

Exhibit L - High Cost project Worksheet (NOFA #008)

Purpose:

This form, labeled “Exhibit L – High-Cost Project Worksheet,” requires an Applicant to justify its average cost per passing when the cost per passing resides within the top 25% of all applications submitted to NOFA 8 (“High-Cost Threshold”).

It has been determined by the Office that the Application submitted falls within the High-Cost Threshold and seeks justification for the cost per passing indicated within the Core Application. The Office may use this information to determine the sufficiency of the cost and whether to disqualify an application exceeding the High-Cost Threshold.

Separate High-Cost Thresholds have been generated for wireless and wireline delivery platforms.

Applicants must provide additional information to the Office to justify the high deployment costs of their proposed project. This information may include a narrative (one page or less) describing contributing or exacerbating factors leading to the estimated total project costs as identified within the Core Application.

Organization Name: Harmony Telephone Company

Is rurality a contributing factor to high cost? If yes, please explain how the rurality of your deployment is contributing to high cost.

Rurality is a key component to this comprehensive cost analysis conducted by Finley Engineering. High level engineering designs approximate a total of 68.03 miles with only 121 eligible service locations; a ratio of 1.77 subscribers to every route mile indicates the area is extremely rural, furthering the need for long stretches of mainline distribution, longer drops to the household and more electronics such as pedestals spread across the proposed network. Additionally, many of the locations are requiring drops that are longer than normal, further contributing to the high cost per passing. Harmony Telephone Company interpreted the ITQ and V5 mapping process as an opportunity to identify rural areas in Iowa similar to the low-density process in Minnesota. The funds requested in the broadband intervention zone #89 South Leroy, are necessary to complete this project as without this process, it would be challenging to make a business case for this construction project given its rurality. Harmony Telephone Company is committed to serving the residents of Iowa regardless of rurality and has made lasting and frequent commitments to the betterment of rural broadband in the State of Iowa

Is topography a contributing factor to high cost? If yes, please explain how the topography of your project area is contributing to high cost.

The area is notorious for its difficult geologic and topographic terrain which has long been a deterrent for contractors and ISPs in the immediate area. Fiber being buried at traditionally 18-36” will have to be dug through a Bedrock of Limestone, Dolomite, and a mixture of both. The topsoil’s in this area range from soft loamy soils and clays from 0-60 sometimes 80" deep, however the shallow areas range around 20" of topsoil’s before hitting the Limestone beds. Attached are geologic maps in this region of Iowa to further the need for high-cost boring processes for both material and labor. The area used to be glacial ice that melted, producing large deposits of sedimentary limestone, dolomite and shale both of which allow for increased rock percentages in both labor and material as drill bits are worn quickly and labor is long.

We estimated 9% of cable footage will be bored for creeks & waterways. Our NOFA007 Winneshiek project as staked came in at 12% cable footage for this itemized expense. This project includes 2% of cable footage included for heavy rock such as limestone at $72 per ft. Winneshiek as staked came in at 3% cable footage. Regarding cobble and other softer rock, 3% of cable footage was included at a price point of $26.00. Winneshiek as staked came in at 5% cable footage. Harmony is also working in partnership with MiEnergy to utilize aerial builds to help minimize costs in this rugged terrain. This unique partnership will deploy lower cost quality networks to MiEnergy’s electric cooperative members. Attached are project maps and preliminary budgets to justify these high network costs.

Is the cost of the technology being used a contributing factor to high cost? If yes, please explain the technology being used and why this lends to high cost.

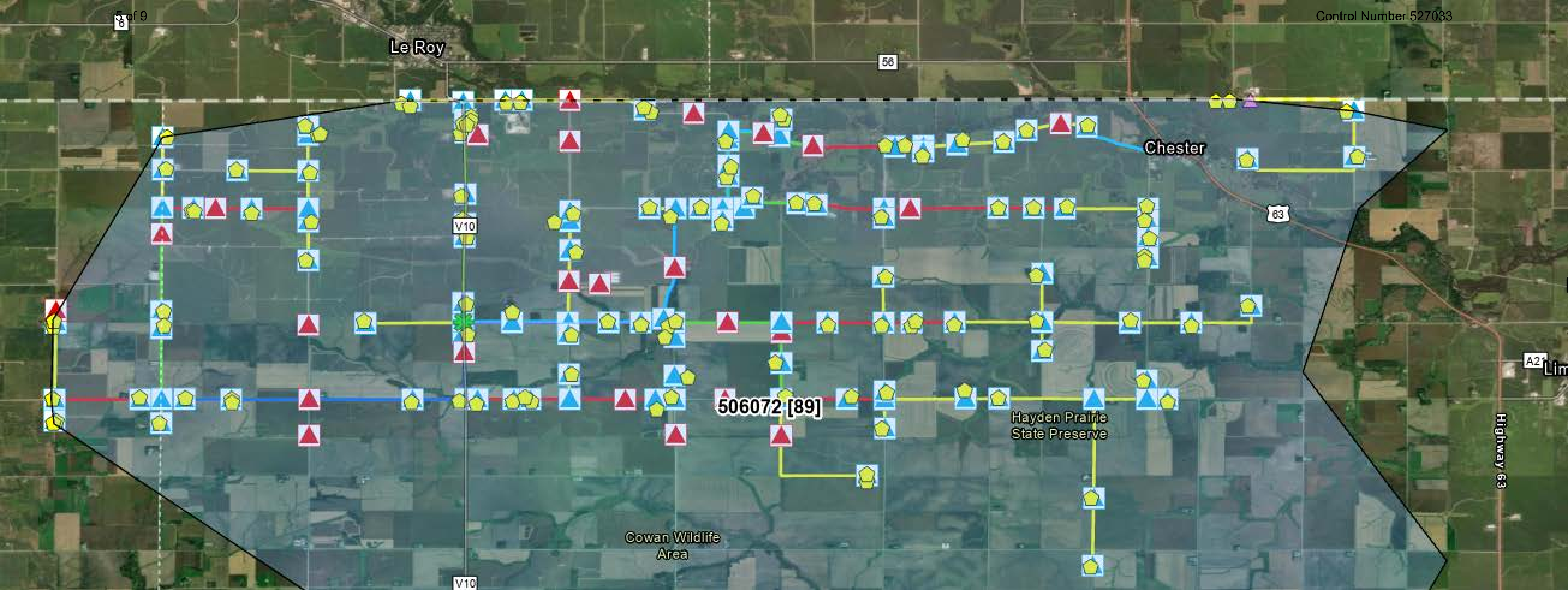
The proposed network is an FTTP XGS-PON network scalable to 10G/10G shared over a 1X32 split ratio. The rugged terrain makes a FTTP network the only viable way to deliver 100Mbps and above service to all locations in the area simultaneously. The downside is that fiber is the most expensive type of network to deploy, the rates for material, and labor associated with the installation of this network come from recent bids from the Winneshiek project that occurred in NOFA007 in a similar region of Iowa combined with other recent area projects. Decade high inflation, inventory availability concerns, and workforce shortages have all attributed to higher costs for similar goods and services juxtaposed to just last year. We have attached a unit cost summary, as well as the previous NOFA007 bid that was refenced indicative of corresponding percentages and pricing sheets for further analysis from the office. This project budget includes a small contingency rate built into its formula to account for these cost considerations, as well as accounting for future increase in both labor and material. Harmony works with Finley Engineering Inc. to develop designs and budgets for all of their projects. Attached are the high-level designs for this project.

Does your project contain a significant amount of Middle Mile that is contributing to high cost? If yes, please explain the distance and approximate location where your middle mile is coming from, the estimated cost of the middle mile portion of your project, and any other relevant information.

Despite Harmony’s proximity to this proposed area – there is a need for 9.5 miles of transport coming from a meet point in Chester to get to BIZ #89. The close proximity to a prior USDA ReConnect 2 award and a current MiEnergy Reconnect 4 award uniquely positions Harmony Telephone Company to build on existing mainline, employ dig once techniques, deploy resources and labor across projects, identifying potential network meet points in the immediate area. Middle mile and mainline costs are expected to decrease due to established partnerships with MiEnergy Electric Cooperative to maximize the use of ADSS aerial assets in the power space, when necessary, as a cost saving mechanism that can also lengthen the construction period window.

Applicants may also provide any additional information, documents or data sets that might further justify the High Cost of the proposed project.

All narrative and additional information should be submitted in a single PDF format named as: “Application Number -Applicant Name – Exhibit L.” Email the completed PDF to ociogrants@iowa.gov.



Le Roy
56
V10
Chester
63
506072 [89]
Hayden Prairie
State Preserve
A21
Highway 63
Cowan Wildlife
Area
V10

	Labor	Material	Ft Miles	Subs	Total
TOTAL SOUTH LEROY BIZ89					
FTTP DISTRIBUTION					
MAINLINE DISTRIBUTION	$3,845,912	$ 862,144	68.03	121	$ 4,708,056
SEBO4	$ 375,128	$ 21,421			$ 396,549
NID,GROUND, & SPLICE	$ 47,626	$ 18,929			$ 66,555
Cutover	$ 53,361	$ 17,787			$ 71,148
Electronics	$ 5,880	$ 139,325			$ 145,205
Permitting	$ 1,400	$ -			$ 1,400
SOUTH LEROY Total	**$4,329,307**	**$1,059,606**			**$ 5,388,913**
		CORE APP			$5,388,912.73
					$ (0)

	INCREASE 5% 2024 LABOR	5% MATERIAL	2023 CONTRACTS LABOR	MATERIAL
BA23	$ 49.35	$ 47.25	$ 47.00	$ 45.00
BDO5A	$ 357.00	$ 598.50	$ 340.00	$ 570.00
BM2(5/8)(8)	$ 28.35	$ 39.90	$ 27.00	$ 38.00
MISC	$ 5.00	$ 5.00	$ 5.00	$ 5.00
PED,POLE & GROUNDING	**$ 439.70**	**$ 690.65**		
BFO12W	$ 3.15	$ 0.58	$ 3.00	$ 0.55
BFO12(D)	$ 1.45	$ 0.58	$ 1.38	$ 0.55
BFO12I	$ 1.45	$ 0.58	$ 1.38	$ 0.55
BFO12IE	$ 1.97	$ 0.58	$ 1.88	$ 0.55
BFO24W	$ 3.15	$ 0.58	$ 3.00	$ 0.55
BFO24(D)	$ 1.45	$ 0.63	$ 1.38	$ 0.60
BFO24I	$ 1.45	$ 0.63	$ 1.38	$ 0.60
BFO24IE	$ 1.97	$ 0.63	$ 1.88	$ 0.60
BFO48W	$ 3.15	$ 0.74	$ 3.00	$ 0.70
BFO48(D)	$ 1.45	$ 0.74	$ 1.38	$ 0.70
BFO48I	$ 1.45	$ 0.74	$ 1.38	$ 0.70
BFO48IE	$ 1.97	$ 0.74	$ 1.88	$ 0.70
BFO96W	$ 3.15	$ 1.16	$ 3.00	$ 1.10
BFO96(D)	$ 1.58	$ 1.16	$ 1.50	$ 1.10
BFO96I	$ 1.58	$ 1.16	$ 1.50	$ 1.10
BFO96IE	$ 2.50	$ 1.16	$ 2.38	$ 1.10
BFO144W	$ 3.15	$ 1.63	$ 3.00	$ 1.55
BFO144(D)	$ 1.58	$ 1.63	$ 1.50	$ 1.55
BFO144I	$ 1.58	$ 1.63	$ 1.50	$ 1.55
BFO144IE	$ 2.50	$ 1.63	$ 2.38	$ 1.55
BFO288W	$ 3.15	$ 2.63	$ 3.00	$ 2.50
BFO288(D)	$ 1.58	$ 2.63	$ 1.50	$ 2.50
BFO288I	$ 1.58	$ 2.63	$ 1.50	$ 2.50
BFO288IE	$ 2.50	$ 2.63	$ 2.38	$ 2.50
BFOV(1-1.25)PLOW	$ 6.30	$ 1.16	$ 6.00	$ 1.10
BFOV(1-1.25)	$ 13.23	$ 1.16	$ 12.60	$ 1.10
BFOV(2-1.25)	$ 14.18	$ 2.31	$ 13.50	$ 2.20
BFOV(3-1.25)	$ 15.12	$ 3.47	$ 14.40	$ 3.30
BM53	$ 31.50	$ 49.35	$ 30.00	$ 47.00
BM60(1.25)	$ 14.49	$ 1.16	$ 13.80	$ 1.10
BM60(1.25)R	$ 71.93	$ 1.16	$ 68.50	$ 1.10
BM60(1.25)COBBLE	$ 25.73	$ 1.16	$ 24.50	$ 1.10
BM71	$ 25.73	$ -	$ 24.50	$ -
BM72	$ 31.50	$ 39.90	$ 30.00	$ 38.00
BM73	$ 31.50	$ 42.00	$ 30.00	$ 40.00
HO1	$ 44.10	$ 0.53	$ 42.00	$ 0.50
BHF (##x##x##)	$ 672.00	$ 1,869.00	$ 640.00	$ 1,780.00
HBFO(*)	$ 299.25	$ 703.50	$ 285.00	$ 670.00
BM2(5/8)(8)	$ 28.35	$ 39.90	$ 27.00	$ 38.00
BM55	$ 52.50	$ 115.50	$ 50.00	$ 110.00
HAND HOLE W/ SPLICE CASE	**$ 1,052.10**	**$ 2,727.90**		
BHF (##x##x##)	$ 504.00	$ 2,020.31	$ 480.00	$ 1,924.10
HBFO(*)			$ 285.00	$ 670.00
BM2(5/8)(8)			$ 50.00	$ 35.62
BM55	$ 52.50	$ 115.50	$ 50.00	$ 110.00
HAND HOLE ONLY	**$ 556.50**	**$ 2,135.81**		
UNKNOWNS	$ 100.00	$ 100.00		

SEB04	$ 6.83	$ 0.39	$ 6.50	$ 0.37
NID	$ 91.35	$ 57.75	$ 87.00	$ 55.00
BM83	$ 21.00	$ 7.88	$ 20.00	$ 7.50
BM2	$ 24.15	$ 31.50	$ 23.00	$ 30.00
HO1P	$ 131.25	$ 9.29	$ 125.00	$ 8.85

COST ASSUMPTIONS

BM60R - Hard Rock	2%	of total cable footage
BM71 - Cobble	3%	of total cable footage
BM60 - directional bores, driveways, creeks,...	9%	of total cable footage
BFOV(1-1.25)PLOW -Direct Buried Pipe	10%	of total cable footage

BEDROCK GEOLOGIC MAP OF IOWA

1:500,000

Iowa Geological and Water Survey
Open File Map OFM-2010-01
March 2010

Primary Map Compilation By

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Iowa Geological and Water Survey, Iowa City, Iowa

Iowa Geological and Water Survey
Robert D. Libra, State Geologist

Iowa Department of Natural Resources
Richard Leopold, Director

ACKNOWLEDGEMENTS

Recognized for significant contributions to the map's production: Bill J. Bunker, James D. Giglierano, Greg A. Ludvigson, Robert M. McKay, Huaibao P. Liu, and Thomas R. Marshall.

Supported in part with funding from the U.S. Geological Survey - National Cooperative Geologic Mapping Program.

EXPLANATION

CRETACEOUS

- **Kmt** — Manson Impact Structure, Terrace Terrane (breccia)
- **Kmm** — Manson Impact Structure, Crater Moat (shaly breccia)
- **Kmc** — Manson Impact Structure, Central Peak (breccia; basement-rock megabreccia)
- **Kn** — Niobrara Formation (shale)
- **Kf** — Fort Benton Group (shale, chalk)
- **Kd** — Dakota and Windrow Formations (sandstone, shale)

JURASSIC

- **Jf** — Fort Dodge Formation (gypsum, redbeds)

PENNSYLVANIAN

- **Pw** — Wabaunsee Group (shale, limestone)
- **Ps** — Shawnee Group (limestone, shale)
- **Pd** — Douglas Group (shale, limestone, sandstone)
- **Pl** — Lansing Group (limestone, shale)
- **Pk** — Kansas City Group (limestone, shale)
- **Pb** — Bronson Group (limestone, shale)
- **Pm** — Marmaton Group (shale, limestone)
- **Pcu** — Upper Cherokee Group (shale, sandstone, limestone)
- **Pcl** — Lower Cherokee Group and Raccoon Creek Group (shale, sandstone)

MISSISSIPPIAN

- **Ms** — "St. Louis" and Pella Formations (dolomite, limestone, sandstone)
- **Ma** — Augusta Group (dolomite, limestone, chert)
- **Mg** — Gilmore City Formation (limestone, dolomite)
- **Mk** — Kinderhookian Formations (dolomite, limestone, siltstone)

DEVONIAN

- **Df** — Famennian Formations (shale, siltstone, dolomite)
- **Dl** — Lime Creek and Sweetland Creek Formations (shale, limestone)
- **Dc** — Cedar Valley Group (dolomite, limestone)
- **Dw** — Wapsipinicon Group (dolomite, limestone, anhydrite)

SILURIAN

- **Sg** — Gower Formation (dolomite)
- **Ss** — Scotch Grove Formation (dolomite, chert)
- **Sh** — Hopkinton, Blanding, Tete des Morts, Mosalem Formations (dolomite, chert)
- **Sl** — LaPorte City Formation (limestone, chert)
- **Sw** — Waucoma Formation (limestone)

ORDOVICIAN

- **Om** — Maquoketa Formation (shale, dolomite)
- **Og** — Galena Group and Platteville Formation (dolomite, shale, chert)
- **Op** — Prairie du Chien Group and St. Peter Sandstone (dolomite, sandstone)

CAMBRIAN

- **Cj** — Jordan Sandstone, St. Lawrence and Lone Rock Formations (sandstone, dolomite)
- **Cw** — Wonewoc Formation (sandstone)
- **Ce** — Eau Claire Formation (sandstone, shale)
- **Cm** — Mt. Simon Sandstone (sandstone)

PRECAMBRIAN

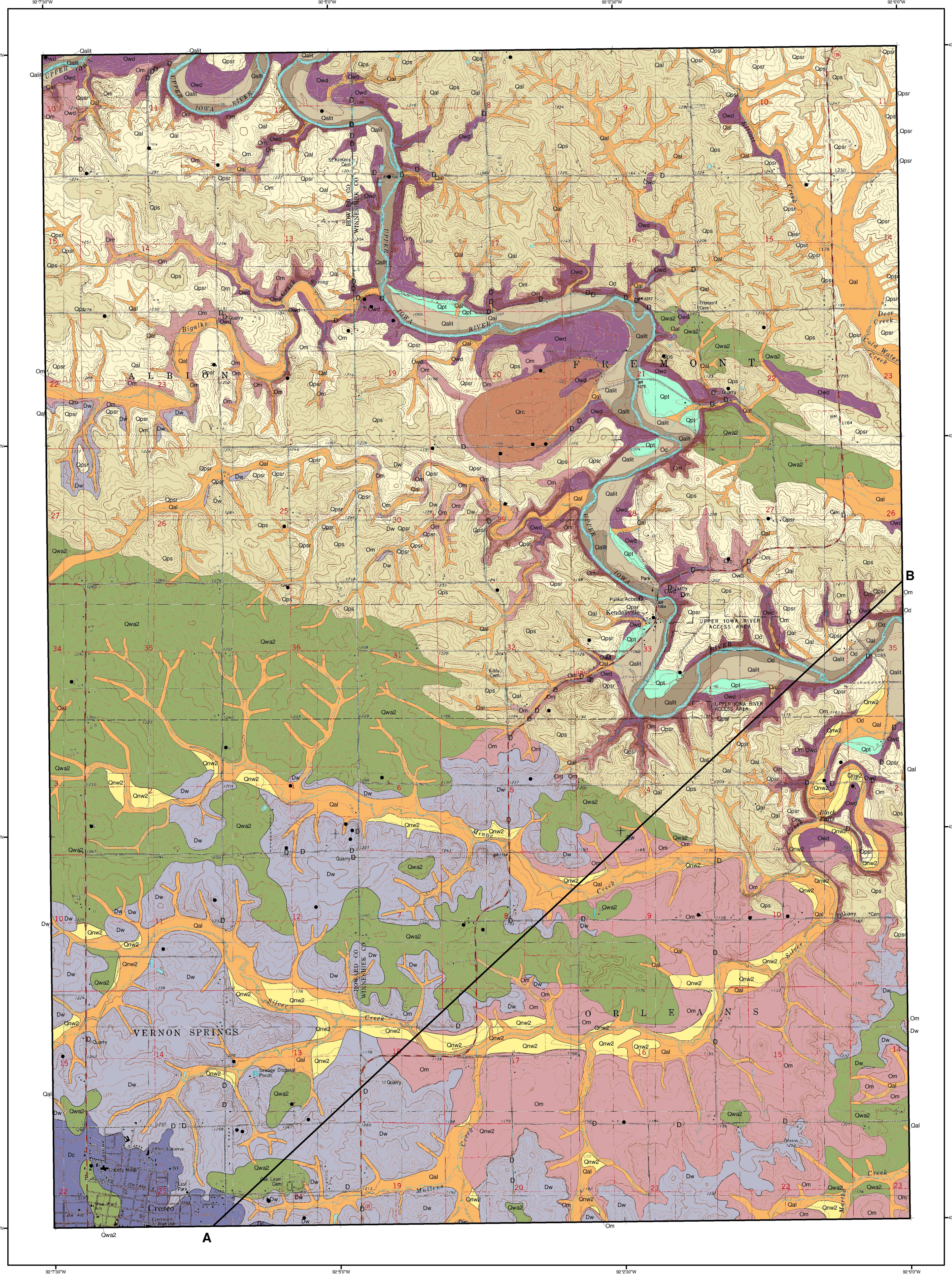
- **Xs** — Sioux Quartzite (quartzite)

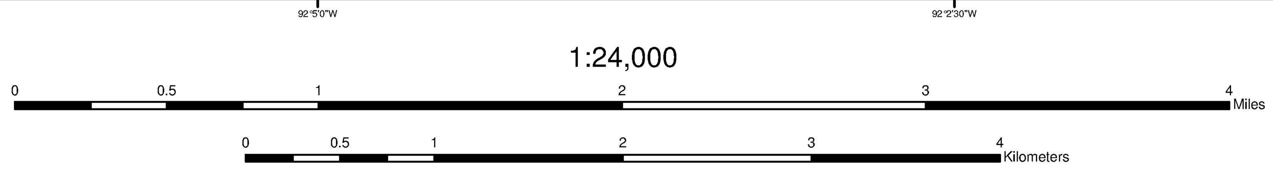
U / D — fault (U - upside, D - downside)

fault buried by Kd

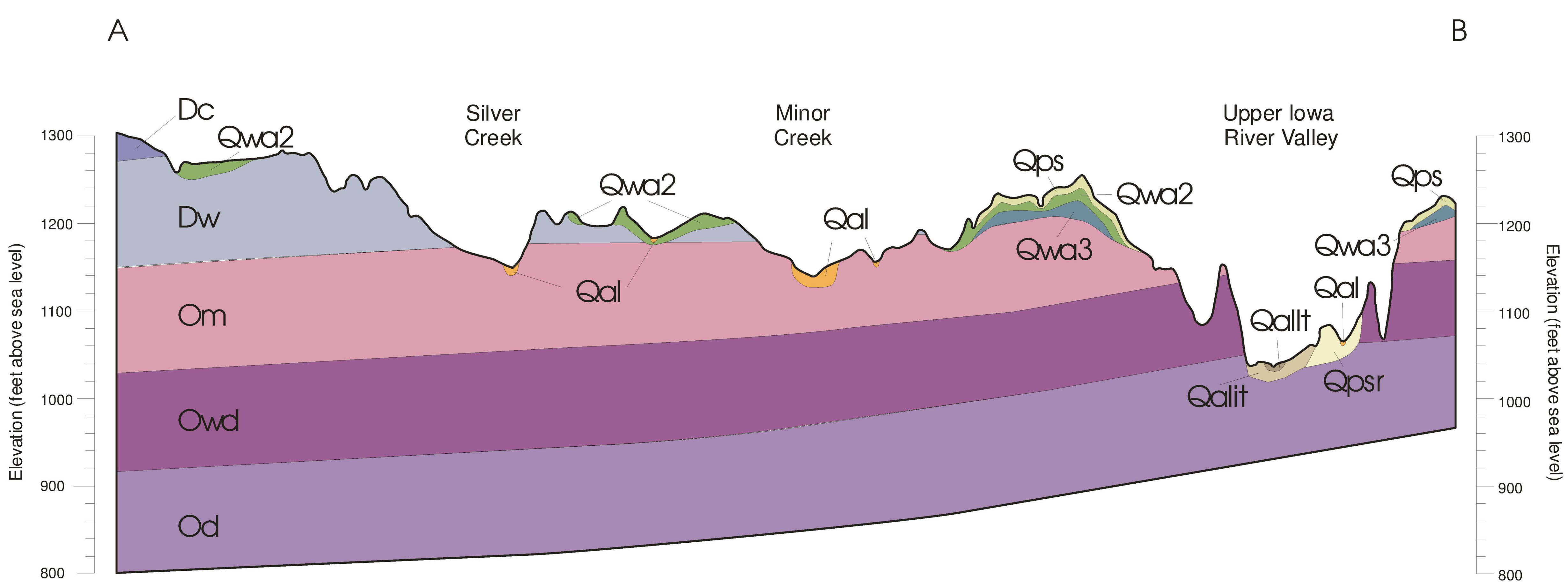
Transparent shades of gray show the bedrock surface as it would be illuminated by an artificial light source coming from the NW direction.

Surficial Geology of the Cresco NE (Iowa) 7.5' Quadrangle





GEOLOGIC CROSS-SECTION A-B



Base map from USGS Cresco NE 7.5' Digital Raster Graphic (IGS GIS file DRGB38.TIF) which was scanned from the Cresco NE 7.5' Topographic Quadrangle map, published by US Geological Survey in 1981 Topographic contours and land features based on 1975 aerial photography, field checked in 1977 Land elevation contours (20' interval) based on NGVD 1929.

Iowa Geological Survey digital cartographic file Cresco_NEquad08_surficial.mxd, version 8/18/08 (ArcGIS 9.2) Map projection and coordinate system based on Universal Transverse Mercator (UTM) Zone 15, datum NAD83.

The map and cross section are based on interpretations of the best available information at the time of mapping. Map interpretations are not a substitute for detailed site specific studies.

LEGEND

CENOZOIC

QUATERNARY SYSTEM

HUDSON EPISODE

Qal

Qal - Alluvium (De Forest Formation-Undifferentiated) One to four meters (3 – 13 ft) of massive to weakly stratified, grayish brown to brown loam, silt loam, clay loam, or loamy sand overlying less than three meters (10 ft) of poorly to moderately well sorted, massive to moderately well stratified, coarse to fine feldspathic quartz sand, pebbly sand, and gravel and more than three meters (10 ft) of pre-Wisconsin or late Wisconsin Noah Creek Formation sand and gravel. Also includes colluvium derived from adjacent map units in stream valleys, on hillslopes, and in closed depressions. Seasonal high water table occurs in this map unit.

Qallt

Qallt - Upper Iowa River Valley - Low Terrace/Modern Channel Belt (DeForest Formation-Camp Creek Member and Roberts Creek Member) Variable thickness of less than 1 m to 5 m (3 – 16 ft) of very dark gray to brown, noncalcareous, stratified silty clay loam, loam, or clay loam, associated with the modern channel belt of the Upper Iowa River valley. Ox-bow lakes and meander scars are common features associated with this terrace level. Post-settlement alluvium thickness varies from 0.5 m (1.5 ft) in higher areas to 2 m (6.5 ft) along the river course and in lower lying areas. Seasonal high water table and frequent flooding potential.

Qalit

Qalit - Upper Iowa River Valley - Intermediate Terrace (DeForest Formation-Camp Creek Member, Roberts Member and Gunder Member) Variable thickness of less than 1 m to 5 m (3 – 16 ft) of very dark gray to brown, noncalcareous, stratified silty clay loam to loam that overlies calcareous, medium- to coarse-grained sand and gravel of Wisconsinan (Noah Creek Formation) and/or pre-Wisconsinan age. Occupies low terrace position. Seasonal high water table and frequent flooding potential.

HUDSON AND WISCONSIN EPISODE

Qnw2

Qnw2 – Sand and Gravel (Noah Creek Formation) Two to eighteen meters (6.5-59 ft) of yellowish brown to gray, poorly to well sorted, massive to well stratified, coarse to fine feldspathic quartz sand, pebbly sand and gravel with few intervening layers of silty clay. Along many valleys a thin mantle of loess, reworked loess, or fine-grained alluvium (Qal) may be present. This unit includes silty colluvial deposits derived from the adjacent map units. In places this unit is mantled with one to three meters of fine to medium, well sorted medium to fine sand derived from wind reworking of the alluvium. This unit encompasses deposits that accumulated in low-relief stream valleys during the Wisconsin Episode and Hudson Episode. Seasonal high water table and some potential for flooding.

WISCONSIN EPISODE

Qpt

Qpt – Loess Mantled High Terrace - either Late Phase or Early Phase (Peoria Formation – silt and/or sand facies) Two to seven meters (6.5-23 ft) of yellowish brown to gray, massive, jointed, calcareous or noncalcareous, silt loam and intercalated fine to medium, well sorted sand. May grade downward to poorly to moderately well sorted, moderately to well stratified, coarse to fine feldspathic quartz sand, pebbly sand, loam, or silt loam alluvium (Late Phase) or may overlie a Farmdale Geosol developed in Roxanna Silt which in turn overlies a well-expressed Sangamon Geosol developed in poorly to moderately well sorted, moderately to well stratified, coarse to fine sand, loam, or silt loam alluvium (Early Phase).

Qps

Qps - Loess (Peoria Formation—silt facies) Generally 2 m to 8 m (6 – 27 ft) of yellowish to grayish brown, massive, jointed noncalcareous grading downward to calcareous silt loam to silty clay loam. May be loamy near the boundary with the erosion surface. Overlies massive, fractured, loamy glacial till of the Pre-Illinoian Wolf Creek or Alburnett formations with or without intervening clayey Farmdale/Sangamon Geosol. In most areas the Pre-Illinoian till is 1 m to 5 m (3 – 16 ft) thick, but may be up to 8 m (27 ft) thick locally. This mapping unit encompasses upland divides, ridge-tops and convex-side slopes. Well to somewhat poorly drained landscape.

Qpsr

Qpsr - Loess over bedrock (Peoria Formation—silt facies) Generally 2 to 8 m (6 – 27 ft) of yellowish to grayish brown, massive, jointed noncalcareous grading downward to calcareous silt loam to silty clay loam. Overlies bedrock units or colluvium. This mapping unit encompasses upland divides, ridge-tops and convex side-slopes. Well to somewhat poorly drained landscape.

Qwa2

Qwa2 - Loamy and Sandy Sediment Shallow to Glacial Till (sediment associated with erosion surface) One to three meters (3 – 10 ft) of yellowish brown to gray, massive to weakly stratified, well to poorly sorted loamy, sandy and silty erosion surface sediment. Map unit includes some areas mantled with less than two meters (6.5 ft) of Peoria Formation- silt (loess) or sand facies. Overlies massive, fractured, firm glacial till of the Wolf Creek and/or Alburnett formations. Seasonally high water table may occur in this map unit.

Qwa3

Qwa3 – Till (Wolf Creek or Alburnett Formations) Generally one to ten meters (3 to 33 feet) of very dense, massive, fractured, loamy glacial till of the Wolf Creek or Alburnett Formations with or without a thin loess mantle (Peoria Formation—less than 2 meters) or thin loamy sediment mantle (unamed erosion surface sediment) may overlie intervening clayey Farmdale/ Sangamon Geosol. This mapping unit can be buried by unnamed erosion surface sediments, loess or alluvium and is shown only in the cross-section.

PLEISTOCENE UNDIFFERENTIATED

Qrc

Qrc - Rock Core Meanders/Structural Benches Includes rock core meanders associated with Pre-Wisconsin river development and terrace deposits overlying bedrock benches. Some areas occupy positions as much as 10m (33 ft) above the modern floodplain. Consists of undifferentiated alluvial and colluvial fill up to 6 meters (20 ft) in thickness of unknown age. May be mantled by 1 to 3 m (3-10 ft) of Peoria Formation- silt facies (loess).

PALEOZOIC

DEVONIAN SYSTEM

Dc

Dc - Dolomite and Limestone (Cedar Valley Group) The lowest subdivision of this map unit, the Little Cedar Formation, occurs in the southwest corner of the quad and attains a thickness up to 12 m (40 ft). It is dominated by slightly argillaceous to argillaceous dolomite and dolomitic limestone, commonly fossiliferous and vuggy, and partially laminated.

Dw

Dw - Dolomite, Limestone, Shale, and minor Sandstone (Wapsipinicon Group) This map unit includes the Spillville Formation, up to 27 m (89 ft), overlain by the Pinicon Ridge Formation, up to 11 m (36 ft), for a maximum total thickness up to 38 m (125 ft). The Spillville Formation is dominated by medium to thick bedded dolomite, with scattered to abundant fossil molds, and vugs commonly filled with calcite crystals; basal portion is sandy or silty; a distinctive stromatolitic limestone facies occurs locally in the upper part. The Spillville is quarried for local aggregate and also hosts numerous small springs. The Pinicon Ridge Formation is dominated by shaly, laminated or brecciated, unfossiliferous limestone and dolomite.

ORDOVICIAN SYSTEM

Om

Om - Shale, Limestone, and Dolostone (Maquoketa Formation) A nonresistant slope-forming map unit up to 40 m (131 ft) composed of variably cherty, interbedded argillaceous limestone, dolostone and grey and brown shale. Fragmentary trilobite and graptolite fossils are common in the basal Elgin Limestone Member, and chert nodules are notable in the middle Fort Atkinson Member. It forms an upper confining unit that bounds a karst system in underlying Dubuque,Wise Lake and Dunleith formations of the Galena Group, and may host sinkholes in its lower portion.

Owd

Owd - Limestone and minor Shale (Wise Lake Formation and overlying Dubuque Formation, both of the Galena Group) A prominent ledge and cliff-forming unit of up to 31 m (102 ft) of limestone with notable thin interbedded shale in the upper 6 m. This map unit is the upper of two successive major cavern and karst-forming bedrock units in the area. The Wise Lake Formation consists of 21 m (67 ft) of medium to thick-bedded relatively chert-free limestone, portions of which exhibit a distinctive bioturbated fabric; serves as a source of concrete aggregate. The Dubuque Formation consists of 10 m (34 ft) of crinoidal limestones and thin interbedded shale. Sinkholes are common to abundant within this map unit.

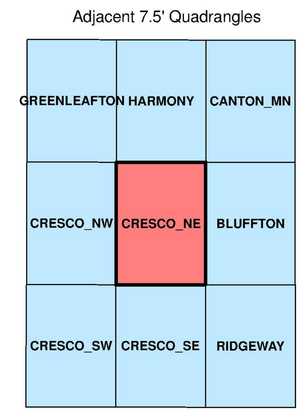
Od

Od - Limestone (Dunleith Formation of the Galena Group) A prominent ledge and cliff-forming unit of up to 42 m (137 ft) of limestone with minor thin interbedded shale. This is the lower of two successive major cavern and karst-forming bedrock units in the area. The formation consists of fossiliferous limestone and argillaceous limestone with common chert nodules; it is commonly quarried for aggregate. Major springs occur near the base, and sinkholes and karst features are common.

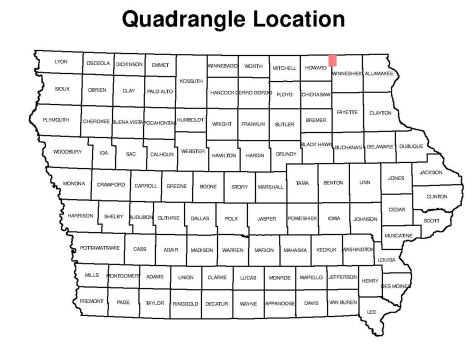
• **Drill Holes**

D **Outcrops**

Adjacent 7.5' Quadrangles



Quadrangle Location



GEOLOGIC MAPPING OF THE UPPER IOWA RIVER WATERSHED: PHASE 4: Cresco NE 7.5' Quadrangle

Iowa Geological Survey
Open File Map 08-2
August 2008

prepared by

Stephanie Tassier-Surine, Huaibao Liu, Robert McKay and James D. Giglierano

Iowa Geological Survey, Iowa City, Iowa

Iowa Department of Natural Resources, Richard A. Leopold, Director
Iowa Geological Survey, Robert D. Libra, State Geologist

Supported in part by the U.S. Geological Survey
Cooperative Agreement Number 07HQAG0087
National Cooperative Geologic Mapping Program (STATEMAP)

ACKNOWLEDGMENTS

We thank the staff of the Northeast Iowa RC & D for their efforts in helping to initiate this mapping project and for supporting our work in the Upper Iowa River watershed. New subsurface geologic data was generated by the University of Iowa students Thomas Marshall and Kelly Wilhelm who produced descriptive logs of water well drill samples. Luther College in Decorah actively participated in the project through subcontract 07-7380-01 for field mapping support. Luther College students Gabriel Demuth and Carl Haakenstad were participants in field and office work in support of the mapping effort. Birgitta Meade of Luther College was instrumental in accurately locating and elevating water wells in the map area. Drilling in selected sites was provided under contract by Aquadrill, Inc. of Swisher, Iowa. Special thanks to the landowners who graciously allowed access to their land for drilling: Craig and Laurie Ollendieck, Randy Greenslade, John Smith, Ray Ferrie and Roger and Kari Ferrie. Deborah Quade, Iowa Geological Survey (IGS) lent support with Quaternary field and office expertise; Robert Rowden (IGS) participated in part of the field work; Amy Sabin (IGS) prepared well samples for stratigraphic logging; Brian Witzke (IGS) provided valued information concerning the Ordovician and Devonian stratigraphy of the area; and Andy Asell and Chris Kahle (IGS) provided GIS mapping technical help. Assistance obtaining drilling records and geologic information was provided by Dave Stanley and staff at Bear Creek Archaeology.