until or at an offset distance from the boundary line from the road that references the address. This will assure that the address point is well within the parcel boundary in case the spatial location of parcel boundary is updated in the future. It also assures that other spatial relationships exist with other GIS layers.

b) Site

A site is defined as a place that has no known or recognized structure or boundary. These can include places such as parks, camp sites, recreational areas, and other large areas. In this case, either an address point is placed based on the centroid of a defined boundary or is associated as a landmark. Point location can also be manually located at the entrance or area of concentration of structures or activities within the site.

c) Geocoding from Road Centerlines

Address point placement is achieved by interpolation of road centerline address ranges. Points are placed based on a calculated method of directional offset representing left or right of the street and providing a desired distance to the property based on address range breaks located in the street centerline layer. This practice should be considered last resort as it provides inconsistency with distances to the actual structure or access location to a property. This technique is useful when establishing and double checking the correct attributes between the street centerline database corresponding to the address point database.

1.2.2 Data Development

All data will consist of visual and verifiable address point information corresponding to some level of ground control. The geometric placement of address points can be derived from digitizing and using field GPS data collection.

1.2.2.1 Digitizing

Address point placement can be completed by visual registration using aerial imagery, site plans or other graphical resources that have been spatially adjusted to meet minimum spatial accuracy requirements. The data source used to digitize or place address points must meet the following minimum requirements.

Capture Scale for digitizing: 1:2400
Projection: Nebraska State Plane Coordinate System
Datum: North American Datum of 1983 (NAD83)
Source: Using aerial imagery that meets verified horizontal accuracy requirements for spatial resolution (12 inch minimum), preferably leaf-off. In cases where tree cover or other obstructions are identified in imagery, it will be necessary to conduct field verification of that location with a mapping grade GPS unit. The NAIP imagery therefore does not meet these accuracy standards.

LiDAR can also be used as a guide to support spatial accuracy placement of certain aspects of building footprints.

Imagery, LiDAR, or other source document that was used to digitize street centerlines that is newly acquired or not made available for public access will need to be provided to entity conducting quality control of the data.

1.2.2.2 Global Positioning Systems (GPS)

The development of address points can be utilized using field observation and data collection techniques using mapping grade GPS. Data collected using a mapping grade GPS will need to meet spatial accuracy requirements in section 1.2.3. Additional post processing of GPS data may be necessary to meet these spatial requirements, particularly when placement of address point falls within the boundary of a structure.

1.2.3 Spatial Accuracy

1.2.3.1 Minimum Horizontal Accuracy Standard

Data that has been collected through digitization or visual representation methods must have an accuracy level of 3.28 to 9.84 feet (1-3 meters) or better.

When using mapping grade GPS, data will need to be collected at 3.28 feet (1 meter) or better. Additional requirements and suggestions for acquiring address point data by field GPS is located in the NENA GIS Data Collection and Maintenance Standards.

1.2.3.2 Minimum Vertical Accuracy Standard

There are no vertical accuracy requirements at this time. These standards are subject to change in the future as data maintenance and accuracy of address point placement is further needed in places such as structures having multiple floors.

1.2.4 Feature Type and Tables

1.2.4.1 Points

Single points will represent the address point features. Corresponding attribute information tied to each point is further defined in Section 1.3.6 Data Schema and Descriptions. Having one point per valid address ensures a one to one match for the purposes of geocoding.

1.2.4.2 Tables

Corresponding tables for one address point location but reference to multiple locations or sub-addresses can be further represented in tabular format. See Section 1.3.6 Data Schema and Descriptions for description on information for tables.

1.2.5 Projection and Datum

For data to be made available for NG9-1-1 operations, the data will need to be in a geographic coordinate system and not projected. This is necessary for the Emergency Call Routing Function (ECRF) or the Location Validation Function (LVF) uses for display.

EPSG:	4326 WGS84 / Latlong
Projection:	Geographic Coordinates, Plate Carrée, Equidistant Cylindrical, Equirectangular
Latitude of the origin:	0°
Longitude of the origin:	0°
Scaling factor:	1
False easting:	0°
False northing:	0°
Ellipsoid:	WGS84
Horizontal Datum:	WGS84
Vertical Datum:	WGS84 Geoid
Units:	decimal degrees
Global extent:	-180, -90, 180, 90

The NAD will also be projected and delivered in Nebraska (State) Plane Coordinate System projection and datum for North American Datum of 1983 (NAD83). The plane coordinate values for a point on the earth's surface should be expressed in feet. The data will also be made available as Web Mercator with WGS 1984 horizontal datum for use among other needed web services.

1.3 Address Attributes

1.3.1 General Address Components

There are several components that make up an address. Many are required to accurately define a specific address and location. When an address is matched against other address database files or for the purpose of generating an address it must be broken down into the individual components separated by a single space between the components. These standards follow the FGDC United State Thoroughfare, Landmark and Postal Address Data standard for address components. The minimum components required to accurately define an address are:

Primary Address Number:	123
Prefix Directional Street:	W
Street Name:	Main
Street Type:	ST
Street Direction:	NW
Unit Address Identifiers:	STE
Unit Number:	5
City:	Lincoln
State:	NE
Zip Code:	68509

Not all of the elements are required to be filled out for an address to be valid. However, the placeholders need to be present in the attribute table to accurately represent the accepted USPS standards. The USPS uses a parsing logic to enter address information into their appropriate fields. When parsing an address into the individual components, start from the right element of the address and work toward the left. Place each element in the appropriate field until all address components are isolated. This process facilitates matching files and produces the correct format for standardized output as well as isolating the mismatches to the closest possible fit before failing.

Associated attributes pertain to formatting and storing of address data within attribute tables that are external to and associated with feature attribute tables of geospatial

datasets. For example, a city's master address database could be associated with and address matched against a city-wide geospatial dataset of points.

Each jurisdiction shall develop a master address database that can be referenced when new street names are being created or assigned so that duplications are avoided. All street names and address numbers shall be kept consistent with geospatial datasets.

Additional information and guidelines for directional prefixes and suffixes, street naming, street type, address parity, sequential direction and consistency with distance-based address grid can be found in the Street Centerline Standards (NITC 3-205).

1.3.2 Unique Identification Code

A unique identifier is required for the statewide address point database. This unique identifier allows the data to be tied or joined to other spatial data sets having the same identifier. The field name for this unique code in NAD is "NEAddressID." The first four (4) digits are the county name followed by number associated from the local addressing authority.

1.3.3 Use of Characters

Street addresses shall not contain characters such as hyphens, dashes, +, #, & or other non-alpha-characters or symbols. An alpha-character added to the address as a sub-number is preferable to a fraction (e.g., 123 A is preferable to 123 1/2).

1.3.4 Data Schema and Descriptions

The following table represents the necessary data schema including field names, descriptions, and associated domains for the address point database. The minimum required fields for these standards are represented by the following identifiers: "**R**" – required, "**RC**" –Recommended, and "**O**" – Optional.

Field Name	Field Type	Field Length	Field Description	Domain Name	Required Level
NEAddressID	String	12	Unique ID of address point where first 4 characters are the first 4 letters of each County name. The remaining 8 characters of the number are provided by the local addressing authority.	N/A	R
NEStreetID	Integer	20	Unique ID of corresponding street centerline segment	N/A	R
State_PID	String	30	County FIPS code plus local government PID number (See Statewide Parcel Database ID requirements)	N/A	R
County_ID	String	3	County FIPS code of where address point resides	CountyFIPS	R
PrefixAddressNumber	String	10	An extension that precedes the address number	N/A	R
AddressNumber	Integer	6	The numeric identifier of a location along a thoroughfare (i.e., 100, 2345, 31)	N/A	R
SuffixAddressNumber	String	15	An extension that follows the address number (i.e., A through Z)	SuffixAddressNumber	R

PreModifier	String	15	A street name modifier that precedes the street name. (i.e., Alternate, bypass, loop, private, spur, etc.)	PreModifier	R
PreDirectional	String	2	A street direction that precedes the street name (i.e., N, S, E, W, NE, NW, SE, SW)	Direction	R
PreType	String	4	A street type that precedes the street name (i.e., AVE, RD, ST, CIR, PL, PKWY, LN, DR, BLVD, ALY)	StreetType	R
SeparatorElement	String	10	An element that precedes the StreetName which separates the PreType and StreetName	SeparatorElement	R
StreetName	String	30	Legal authoritative street name component of segment name	N/A	R
PostType	String	4	A street type that follows the street name (i.e., AVE, RD, ST, CIR, PL, PKWY, LN, DR, BLVD, ALY)	StreetType	R
PostDirectional	String	2	A street direction that follows the street name (i.e., N, S, E, W, NE, NW, SE, SW)	Direction	R
PostModifier	String	12	A descriptor that follows the street name and is not a suffix or a direction (i.e., Access, Central, Crossover, Scenic, Terminal, Underpass)	PostModifier	R
Building	String	60	The name of one among a group of buildings that have the same address number and street name, that are multiple independently named structures at the same address	N/A	R
Floor	String	10	A floor, story, or level within a building	N/A	O
NumberFloors	String	4	Number of floors in building	N/A	O
Room	String	10	A room identification in a building	N/A	RC
NumberRooms	String	4	Number of rooms in building or structure.	N/A	O
Seat	String	5	The place where a person may be located within a room or building.	N/A	O
Unit	String	4	A group or suite of rooms within a building that are under common ownership or tenancy, typically having a common primary entrance. (ie, A, 4, etc.)	N/A	R
UnitType	String	4	The unit type abbreviation. (ie, APT, BLDG, DEPT, FL, STE, UNIT	UnitType	C
Location	String	20	For sub-address, other than building, floor, unit, room or seat. For example, northeast	N/A	O

			corner of building.		
Subdivision	String	60	Subdivision name	N/A	C
City	String	40	Name of the municipality where the site is located. Also the postal community name associated to the zip code or postal code.	N/A	R
State	String	2	State name abbreviation	State	R
ZipCode	String	5	5 digit zip code	N/A	R
Ph_Zip4	String	4	Mailing post code +4 designation for the tax parcel	N/A	RC
FullAddress	String	75	Concatenated street address consisting of address number, pre direction, pre type, street name, street type, suffix direction, unit number, building, floor.	N/A	RC
SubAddress	String	75	Entire sub-address string that consists of Building, Floor, Unit, and Location fields concatenated together	N/A	RC
LandmarkName	String	60	Common Place Name such as library, town hall, Chimney Rock, stadium	N/A	R
MSAG	String	30	Service community name associated with the location of the address.	N/A	R
ESN	String	5	Emergency Service Number associated with the location of the address identified by MSAG.	N/A	R
PSAP	String	25	Public Service Access Point identifier number	N/A	R
PrimaryPoint	String	3	Is this the primary point? Yes or No. Distinguishes between Primary and SubAddress points.	PrimaryPoint	R
PointType	String	3	Address point type (primary structure, primary property entrance, secondary structure, secondary property entrance, parcel centroid, etc.)	PointType	R
PlaceType	String	75	Description of the type of feature for address (House, duplex, trailer, apartment, secondary structure, utility, school, hospital, commercial business, industrial, etc.)	N/A	RC
AddOwner	String	25	Current local entity responsible for creation of address data	N/A	R
AddMaint	String	25	Current local entity responsible for maintenance of address data	N/A	R
AddressSource	String	30	The primary data source for the attributes used in this	AddressSource	R

			record		
SourceOfData	String	30	Entity that provided the data	N/A	R
Create_DT	Date	26	Date/time stamp data was collected	N/A	R
Update_DT	Date	26	Date/time stamp the record was last modified	N/A	R
RecentFieldEditor	String	30	Recent field editor of data	N/A	R
Add_Status__Code	String	2	Status code indicating operational condition of address point (1=active, 2=retired, 3=unknown)	N/A	R
Basement	String	3	Is there a basement? Yes, No	N/A	O
StrmShelter	String	25	The type of storm shelter	N/A	O
OccupTime	String	50	Time when the site/structure is typically occupied (7:00 – 6:00 pm)	N/A	O
X_COORD	Numeric	15	Points X coordinate	N/A	R
Y_COORD	Numeric	15	Points Y coordinate	N/A	R
Z_COORD	Numeric	7	Points Z elevation coordinate in feet. Height above mean sea level.	N/A	O
Comments	String	100	Comments or notes	N/A	O

1.4 Data Format

The data format provided will need to be in an enterprise geodatabase format that can be interpreted by commercial GIS software. A geodatabase schema including domains can be provided free upon request by contacting the State of Nebraska, Office of the CIO GIS Shared Services.

Tabular data will need to be provided in MS ACCESS, DBF, or MS SQL formats.

1.5 Maintenance

Addressing authorities need to be identified at the local level for approval of new addresses and assuring the addresses are implemented towards the database. This will insure that the physical location and the attribute database is updated and maintained in a timely manner. After spatial and attribute updates and/or modifications are performed to the database it shall be submitted to the appropriate entity(s) responsible for performing quality control and maintenance of the NAD.

Maintenance of address points requires capturing addresses and locations associated with new developments as soon as possible. This means mapping new structures by creating a geographic point as soon as (a) an address is assigned by the municipality and, if possible, (b) the physical location of the structure can be determined. For example, if a building permit has been issued and it includes a street address for the construction of a new residence, once a foundation is poured, then it would be possible to visit the site and capture that location.

1.5.1 Reporting Errors and Handling Updates

The reporting of errors need to be directed to specific local (city and/or county) and/or state entity(s) involved in the workflow in a timely manner. Updated spatial and attribute information in database will also need to be redistributed. The date field in the database when the last record was modified will also need to be updated to ensure proper records management and communication with others in the workflow.

1.6 Quality Control

The quality of the NAD is evaluated based on the overall functional correctness and completeness of the attribute and spatial data. The FGDC and NENA have adopted nationally recognized standards for accuracy testing of GIS data. NENA recommends that address data for use in data exchanges associated with NG-911 call processing be based on the FGDC compliant database. Refer to the FGDC United State Thoroughfare, Landmark and Postal Address Data standard and the NENA Civic Location Data Exchange Format (CLDXF) Standard for these data exchange standards.

1.6.1 Attribute Accuracy

a) Attribute fields are complete compared to source data having valid data elements, domain or range values.
b) Correct spelling in comparison of source data.
c) Standard first letter capitalized of every word and USPS capitalization of the State abbreviation.
d) Not to contain duplicate address points, each address point should be uniquely identifiable by the attributes.
e) Assure that the address points on the left or right of the street centerline are consistently either odd or even addresses.
f) The address point database has a thematic approach to accuracy. In other words, the type of address points recorded reflect the appropriate attribute values associated to that type. The data schema is setup with several field names that help qualify these relationships and thematic criteria to ensure accuracy of address point information.
g) For NG9-1-1 applications, the address for each point need to qualify and meet certain thresholds for the MSAG and ALI databases. For MSAG and ALI databases, the address for each point will need to be valid at a rate of 98 percent or better. For areas without an MSAG, the addresses in the point file will meet USPS Publication 28 standards. For the ALI database, this is determined by geocoding the addresses in the ALI database to the point layer with addresses developed for that area. Overall, the address data is consistent with source information from MSAG and ALI.
h) The correct formatting of address attributes are used in these standards and are also included in the NENA standards and abbreviations as they are found in USPS Publication 28.
i) The temporal quality is met by being current, updating appropriate attributes, and indicating the time the changes were made in the date updated field. Address points assigned early on due to missing or unknown structures may end up being incorrect later on as construction begins and structures are further identified.
j) Internal QA/QC checks for allowable domain values, summary statistics and record counts.

1.6.2 Physical Location

The quality of the physical location will be evaluated based on:

a) The placement of the address point representing it's real location and if it meets horizontal accuracy requirements. The National Standard for Spatial Data Accuracy (NSSDA) outlines a methodology for measuring positional accuracy. If additional testing is required, the NSSDA procedures outline the statistical procedures.
b) The geometric placement of the address point is consistently logical to the context of other features such as street centerlines, parcels, emergency service zones, and other address points.

1.7 Integration with other Standards

1.7.1 Street Centerline Standards (NITC 3-205)

The address elements identified in these standards shall meet the same address field relationships found in the Street Centerline Standards NITC 3-205. This is to assure the connection of street addresses and routing to address points having the same address information.

1.8 Metadata

A requirement for address point data is creating and maintaining it's metadata. The metadata for address point data will require detailing the characteristics and quality of submitted address points. Information needs to be provided to allow the user sufficient information so they can determine the data's intended purpose as well as how to access the data. The metadata requires a process description summarizing collection parameters such as: contact information, data source, scale, accuracy, projection, use restrictions, and date associated to each street centerline segment. The process description will also need to be included to describe methodology towards the deliverable products.

1.8.1 Federal Metadata

The Federal Metadata Content Standard from FGDC should be used when feasible and in every effort possible to assure high quality rigorous standards. All geospatial address point geodatabases, and their associated attribute databases should be documented with FGDC compliant metadata outlining how the data was derived, attribute field definitions and values, map projections, appropriate map scale, contact information, access and use restrictions, to name a few.

1.8.2 State Metadata

These standards need to apply to Nebraska's metadata standards located within NITC 3-201 Geospatial Metadata Standard. All metadata from address point data will need to be registered through the metadata portal at NebraskaMAP (http://NebraskaMAP.gov). All developers of Nebraska-related geospatial data are encouraged to use the site to either upload existing metadata and/or use the online tools available on the site to create the metadata for address point data.

2.0 Purpose and Objectives

2.1 Purpose

The purpose of this standard is to provide the necessary requirements for the creation, development, delivery, and maintenance of address point data to support a statewide NAD.

These standards will help ensure that address data creation and development are current, consistent, accurate, publicly accessible, and cost-effective.

2.2 Objectives

These standards will guide the statewide NAD having the following objectives:

2.2.1 Provide guidance, address database schema, and necessary workflows to state and local officials as they work, either in-house or with private contractors, to create, develop and maintain address point data. This can increase the likelihood that the data created will be suitable for the range of intended applications and likely future applications. The maintenance of address data is necessary for the data to be current and accurate.

2.2.2 Enhance coordination and program management across jurisdictional boundaries by insuring that address point data can be horizontally integrated across jurisdictional and/or project boundaries, and other framework data layers for regional or statewide applications.

2.2.3 Save public resources by facilitating the sharing of address point data among public agencies or sub-divisions of agencies by incorporating data standards and following guidelines. Data that is developed by one entity can be done in a way that is suitable to serve the multiple needs of other entities. This avoids the costly duplication of developing and maintaining similar address point data in the state.

2.2.4 Make address point data current and readily accessible to the wide range of potential users through NebraskaMAP and other necessary resources.

2.2.5 Facilitate harmonious, trans-agency and public policy decision-making and implementation by enabling multiple agencies and levels of government to access and appropriately use current address data. This can make it more likely that intersecting public policy decisions, across levels of government, will be based on the same information.

2.2.6 Lay the foundation for facilitating intergovernmental partnerships for the acquisition and development of high-quality address point data by defining standards that increase the likelihood that this data will meet the needs of multiple users.

2.2.7 Establish and promote the integration and interrelationships of address data with related NESDI framework layers through geometric placement and attributes.

3.0 Definitions

Accuracy

Absolute - A measure of the location of features on a map compared to their true position on the face of the earth.

Relative - A measure of the accuracy of individual features on a map when compared to other features on the same map.

Address

Actual or Real - The simple, everyday element that designates a specific, situs location, such as a house number or an office suite.

Range - Numbers associated with segments of a digital street centerline file that represent the actual high and low addresses at either end of each segment.

Theoretical - A location that can be interpolated along a street centerline file through geocoding software.

Vanity - A special address that is inconsistent with or an exception to the standard addressing schema.

Address matching – See Geocoding

Automatic Location Identification (ALI) - The automatic display at the PSAP of the caller's phone number, the address/location of the telephone and supplementary emergency services information of the location from which a call originates.

Attribute – The properties and characteristics of entities.

Datum – A set of values used to define a specific geodetic system.

Data Stewardship – Entity(s) responsible for developing and maintaining the data.

Entity – a data entity is any object about which an organization chooses to collect data.

Geocoding – A mechanism for building a database relationship between addresses and geospatial features. When an address is matched to the geospatial features, geographic coordinates are assigned to the address.

Geospatial feature – A point, line or polygon stored within geospatial software.

Line – A linear feature built of straight line segments made up of two or more coordinates.

Master Street Address Guide (MSAG) - A listing of streets and house number hich describes the exact spelling of streets, street number ranges, and other address elements.

National Emergency Number Association (NENA) – A professional association consisting of emergency number agencies and telephone company personnel responsible for the planning, implementation, establishing national standards, management, and administration of emergency number systems.

Nebraska Spatial Data Infrastructure (NESDI) - A framework of geospatial data layers that have multiple applications, used by a vast majority of stakeholders, meet quality standards and have data stewards to maintain and improve the data on an ongoing basis. These layers are also consistent with the Federal National Spatial Data Infrastructure (NSDI).

Point - A geospatial feature that is stored as a single X-Y coordinate pair. Some data systems store X-Y-Z coordinates, where Z represents elevation of the point above a given surface (or datum).

Projection – A map projection flattens the earth, allowing for locations to by systematically assigned new positions so that a curved surface can be represented on a flat map

Public Safety Answering Point (PSAP) - An entity operating under common management which receives 9-1-1 calls from a defined geographic area and processes those calls according to a specific operational policy.

State Plane Coordinate System - The State Plane Coordinate System is a set of 124 geographic zones or coordinate systems designed for specific regions of the United States. It uses a simple Cartesian coordinate system to specify locations rather than a more complex spherical coordinate system (the geographic coordinate system of latitude and longitude). By thus ignoring the curvature of the Earth, "plane surveying" methods can be used, speeding up and simplifying calculations. The system is highly accurate within each zone (error less than 1:10,000). Outside a specific state plane zone, accuracy rapidly declines, thus the system is not useful for regional or national mapping

Unique Identification Code – Every element is assigned an identification code, making it unique from other elements. For these standards, the first four (4) digits are the county name followed by number associated from the local addressing authority.

4.0 Applicability

4.1 State Government Agencies

State agencies that have the primary responsibility for developing and maintaining address point data for a particular jurisdiction(s) or geographic area (e.g. for counties for which it has assumed the primary role) are required to comply with the standards as described in Section 1. Those state agencies with oversight responsibilities in this area are required to ensure that their oversight guidelines, rules, and regulations are consistent with these standards.

4.2 State Funded Entities

Entities that are not State agencies but receive State funding, directly or indirectly, for address point development and maintenance for a particular jurisdiction or geographic area are required to comply with the standards as described in Section 1.

4.3 Other

Other entities, such as city and local government agencies (e.g. County Engineer, PSAPs, and municipalities) that receive state funds have the primary responsibility for developing and maintaining address point data are required to comply with the standards as described in Section 1.

5.0 Responsibility

5.1 NITC

The NITC shall be responsible for adopting minimum technical standards, guidelines, and architectures upon recommendation by the technical panel. Neb. Rev. Stat. § 86-516(6)

5.2 State Agencies

The State of Nebraska, Office of the CIO (OCIO) GIS Shared Services will be responsible for ensuring that standards and guidelines relative to development, meeting quality control

standards, and approving address points for the statewide address point database for distribution are conducted according to subsections in Section 1. The OCIO GIS Shared Services will be responsible for assuring that metadata is completed and the data is registered and available for distribution through NebraskaMAP.

5.3 Granting Agencies and Entities

State granting or fund disbursement entities or agencies will be responsible for ensuring that these standards are included in requirements related to fund disbursements as they relate to address points.

5.4 Other

Local government agencies that have the primary responsibility and authority for address naming and point placement will be responsible for ensuring that those sub-sections defined in Section 1 will be incorporated in the address point data development efforts and contracts.

6.0 Authority

6.1 NITC GIS Council

According to Neb. Rev. Stat. § 86-572(2), the GIS Council shall: Establish guidelines and policies for statewide Geographic Information Systems operations and management (a) The acquisition, development, maintenance, quality assurance such as standards, access, ownership, cost recovery, and priorities of data bases; (b) The compatibility, acquisition, and communications of hardware and software; (c) The assessment of needs, identification of scope, setting of standards, and determination of an appropriate enforcement mechanism; (d) The fostering of training programs and promoting education and information about the Geographic Information Systems; and (e) The promoting of the Geographic Information Systems development in the State of Nebraska and providing or coordinating additional support to address Geographic Information Systems issues as such issues arise.

7.0 Related Documents

7.1 NENA."NENA Next Generation 9-1-1 (NG9-1-1) Civic Location Data Exchange Format (CLDXF) Standard." NENA-STA-004. March 23, 2014. NENA Joint Data Technical/Next Generation Integration Committees, Next Generation Data Development Working Group (NGDD).

7.2 National Emergency Number Association. “NENA Information Document for Development of Site/Structure Address Point GIS Data for 9-1-1.”NENA-STA-XXX (Currently in Development), http://www.nena.org/?NG911_Project.

7.3 National Emergency Number Association. “NENA Standard for NG9-1-1 GIS Data Model.”NENA-STA-XXX (Currently in Development).

7.4 NENA GIS Data Collection and Maintenance Standards, NENA 02-014, July 17, 2007

7.5 NENA Information Document for Synchronizing Geographic Information System databases with MSAG & ALI, NENA 71-501, Version 1.1, September 8, 2009

7.6 Federal Geographic Data Committee (FGDC) United States Thoroughfare, Landmark and Postal Address Data Standard. FGDC Document Number FGDC-STD-016-2011. February 2011.

7.7 NITC 3-201 Geospatial Metadata Standard – http://nitc.ne.gov/standards/3-201.html

7.8 NITC 3-205 Street Centerline Standards. (Waiting Review and Approval)

7.9 United States Postal Service Publication 28. “Postal Addressing Standards.”

8.0 Appendices

8.1 Domains

Domains are provided for street centerline, alternate street names, and centerline points. This information provides consistency in reporting of data across multiple data sets.

SuffixAddressNumber

Domain	Description
A	A
B	B
C	C
D	D
E	E
F	F
G	G
H	H
I	I
J	J
K	K
L	L
M	M
N	N
O	O
P	P
Q	Q
R	R
S	S
T	T
U	U
V	V
W	W
X	X
Y	Y
Z	Z

PreModifier

Domain	Description
Alternate	Alternate
Archway	Archway
Behind	Behind
Business	Business
Bypass	Bypass
Center	Center
De	De
Del	Del
Drive	Drive
Entrance	Entrance
Extended	Extended
Head	Head
Historic	Historic
La	La
Le	Le
Loop	Loop
New	New
Old	Old
Olde	Olde
Our	Our
Out	Out
Private	Private
Public	Public
Spur	Spur
The	The
To	To

Direction

Domain	Description
N	North
S	South
E	East
W	West
NE	Northeast
NW	Northwest
SE	Southeast
SW	Southwest

SeperatorElement

Domain	Description
And	And
At	At
By The	By The
Con	Con
De Las	De Las
For	For
For The	For The
In The	In The
Of	Of
Of The	Of The
On The	On The
The	The
To	To
Y	Y

PostModifier

Domain	Description
Access	Access
Alternate	Alternate
Approach	Approach
Business	Business
Bypass	Bypass
Center	Center
Central	Central
Centre	Centre
Company	Company
Concourse	Concourse
Connector	Connector
Crossing	Crossing
Crossover	Crossover
Cut Off	Cut Off
Cutoff	Cutoff
Dock	Dock
End	End
Entrance	Entrance
Executive	Executive
Exit	Exit
Extended	Extended
Extension	Extension
Industrial	Industrial
Interior	Interior
Loop	Loop
Overpass	Overpass
Private	Private
Public	Public
Ramp	Ramp
Scenic	Scenic
Service	Service
Spur	Spur
Terminal	Terminal
Transverse	Transverse
Underpass	Underpass

State

Domain	Description
NE	Nebraska
CO	Colorado
WY	Wyoming
SD	South Dakota
IA	Iowa
MO	Missouri
KS	Kansas

PointType

Domain	Description
1	Primary Structure
2	Primary Property Entrance
3	Secondary Structure
4	Secondary Property Entrance
5	Parcel Centroid
6	Other location in Parcel
7	Site
8	Geocoded from Street Centerlines
9	Other

AddressSource

Domain	Description
County911AL	County 911 Address List
CountyAP	County Address Points
CountyBF	County Building Footprint
CountyCP	County Common Places
CountyParcels	County Parcels
GDRAP	GDR Address Points
MunicipalAP	Municipal Address Points
MunicipalParcels	Municipal Parcels
StateAP	State Address Points
Other	Other

PrimaryPoint

Domain	Description
Y	Yes
N	No

StreetType (for both PreType and PostType) Additional commonly used street suffixes and abbreviations are located within the USPS Publication 28.

Domain	Description
Acrs	Acres
Aly	Alley
Anx	Annex
Arc	Arcade
Ave	Avenue
Bay	Bay
Bch	Beach
Bg	Burg
Bgs	Burgs
Blf	Bluff
Blfs	Bluffs
Blvd	Boulevard
Bnd	Bend
Br	Branch
Brg	Bridge
Brk	Brook
Brks	Brooks
Btm	Bottom
Byp	Bypass
Byu	Bayou
Chas	Chase
Cir	Circle
Cirs	Circles
Clb	Club
Clf	Cliff
Clfs	Cliffs
Clos	Close
Cmn	Common
Cmns	Commons
Cnrs	Corners
Cor	Corner
Cors	Corners

StreetType, continued

County Hwy	County Road
County Rte	County Touring Route
Cp	Camp
Cpe	Cape
Cres	Crescent
Crk	Creek
Crse	Course
Crst	Crest
Cswy	Causeway
Ct	Court
Ctr	Center
Ctrs	Centers
Cts	Courts
Curv	Curve
Cv	Cove
Cvs	Coves
Cyn	Canyon
Dl	Dale
Dm	Dam
Dr	Drive
Drs	Drives
Drwy	Driveway
Dv	Divide
End	End
Est	Estate
Ests	Estates
Expy	Expressway
Ext	Extension
Exts	Extensions
Fall	Fall
Farm	Farm
Fld	Field
Flds	Fields
Fls	Falls
Flt	Flat
Flts	Flats
Frd	Ford
Frds	Fords
Frg	Forge
Frgs	Forges
Frk	Fork
Frks	Forks
Frst	Forest
Fry	Ferry
Ft	Fort
Fwy	Freeway
Gate	Gate
Gdn	Garden
Gdns	Gardens
Gln	Glen
Glns	Glens
Grds	Grounds
Grn	Green
Grns	Greens
Grv	Grove
Grvs	Groves
Gtwy	Gateway
Hbr	Harbor
Hbrs	Harbors
Hl	Hill
Hls	Hills
Holw	Hollow
Hrbr	Harbor
Hts	Heights
Hvn	Haven
Hwy	Highway
I	Interstate
Inlt	Inlet
Is	Island
Isle	Isle
Iss	Islands
Jct	Junction
Jcts	Junctions
Knl	Knoll
Knls	Knolls
Ky	Key
Kys	Keys
Land	Land
Lck	Lock
Lcks	Locks
Ldg	Lodge
Lf	Loaf
Lgt	Light
Lgts	Lights
Lk	Lake
Lks	Lakes
Ln	Lane
Lndg	Landing
Loop	Loop
Mall	Mall
Mdw	Meadow
Mdws	Meadows
Mews	Mews
Ml	Mill
Mls	Mills
Mnr	Manor
Mnrs	Manors
Msn	Mission
Mt	Mount
Mtn	Mountain
Mtns	Mountains
Mtwy	Motorway
Nck	Neck
Opas	Overpass
Orch	Orchard
Otlk	Outlook
Oval	Oval
Ovlk	Overlook
Park	Park
Pass	Pass
Path	Path
Pike	Pike
Pkwy	Parkway
Pl	Place
Pln	Plain
Plns	Plains
Plz	Plaza
Pne	Pine
Pnes	Pines
Pr	Prairie
Prom	Promenade
Prt	Port

StreetType, continued

Prts	Ports
Psge	Passage
Pt	Point
Pts	Points
Radl	Radial
Ramp	Ramp
Rd	Road
Rdg	Ridge
Rdgs	Ridges
Rds	Roads
Rdwy	Roadway
Rise	Rise
Riv	River
Rnch	Ranch
Row	Row
Rpd	Rapid
Rpds	Rapids
Rst	Rest
Rte	Route
Rue	Rue
Run	Run
Shls	Shoals
Sho	Shoal
Shr	Shore
Shrs	Shores
Skwy	Skyway
Smt	Summit
Spg	Spring
Spgs	Springs
Spur	Spur
Sq	Square
Sqs	Squares
St	Street
Sta	Station
State Hwy	State Touring Highway
State Pkwy	State Parkway
State Rte	State Route
Stra	Stravenue
Strm	Stream
Sts	Streets
Ter	Terrace
Tlpk	Trailer Park
Tpke	Turnpike
Trak	Track
Trce	Trace
Trfy	Trafficway
TrkTrl	Truck Trail
Trl	Trail
Trlr	Trailer
Trwy	Thruway
Tunl	Tunnel
Turn	Turn
Twrs	Towers
Un	Union
Uns	Unions
Upass	Underpass
US Hwy	Federal Highway
US Rte	US Route
Vale	Vale
Via	Viaduct
Vis	Vista
Vl	Ville
Vlg	Village
Vlgs	Villages
Vls	Villas
Vly	Valley
Vlys	Valleys
Vw	View
Vws	Views
Walk	Walk
Wall	Wall
Way	Way
Ways	Ways
Wds	Woods
Wels	Wells
Wl	Well
Wood	Wood
Xing	Crossing
Xrd	Crossroad
Xrds	Crossroads

UnitType

Domain	Description
APT	Apartment
BSMT	Basement
	Blank, unable to determine
BLDG	Building
DEPT	Department
FL	Floor
FRNT	Front
HNGR	Hanger
KEY	Key
LBBY	Lobby
LOT	Lot
LOWR	Lower
OFC	Office
PH	Penthouse
PIER	Pier
REAR	Rear
RM	Room
SIDE	Side
SLIP	Slip
SPC	Space
STOP	Stop
STE	Suite
TRLR	Trailer
UNIT	Unit
UPPR	Upper

CountyFIPS

Domain	Description	Domain	Description	Domain	Description
1	Adams	63	Frontier	125	Nance
3	Antelope	65	Furnas	127	Nemaha
5	Arthur	67	Gage	129	Nuckolls
7	Banner	69	Garden	131	Otoe
9	Blaine	71	Garfield	133	Pawnee
11	Boone	73	Gosper	135	Perkins
13	Box Butte	75	Grant	137	Phelps
15	Boyd	77	Greeley	139	Pierce
17	Brown	79	Hall	141	Platte
19	Buffalo	81	Hamilton	143	Polk
21	Burt	83	Harlan	145	Red Willow
23	Butler	85	Hayes	147	Richardson
25	Cass	87	Hitchcock	149	Rock
27	Cedar	89	Holt	151	Saline
29	Chase	91	Hooker	153	Sarpy
31	Cherry	93	Howard	155	Saunders
33	Cheyenne	95	Jefferson	157	Scotts Bluff
35	Clay	97	Johnson	159	Seward
37	Colfax	99	Kearney	161	Sheridan
39	Cuming	101	Keith	163	Sherman
41	Custer	103	Keya Paha	165	Sioux
43	Dakota	105	Kimball	167	Stanton
45	Dawes	107	Knox	169	Thayer
47	Dawson	109	Lancaster	171	Thomas
49	Deuel	111	Lincoln	173	Thurston
51	Dixon	113	Logan	175	Valley
53	Dodge	115	Loup	177	Washington
55	Douglas	117	McPherson	179	Wayne
57	Dundy	119	Madison	181	Webster
59	Fillmore	121	Merrick	183	Wheeler
61	Franklin	123	Morrill	185	York

State of Nebraska
Nebraska Information Technology Commission
Standards and Guidelines

AMENDMENTS TO NITC 7-104

NITC 7-104 (Web Domain Name Standard) is amended as follows:

1. Section 1 is amended to read:

1. Standard

1.1
The official Nebraska ~~government domain is nebraska.gov~~state government domain names are nebraska.gov and ne.gov. The State CIO may also allow other domain names using the .gov top level domain.

1.2
All web domain name registrations, purchases, and renewals must be made by the Office of the CIO. Top level domain names other than .gov may be registered but cannot serve content or be publicly promoted. The domain state.ne.us is a supported legacy domain which may serve content but which should not be publicly promoted.
~~All public facing domains shall be registered as at least a third-level domain within the nebraska.gov domain. The third-level domain name shall uniquely identify the state agency or service. In addition to nebraska.gov, the domain ne.gov may be registered as an alternate domain to the corresponding nebraska.gov domain name.~~

1.3
All registered ~~nebraska.gov and ne.gov~~.gov domains ~~shall~~ must adhere to all federal .gov domain ~~registration requirements and~~policies and guidelines.

1.4
~~Domains other than nebraska.gov and ne.gov may be purchased but cannot serve content or be publicly promoted. The domain state.ne.us is a supported legacy domain which can serve content but which should not be publicly promoted.~~

~~**1.5**~~
Nonconforming domains in existence when this standard is adopted will be exempt from ~~the~~ these requirements ~~in Section 1.4~~ until December 31, 2014.

2. Effective January 1, 2015, Section 1.4 is repealed.

Nebraska Information Technology Commission

2015-2017 Biennial Budget Review Timeline

	Task	Due Date
1	IT Project Proposals due	9/15/2014
2	Projects posted on NITC website	9/17/2014
3	Project reviewers assigned and notice sent to Technical Panel	9/18/2014
4	Project proposals and scoring sheets sent to reviewers	9/19/2014
5	Completed scoring sheets due from reviewers	10/1/2014
6	Summary Sheets, with reviewer scores and comments, sent to submitting agencies for comment/response	10/6/2014
7	**State Government Council** meeting	10/9/2014
8	**Technical Panel** meeting	10/14/2014
9	**Education Council** meeting	10/15/2014
10	**eHealth Council** meeting	TBD
11	Agency comment/response due (optional)	10/17/2014
12	**NITC** meeting	TBD
13	**Report submitted to Governor and Legislature**	11/15/2014