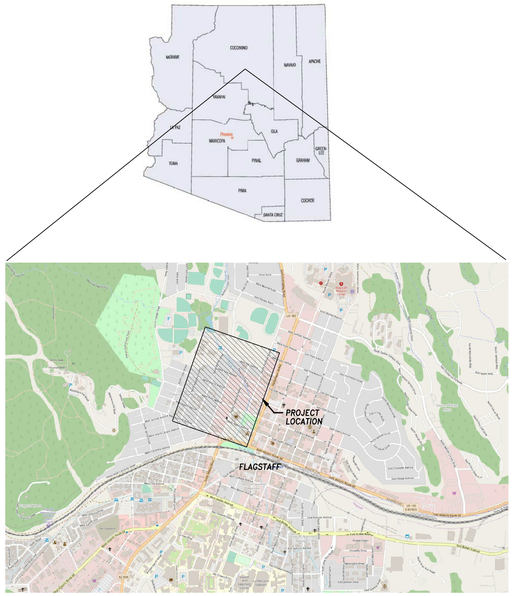
Rio de Flag Low Flow Channel Concept Development

Proposed Channel in Conjunction with USACE Flood Control Project



NORTH LOCATION MAP
T21N R7E Section 16
Coconino County, Arizona

Prepared for:

City of Flagstaff
211 W. Aspen Ave, Flagstaff, AZ 86001
Project Manager: Trevor Henry

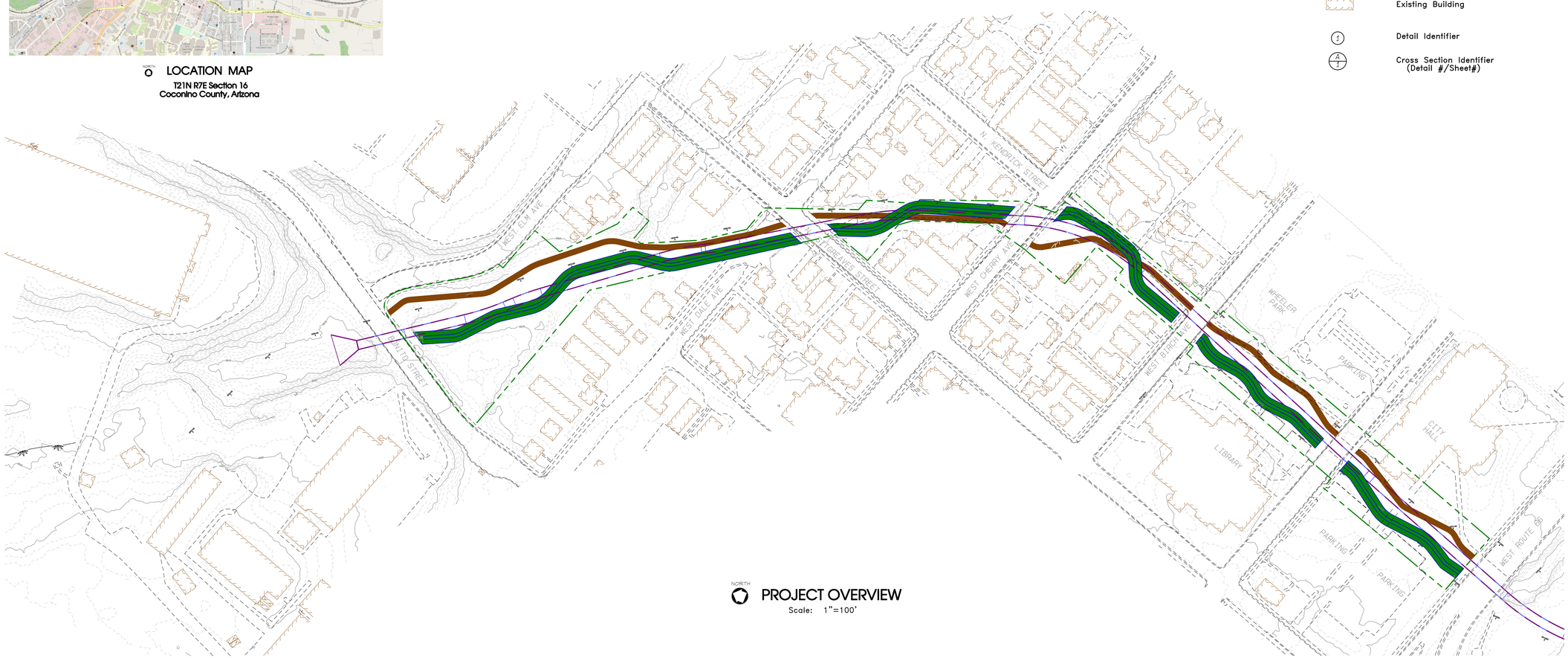
PRELIMINARY

INDEX OF DRAWINGS

SHEET NO.	TITLE
1	COVER SHEET: Title, Vicinity Map
2	Concept Plan/Profile – Frances Short Pond to Bonito Street
3	Concept Plan/Profile – Bonito Street to Sitgreaves Street
4	Concept Plan/Profile – Sitgreaves Street to Birch Avenue
5	Concept Plan/Profile – Birch Avenue to Route 66
6	Typical Cross Sections & Details

DRAWING LEGEND

- Major Contours (Exist)
- Minor Contours (Exist)
- Major Contours (Design)
- Minor Contours (Design)
- Rio de Flag Right-of-Way
- Proposed Low Flow Channel
- Proposed FUTs Alignment
- Existing Building
- Detail Identifier
- Cross Section Identifier (Detail #/Sheet#)



NORTH PROJECT OVERVIEW
Scale: 1"=100'

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DRAWING NUMBER: CVR01
SHEET NUMBER: 1 of 6
DATE: 18 SEP 2019
NCD PROJECT NUMBER: 19-327AZ

PRELIMINARY NOT FOR CONSTRUCTION

FEASIBILITY ANALYSIS
RIO DE FLAG LOW FLOW CHANNEL

TITLE, COVER AND PROJECT OVERVIEW

DRAWN BY: J
DESIGNED BY:
REVIEWED BY:

NO.	DATE	BY	REVISION

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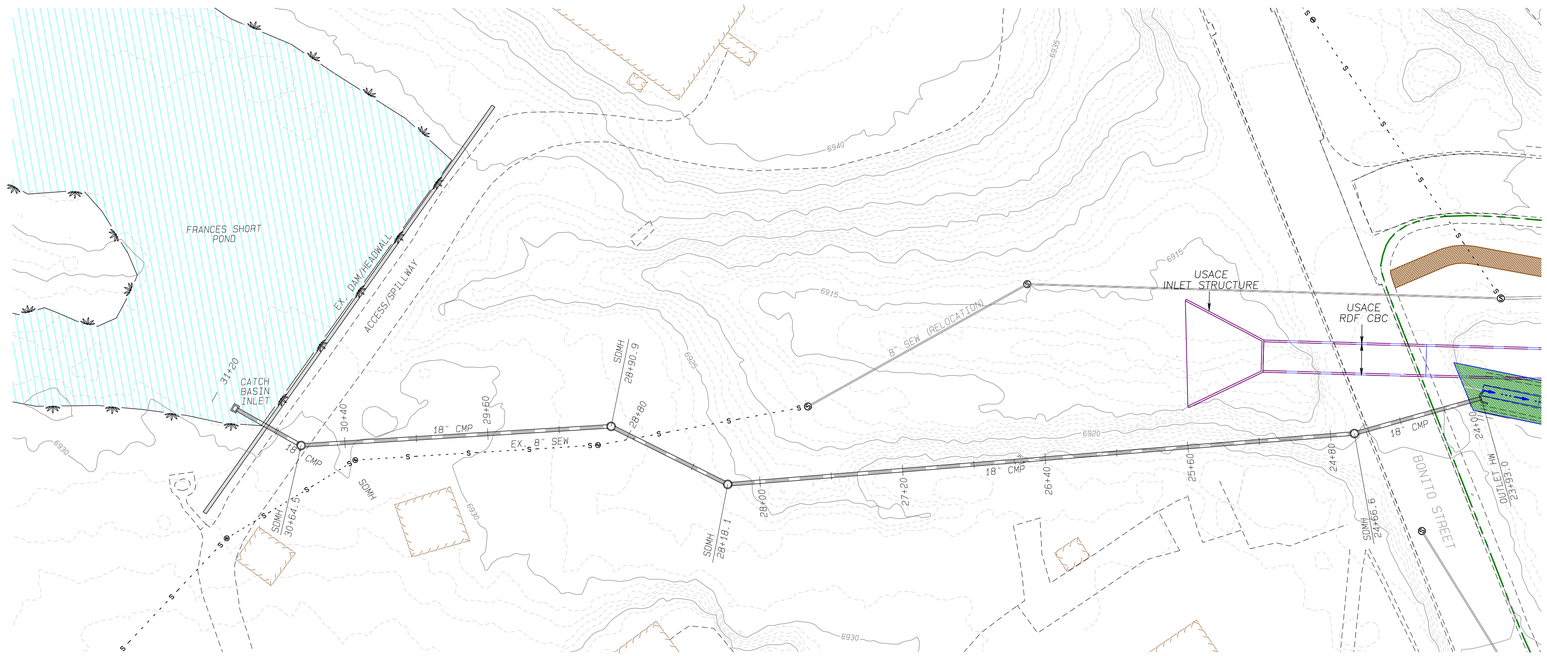
Flagstaff, Arizona 86004
(928) 774-2336

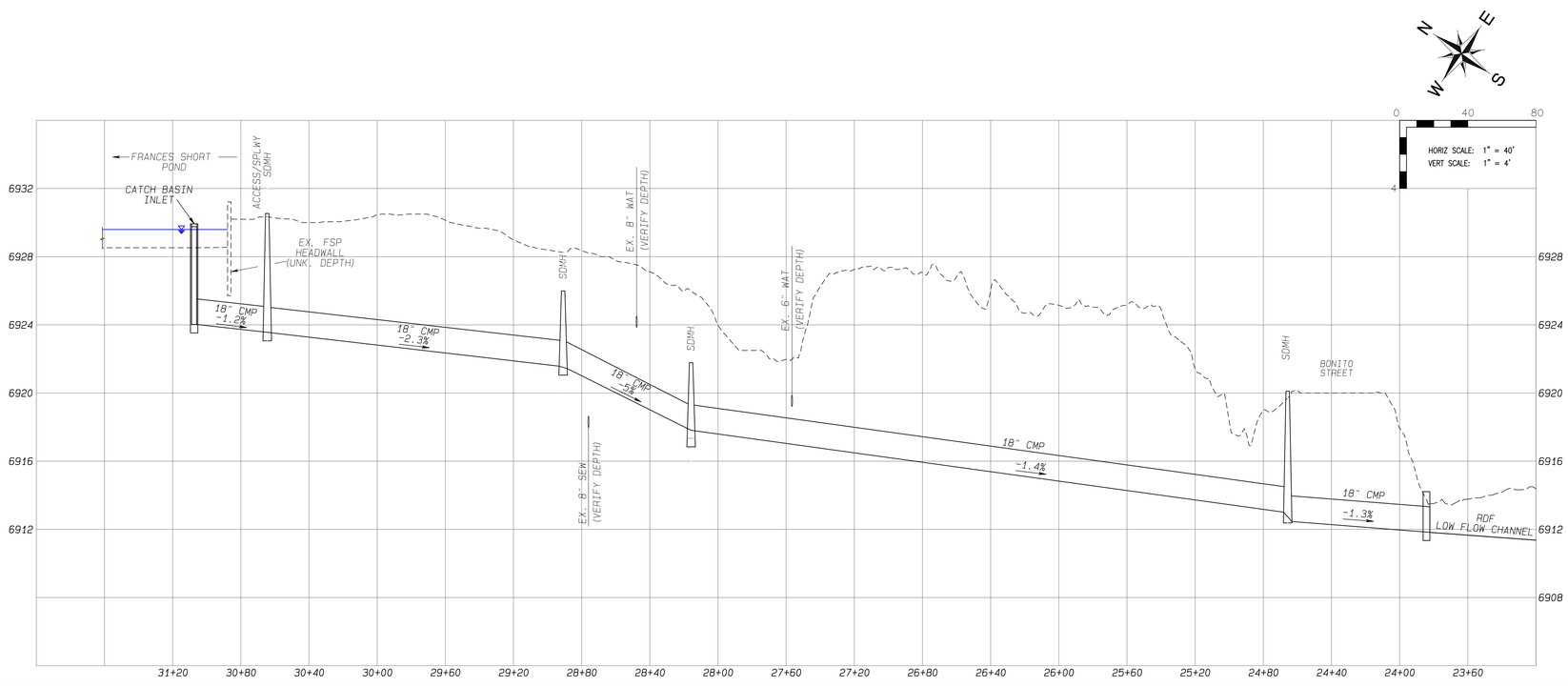


NOTES:

> Delivery system for base flow and seasonal flow to down stream open channel is proposed to be provided via grated inlet weir/catch basin in Frances Short Pond and delivered via storm drain to downstream side of Bonito Street.

> Pipe system intended to minimize disturbance to existing riparian habitat within this reach of the Rio de Flag and provide a means for metering flow to the downstream reaches.

> Verification of sewer depth and other possible utilty crossings is needed prior to moving past conceptual design. The existing sewer lines shown per COF GIS. Sewer relocatoin per plans/information provided by SWI.



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NCD PROJECT NUMBER: 19-327AZ
DRAWING NUMBER: PL01
SHEET NUMBER: 2 of 6

PRELIMINARY NOT FOR CONSTRUCTION

FEASIBILITY ANALYSIS
RIO DE FLAG LOW FLOW CHANNEL

PLAN/PROFILE
FRANCES SHORT POND TO BONITO STREET

DRAWN BY: J
DESIGNED BY:
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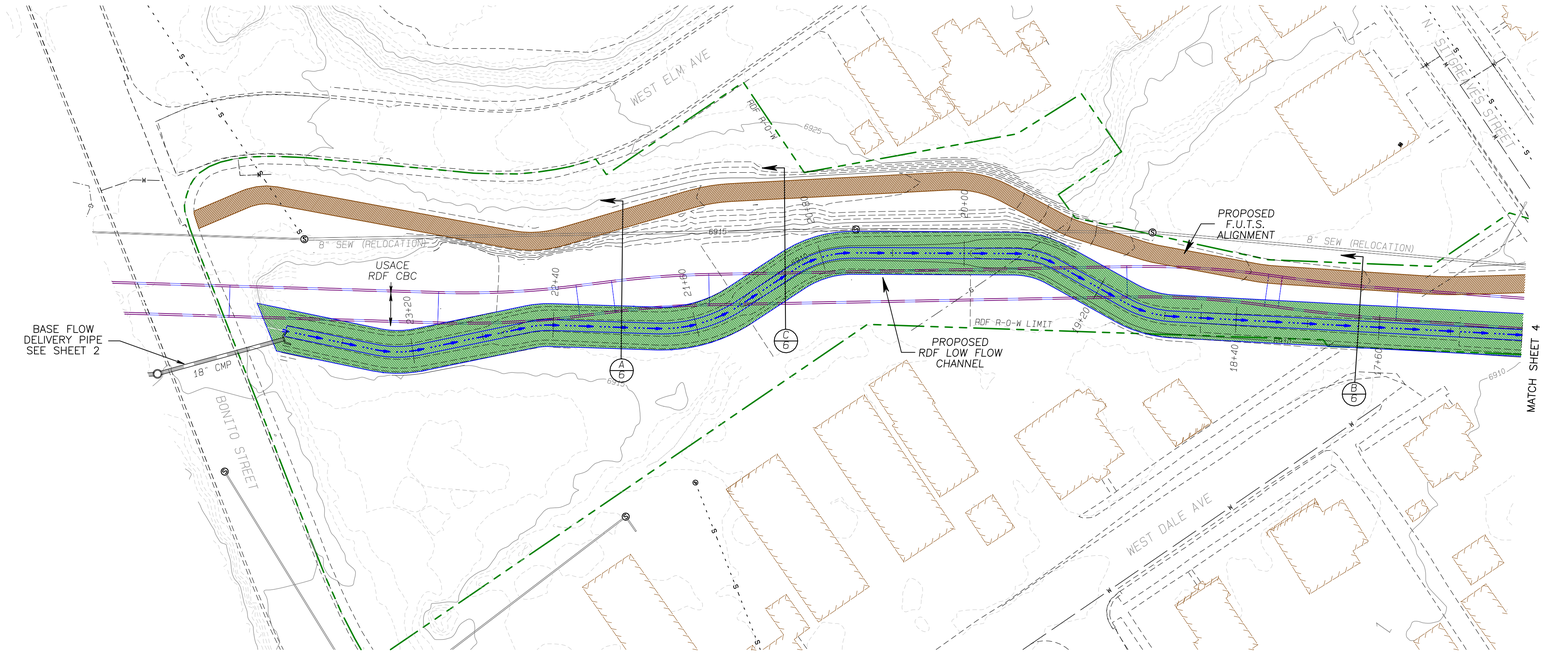
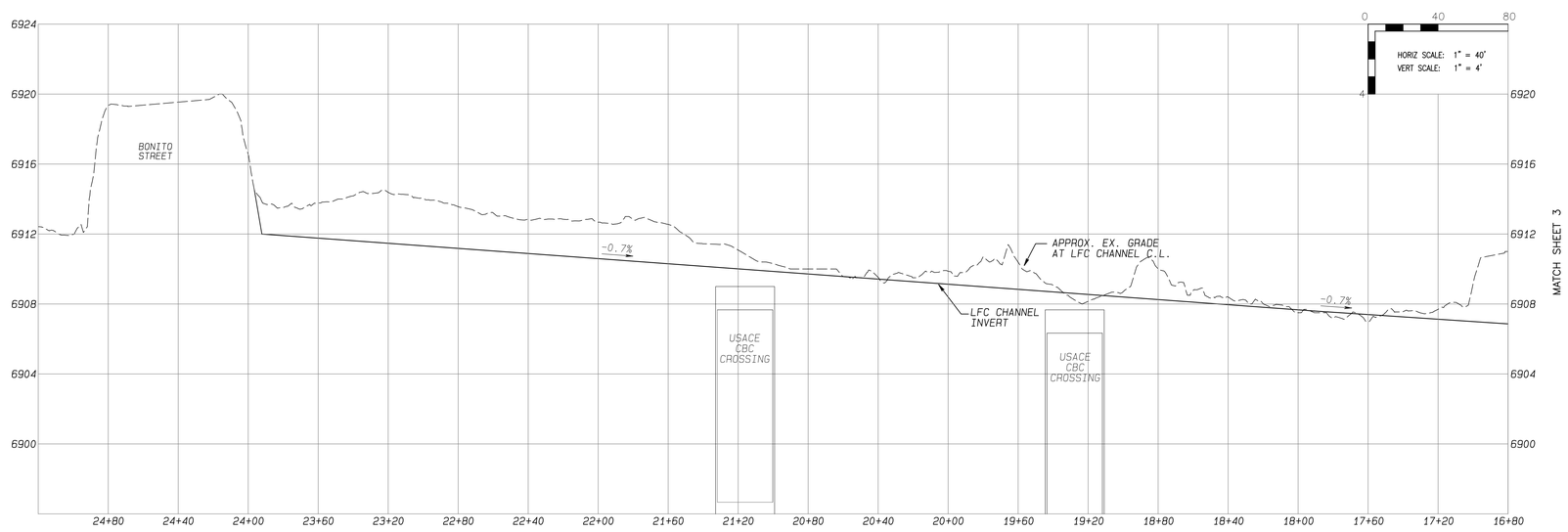


BONITO TO SITGREAVES



NOTES:

> Some limits of grading/tie slopes may extend outside the limits of the RDF right-of-way and will require a Temporary Construction Easement across those affected parcels.

> Passage of seasonal base flow below cross streets is proposed to be accomplished with pipe culvert capable of passing the ~10 cfs seasonal flow with any any accumulated storm excess passed to flood control box culvert via overflow grates/catch basins.

> FUTS Trail alignment is intended to be above the flow level of the channel at maximum design flow.

> The existing sewer lines per COF GIS information are shown. Plans by SWI provide information/detail of required relocation of sewer and other utilities relative to the USACE box culvert construction.

> See Sheet 6 for concept level design channel characteristics.

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DATE: 18 SEP 2019

NCD PROJECT NUMBER: 19-327AZ

DRAWING NUMBER: PL02

SHEET NUMBER: 3 of 6

PRELIMINARY
NOT FOR
CONSTRUCTION

FEASIBILITY ANALYSIS
RIO DE FLAG LOW FLOW CHANNEL

PLAN/PROFILE
BONITO STREET TO SITGREAVES STREET

DRAWN BY: J
DESIGNED BY:
REVIEWED BY:

NO.	DATE	BY	REVISION

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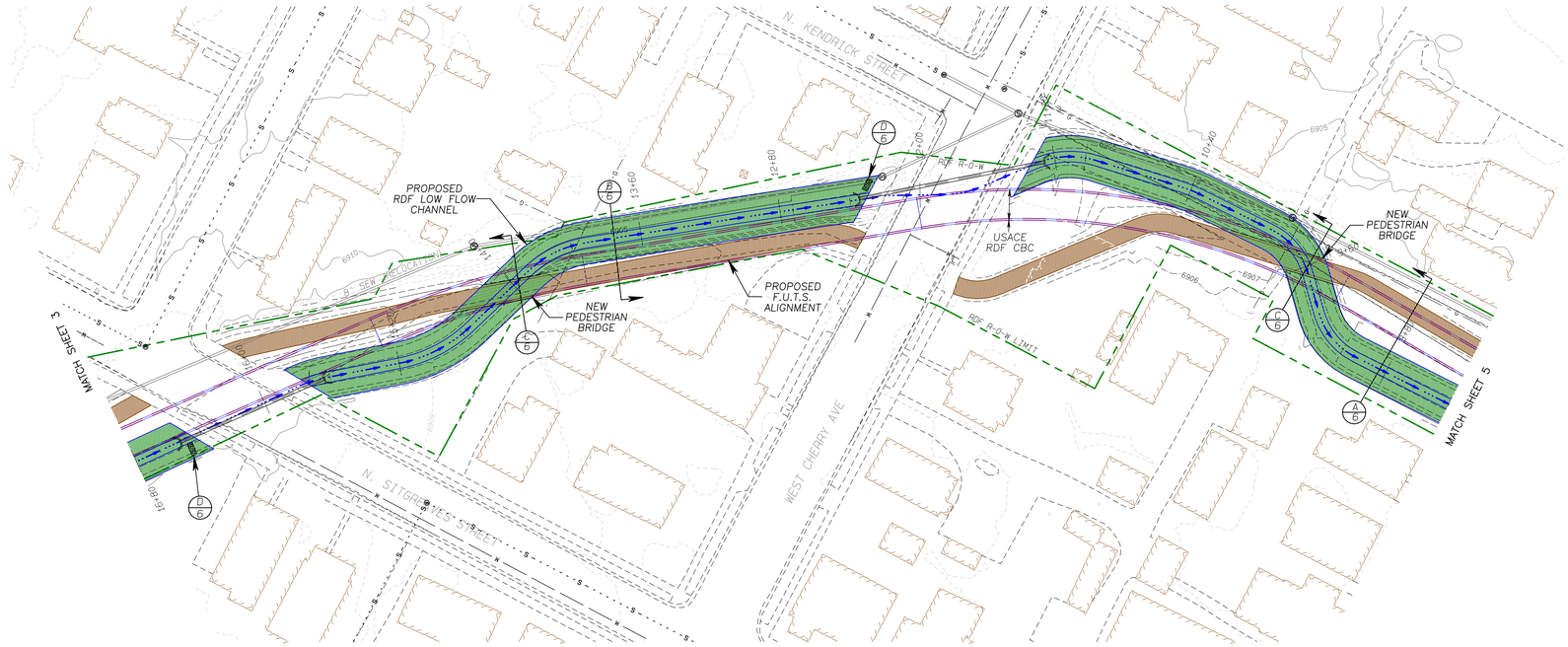


SITGREAVES TO BIRCH

NOTES:

> Some limits of grading/tie slopes may extend outside the limits of the RDF right-of-way and will require a Temporary Construction Easement across those affected parcels.

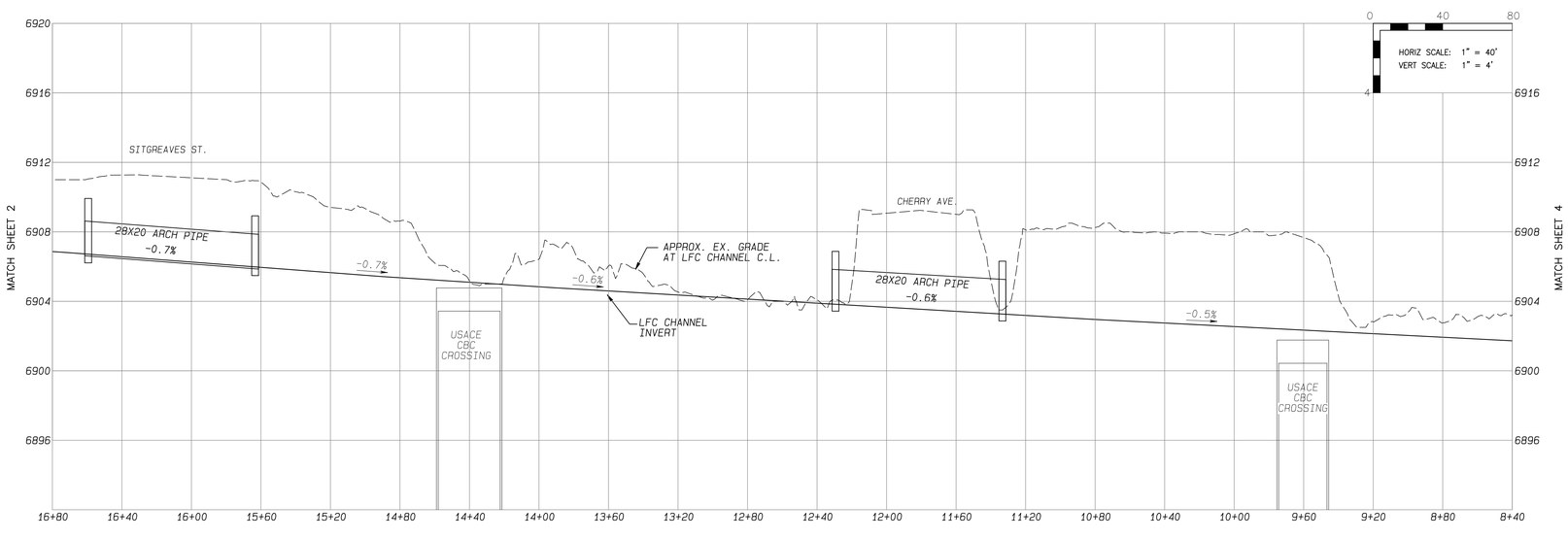
> Passage of seasonal base flow below cross streets is proposed to be accomplished with pipe culvert capable of passing the ~10 cfs seasonal flow with any any accumulated storm excess passed to flood control box culvert via overflow grates/catch basins.

> FUTS Trail alignment is intended to be above the water level of the channel at maximum design flow.

> Where the trail crosses the channel it is anticipated that a pedestrian bridge would be constructed to maintain access. However, a low water crossing of the channel may be provided which would allow for trail use during base flow conditions, but may preclude trail usage during high flow events.

> The existing sewer lines per COF GIS information are shown. Plans by SWI provide information/detail of required relocation of sewer and other utilities relative to the USACE box culvert construction.

> See Sheet 6 for concept level design channel characteristics.



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DATE: 18 SEP 2019

NCD PROJECT NUMBER: 19-327AZ

DRAWING NUMBER: PL03

SHEET NUMBER: 4 of 6

PRELIMINARY NOT FOR CONSTRUCTION

FEASIBILITY ANALYSIS
RIO DE FLAG LOW FLOW CHANNEL

PLAN/PROFILE
SITGREAVE STREET TO BIRCH AVE

DRAWN BY: J
DESIGNED BY:
REVIEWED BY:

NO.	DATE	BY	REVISION

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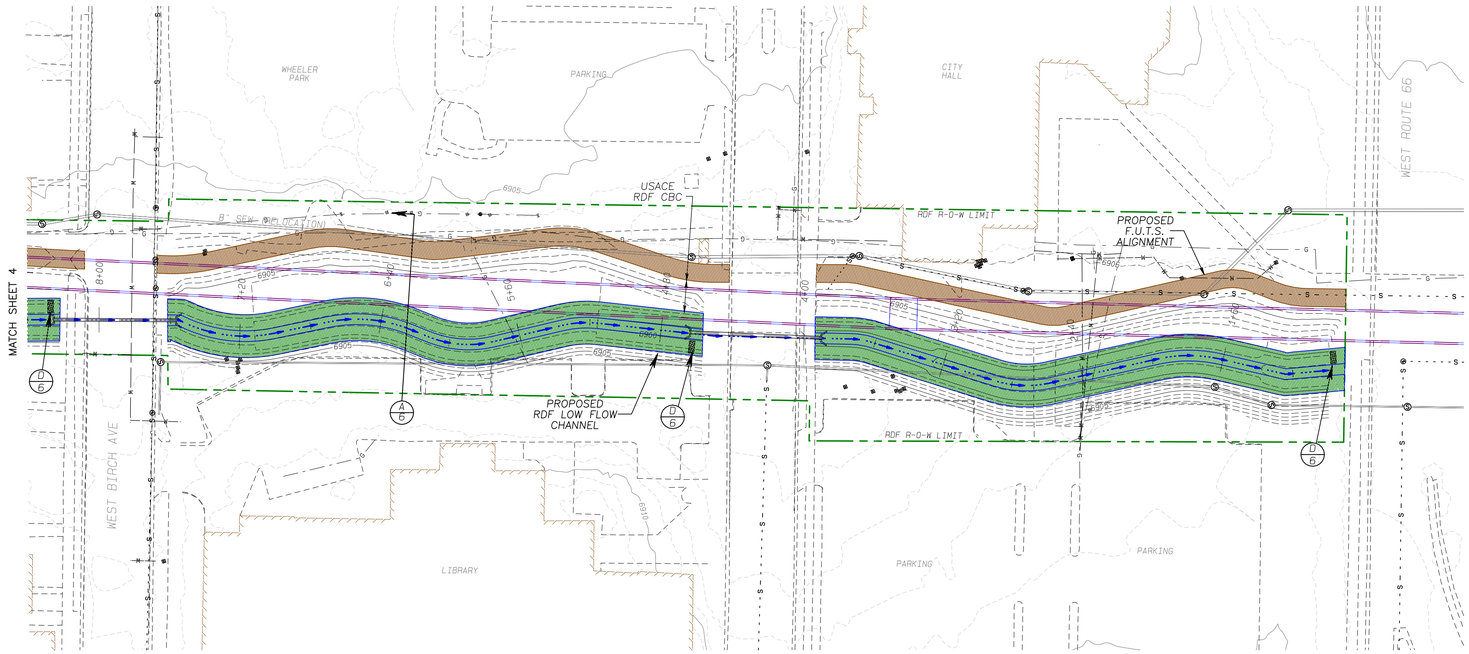
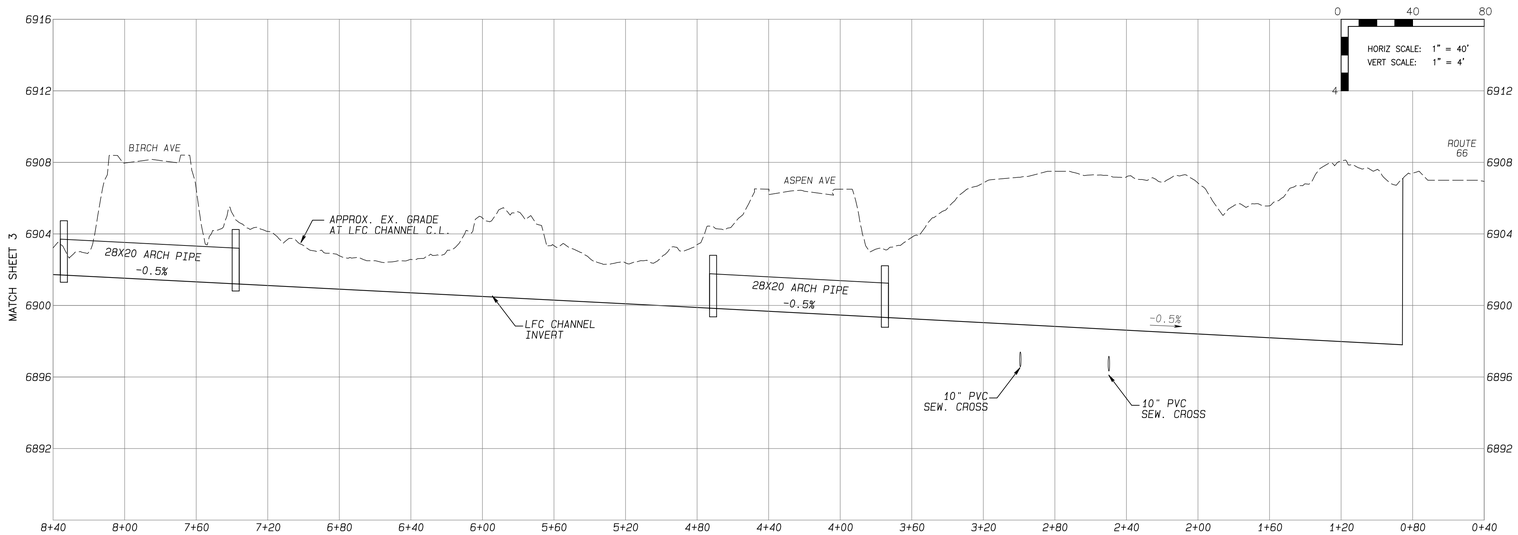


BIRCH TO ROUTE 66



NOTES:

> Some limits of grading/tie slopes may extend outside the limits of the RDF right-of-way and will require a Temporary Construction Easement across those affected parcels.

> Passage of seasonal base flow below cross streets is proposed to be accomplished with pipe culvert capable of passing the ~10 cfs seasonal flow with any any accumulated storm excess passed to flood control box culvert via overflow grates/catch basins.

> FUTS Trail alignment is intended to be above the water level of the channel at maximum design flow.

> The existing sewer lines per COF GIS information are shown. Plans by SWI provide information/detail of required relocation of sewer and other utilities relative to the USACE box culvert construction.

> See Sheet 6 for concept level design channel characteristics.

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DATE: 18 SEP 2019

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NCD PROJECT NUMBER: 19-327AZ

SHEET NUMBER: 5 of 6

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FEASIBILITY ANALYSIS
RIO DE FLAG LOW FLOW CHANNEL

PLAN/PROFILE
BIRCH AVENUE TO ROUTE 66

DRAWN BY: J
DESIGNED BY:
REVIEWED BY:

NO.	DATE	BY	REVISION

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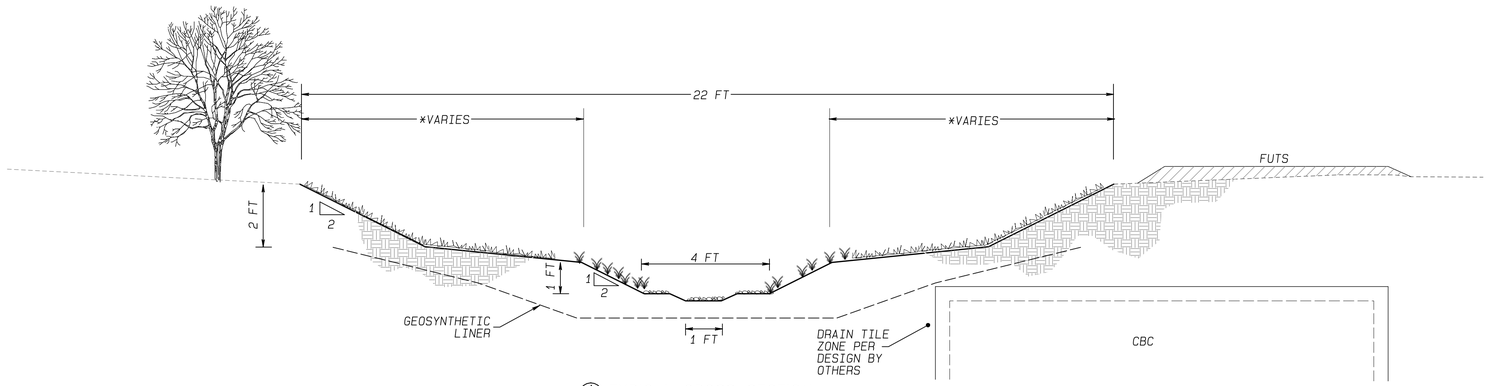
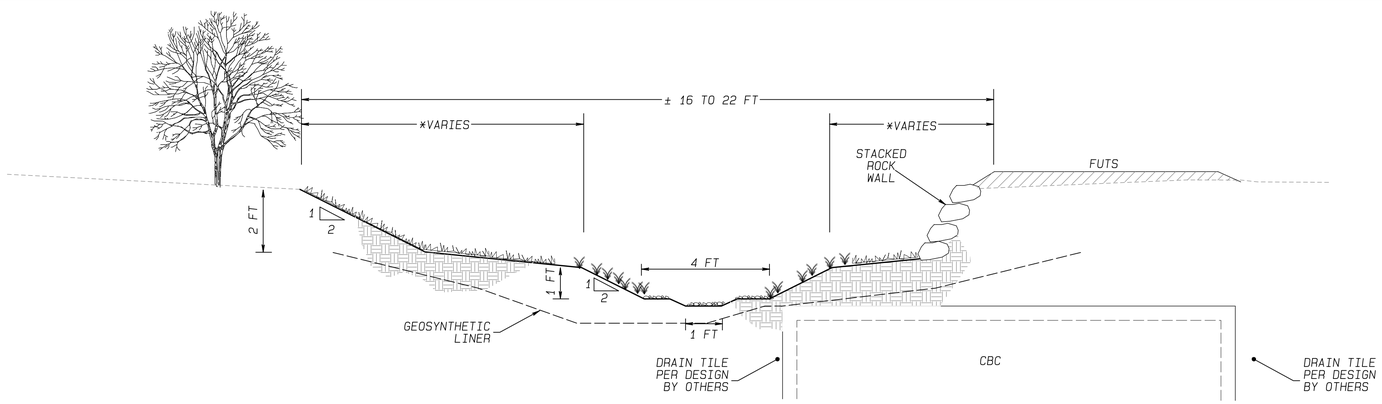
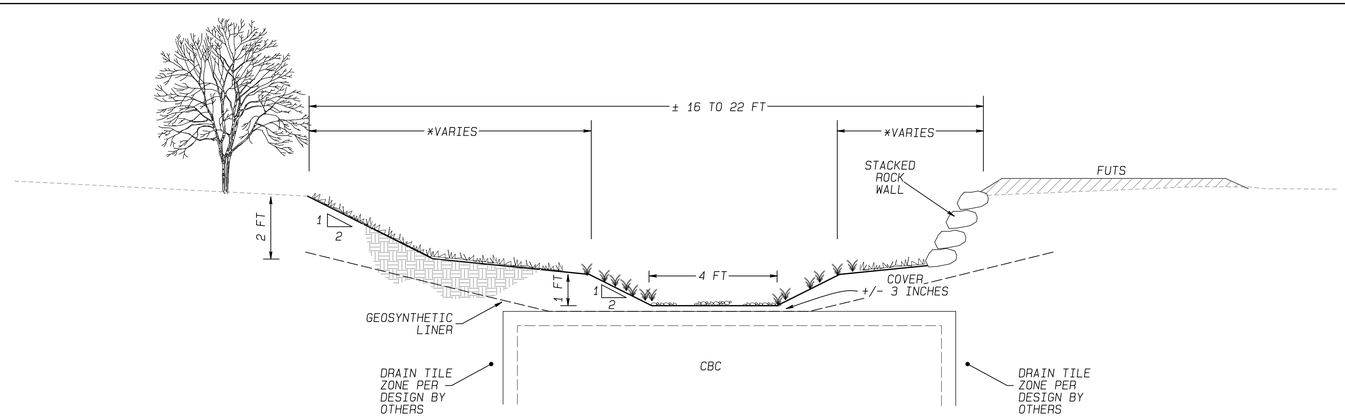


A/6 TYPICAL CROSS SECTION
(ADEQUATE RIGHT-OF-WAY)
N.T.S.



B/6 TYPICAL CROSS SECTION
(LIMITED RIGHT-OF-WAY)
N.T.S.



C/6 TYPICAL CROSS SECTION
(AT LOW FLOW/CBC CROSSING)
N.T.S.

CONCEPT LEVEL CHANNEL DESIGN PARAMETERS

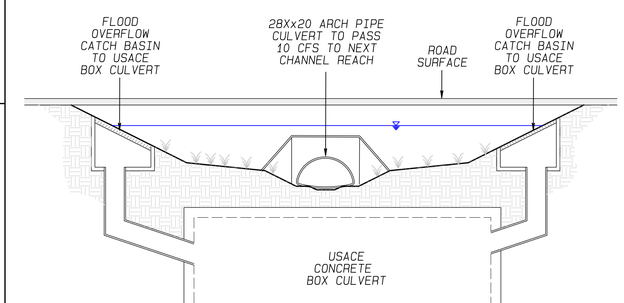
TARGET CONTRIBUTING WATERSHED AREA	± 20 – 25 AC.
"BANKFULL" CROSS SECTIONAL AREA	6 – 8 SQ. FT
"BANKFULL FLOW"	12–16 CFS
PROPOSED YEAR-ROUND BASE FLOW [1]	0.5 TO 1 CFS
PROPOSED SEASONAL FLOW [2]	10 CFS
DESIGN CHANNEL CAPACITY [3]	35 CFS
ULTIMATE CHANNEL CAPACITY [4]	75 CFS

[1] YEAR-ROUND BASE FLOW WOULD REQUIRE THE INTRODUCTION OF COF RECLAIMED WATER TO THE CHANNEL WHICH WOULD OFFER THE BENEFIT OF HELPTING TO SUSTAIN RIPARIAN VEGETATION THROUGH THE LOW FLOW CHANNEL REACH.

[2] SEASONAL BASE FLOW WOULD OCCUR DURING SPRING SNOWMELT RUNOFF EVENTS WHEN THE RIO DE FLAG, UPSTREAM OF FRANCES SHORT POND IS FLOWING. 10 CFS WOULD BE METERED THROUGH FRANCES SHORT POND TO THE RDF LOW FLOW CHANNEL FOR AESTHETICS AND TO SUSTAIN RIPARIAN HABITAT VEGETATION.

[3] CHANNEL DESIGN FLOW ASSUMES MINIMUM 1 FOOT OF FREEBOARD. IT IS ENVISIONED THAT THE RESIDENTIAL AND STREET AREAS NEAREST TO THE CHANNEL WOULD BE ALLOWED TO DRAIN INTO IT TO PRODUCE LOW IMPACT DEVELOPMENT BENEFITS AND PROVIDE SOIL MOISTURE TO SUPPORT RIPARIAN VEGETATION.

[4] ULTIMATE CHANNEL CAPACITY IS MAXIMUM FLOW BEFORE OVERTOPPING LOW FLOW CHANNEL BANKS.



D/6 TYPICAL CHANNEL AT ROAD CROSSING
N.T.S.

OVERFLOW CATCH BASIN MAY BE A DOUBLE CONFIGURATION AS SHOWN OR A SINGLE, DEPENDING ON LOCATION CONRIBUTING WATERSHED AND AND CAPCITY OF THE GRATE.

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DATE: 18 SEP 2019
NCD PROJECT NUMBER: 19-327AZ

PRELIMINARY NOT FOR CONSTRUCTION

FEASIBILITY ANALYSIS
RIO DE FLAG LOW FLOW CHANNEL

TYPICAL CROSS SECTIONS AND DETAILS

DRAWN BY: J
DESIGNED BY:
REVIEWED BY:

NO.	DATE	BY	REVISION

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