

FALL LINE TRAIL

BRYAN PARK

TREE IMPACT STUDY

Summary



Produced by the Office of Equitable Transit and Mobility



Introduction

Tree Preservation Takes Place Over Time

Various people such as arborists, engineers, architects, planners, and municipal officials are involved in preserving Richmond’s trees. The three phases that will be taken for Bryan Park are as follows:

Preconstruction- (current phase)

- Tree inventory
- Planning, design, negotiations
- Removals
- Staking of construction footprints under trees—required limb pruning
- Insect control or other care
- Fencing preserved trees

Construction (next phase)

- Communication and education
- Protection zones
- Required root pruning
- Maintenance of fencing
- Monitoring tree health
- Tree care

After Construction (future phase)

- Communication and education
- Protecting
- Tree care



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Preconstruction Activities

The goal of preserving trees in development projects is to protect adequate space for trees with the best health, structure, and appearance, while removing hazardous trees, lower quality trees, and others that are in the way of construction. Above all else, preserved trees need adequate space for root and canopy function and growth. The first preconstruction action is to decide how a tree inventory will be completed.



Tree Inventory

A tree inventory provides information used to make decisions on which trees can be preserved and what measures are needed to protect them. It takes both common sense and professional advice to plan for and complete a tree inventory. Trees included in the tree inventory table Exhibit A were surveyed by Timmons Group in March of 2024 and have been approximately located with a GPS unit.

Exhibit A:

Title	Botanical name	Condition	DBH (in.)	CRZ RADIUS (ft.)	Retain	Remove
1	Ilex opaca	Good	15	15	X	
2	Ilex opaca	Fair	21	21	X	
3	Cercis canadensis	Good	5	5	X	
4	Pyrus calleryana	Invasive	28	28	X	
5	Ilex opaca	Good	12	12	X	
6	Pyrus calleryana	Invasive	30	30	X	
7	Metasequoia glyptostro	Fair	6	6	X	
8	Metasequoia glyptostro	Good	3	3	X	
9	Ilex opaca	Good	24	24	X	
10	Liquidambar styraciflua	Good	37	37	X	
11	Ulmus americana	Good	3	3	X	
12	Ulmus americana	Good	5	5	X	
13	Ulmus americana	Good	2	2	X	
14	Liquidambar styraciflua	Fair	40	40	X	
15	Pinus taeda	Good	29	29	X	
16	Celtis occidentalis	Poor	6	6	X	
17	Fraxinus pennsylvanica	Fair	8	8	X	
18	Cercis canadensis	Fair	12	12	X	
19	Quercus alba	Excellent	35	35	X	
20	Quercus alba	Good	26	26	X	
21	Cornus florida	Poor	8	8	X	
22	Pinus taeda	Excellent	6	6	X	
23	Pinus taeda	Excellent	5	5	X	
24	Pinus taeda	Good	13	13	X	
25	Pinus taeda	Fair	11	11	X	
26	Acer saccharinum	Good	4	4	X	
27	Acer saccharinum	Good	3	3	X	
28	Acer saccharinum	Good	4	4	X	
29	Acer saccharinum	Good	3	3	X	
30	Carya glabra	Fair	19	19	X	
31	Juniperus virginiana	Good	17	17	X	
32	Juniperus virginiana	Good	24	24	X	
33	Acer saccharinum	Good	4	4	X	
34	Juniperus virginiana	Excellent	4	4	X	
35	Pinus strobus	Good	33	33	X	
36	Magnolia soulangeana	Fair	15	15	X	
37	Quercus alba	Good	41	41	X	
38	Quercus alba	Good	30	30	X	
39	Carya glabra	Fair	10	10	X	
40	Quercus alba	Good	27	27	X	



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Title	Botanical name	Condition	DBH (in.)	CRZ RADIUS (ft.)	Retain	Remove
41	Carya glabra	Good	28	28	X	
42	Quercus alba	Good	30	30	X	
43	Carya glabra	Good	16	16	X	
44	Quercus alba	Fair	29	29	X	
45	Quercus alba	Good	20	20	X	
46	Pinus taeda	Fair	16	16	X	
47	Carya alba	Good	20	20	X	
48	Acer saccharinum	Good	24	24	X	
49	Carya glabra	Fair	19	19	X	
50	Acer rubrum	Fair	29	29	X	
51	Quercus rubra	Good	29	29	X	
52	Acer saccharinum	Good	4	4	X	
53	Cupressus x leylandii	Good	28	28	X	
54	Cupressus x leylandii	Fair	24	24	X	
55	Cupressus x leylandii	Good	28	28	X	
56	Platanus occidentalis	Fair	18	18	X	
57	Acer saccharinum	Poor	3	3	X	
58	Prunus yedoensis	Fair	6	6	X	
59	Prunus yedoensis	Fair	10	10	X	
60	Prunus yedoensis	Fair	11	11	X	
61	Prunus yedoensis	Poor	9	9	X	
62	Quercus rubra	Fair	27	27	X	
63	Acer saccharinum	Good	5	5	X	
64	Acer saccharinum	Good	4	4	X	
65	Quercus rubra	Fair	29	29	X	
66	Carya glabra	Good	12	12	X	
67	Diospyros virginiana	Good	11	11	X	
68	Quercus rubra	Fair	41	41	X	
69	Carya glabra	Fair	13	13	X	
70	Quercus rubra	Fair	24	24	X	
71	Carya glabra	Good	11	11	X	
72	Carya glabra	Fair	10	10	X	
73	Carya glabra	Good	13	13	X	
74	Quercus rubra	Good	24	24	X	
75	Acer saccharinum	Good	7	7	X	
76	Carya glabra	Fair	8	8	X	
77	Carya glabra	Fair	16	16	X	
78	Quercus rubra	Poor	39	39	X	
79	Quercus alba	Fair	25	25	X	
80	Carya glabra	Fair	8	8	X	
81	Quercus rubra	Good	25	25	X	
82	Quercus alba	Fair	7	7	X	
83	Carya glabra	Good	13	13	X	
84	Quercus alba	Good	31	31	X	
85	Carya alba	Good	9	9	X	
86	Quercus rubra	Good	23	23	X	
87	Quercus rubra	Good	33	33	X	
88	Quercus rubra	Good	11	11	X	
89	Carya glabra	Fair	9	9	X	
90	Quercus rubra	Good	26	26	X	
91	Carya glabra	Good	16	16	X	
92	Carya glabra	Good	9	9	X	
93	Carya glabra	Fair	13	13	X	
94	Quercus velutina	Good	39	39	X	
95	Quercus rubra	Good	3	3	X	
96	Acer rubrum	Good	12	12	X	
97	Quercus rubra	Good	52	52	X	
98	Lagerstroemia indica	Good	27	27	X	
99	Prunus serotina	Fair	12	12	X	
100	Quercus phellos	Good	67	67	X	



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e	Title	Botanical name	Condition	DBH (in.)	CRZ RADIUS (ft.)	Retain	Remove
	101	Quercus rubra	Fair	31	31	X	
	102	Magnolia soulangeana	Fair	8	8	X	
	103	Magnolia soulangeana	Good	46	46	X	
	104	Quercus rubra	Fair	32	32	X	
	105	Carya glabra	Fair	23	23	X	
	106	Carya glabra	Fair	20	20	X	
	107	Quercus rubra	Fair	30	30	X	
	108	Quercus rubra	Fair	46	46	X	
	109	Juniperus virginiana	Fair	9	9	X	
	110	Quercus alba	Good	36	36	X	
	111	Quercus alba	Good	27	27	X	
	112	Quercus phellos	Good	55	55	X	
	113	Unknown	Fair	25	25	X	
	114	Quercus virginiana	Good	3	3		X
	115	Carya ovata	Poor	40	40	X	
	116	Lagerstroemia indica	Good	48	48		X
	117	Lagerstroemia indica	Fair	39	39	X	
	118	Lagerstroemia indica	Good	36	36		X
	119	Lagerstroemia indica	Good	25	25	X	
	120	Lagerstroemia indica	Fair	25	25	X	
	121	Lagerstroemia indica	Good	41	41	X	
	122	Lagerstroemia indica	Fair	48	48	X	
	123	Lagerstroemia indica	Good	36	36		X
	124	Quercus phellos	Good	68	68	X	
	125	Quercus virginiana	Good	16	16	X	
	126	Quercus virginiana	Excellent	26	26	X	
	127	Ilex opaca	Good	35	35	X	
	128	Ilex opaca	Good	27	27	X	
	129	Ilex opaca	Good	28	28	X	
	130	Ilex opaca	Good	21	21	X	
	131	Ilex opaca	Good	23	23	X	
	132	Ilex opaca	Good	15	15	X	
	133	Pinus taeda	Good	35	35	X	
	134	Quercus rubra	Good	48	48	X	
	135	Carya glabra	Fair	20	20	X	
	136	Fraxinus americana	Fair	46	46	X	
	137	Liriodendron tulipifera	Good	13	13	X	
	138	Quercus rubra	Fair	32	32	X	
	139	Pinus taeda	Fair	22	22	X	
	140	Pinus taeda	Good	14	14	X	
	141	Liquidambar styraciflua	Good	28	28	X	
	142	Quercus rubra	Fair	32	32	X	
	143	Carya glabra	Good	32	32	X	
	144	Quercus rubra	Fair	34	34	X	
	145	Quercus rubra	Good	43	43	X	
	146	Quercus prinus	Good	35	35	X	
	147*	Quercus rubra	Poor	35	35		X
	148*	Quercus rubra	Poor	29	29		X
	149*	Quercus rubra	Poor	28	28		X
	150	Quercus rubra	Good	35	35	X	
	151	Liriodendron tulipifera	Excellent	37	37	X	
	152	Liriodendron tulipifera	Good	23	23	X	
	153	Liriodendron tulipifera	Good	14	14	X	
	154	Liquidambar styraciflua	Good	17	17	X	
	155	Liquidambar styraciflua	Good	18	18	X	
	156	Liquidambar styraciflua	Good	14	14	X	
	157	Quercus velutina	Good	32	32	X	



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Title	Botanical name	Condition	DBH (in.)	CRZ RADIUS (ft.)	Retain	Remove
158	Liquidambar styraciflua	Fair	14	14	X	
159	Liriodendron tulipifera	Good	21	21	X	
160	Cornus florida	Fair	7	7	X	
161	Carya glabra	Fair	11	11	X	
162	Cornus florida	Fair	5	5	X	
163	Liriodendron tulipifera	Good	17	17	X	
164	Pinus taeda	Good	17	17	X	
165	Pinus taeda	Good	20	20	X	
166	Liquidambar styraciflua	Good	15	15	X	
167	Pinus taeda	Good	25	25	X	
168	Carya glabra	Good	17	17	X	
169	Pinus taeda	Good	18	18	X	
170	Pinus taeda	Fair	23	23	X	
171	Liriodendron tulipifera	Good	19	19	X	
172	Pinus taeda	Good	22	22	X	
173	Liquidambar styraciflua	Good	24	24	X	
174	Prunus serotina	Good	14	14	X	
175	Pinus virginiana	Good	25	25	X	
176	Quercus velutina	Good	36	36	X	
177	Liquidambar styraciflua	Good	138	138	X	
178	Ilex opaca	Excellent	18	18	X	
179	Prunus yedoensis	Good	10	10	X	
180	Amelanchier arborea	Good	21	21	X	
181	Prunus yedoensis	Good	13	13	X	
182	Ilex opaca	Good	20	20	X	
183	Unknown	Fair	17	17	X	
184	Koelreuteria paniculata	Good	7	7	X	
185	Pinus taeda	Good	26	26	X	
186	Celtis occidentalis	Good	4	4	X	
187	Acer rubrum	Fair	33	33	X	
188	Pinus taeda	Good	30	30	X	
189	Liquidambar styraciflua	Good	27	27	X	
190	Liquidambar styraciflua	Good	26	26	X	
191	Quercus velutina	Good	28	28	X	
192	Pinus taeda	Good	22	22	X	
193	Unknown	Good	4	4	X	
194	Quercus velutina	Good	15	15	X	
195	Carya glabra	Good	11	11	X	
196	Quercus velutina	Good	13	13	X	
197	Quercus velutina	Good	28	28	X	
198	Quercus velutina	Good	22	22	X	
199	Pinus strobus	Good	22	22	X	
200	Quercus velutina	Good	33	33	X	



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Title	Botanical name	Condition	DBH (in.)	CRZ RADIUS (ft.)	Retain	Remove
201	Quercus velutina	Fair	17	17	X	
202	Quercus velutina	Good	29	29	X	
203	Quercus michauxii	Fair	30	30	X	
204	Quercus michauxii	Good	19	19	X	
205	Carya glabra	Good	9	9	X	
206	Pinus taeda	Good	14	14	X	
207	Pinus taeda	Good	12	12	X	
208	Pinus taeda	Good	20	20	X	
209	Carya glabra	Good	6	6	X	
210	Carya glabra	Good	7	7	X	
211	Ilex opaca	Good	14	14	X	
212	Carya glabra	Fair	7	7	X	
213	Prunus serotina	Good	14	14	X	
214	Carya glabra	Poor	16	16	X	
215	Carya tomentosa	Good	14	14	X	
216	Carya tomentosa	Good	16	16	X	
217	Quercus alba	Good	24	24	X	
218	Carya glabra	Good	17	17	X	
219	Quercus velutina	Fair	22	22	X	
220	Quercus alba	Poor	22	22	X	
221	Quercus alba	Good	14	14	X	
222	Quercus alba	Good	16	16	X	
223	Quercus alba	Good	26	26	X	
224	Quercus alba	Poor	16	16	X	
225	Quercus alba	Good	26	26	X	
226	Quercus alba	Good	26	26	X	
227	Acer rubrum	Good	16	16	X	
228	Carya glabra	Good	17	17	X	
229	Ulmus alata	Good	4	4	X	
230	Quercus alba	Fair	30	30	X	
231	Quercus alba	Fair	39	39	X	
232	Quercus alba	Fair	22	22	X	
233	Quercus alba	Fair	25	25	X	
234	Quercus alba	Good	21	21	X	
235	Quercus alba	Good	33	33	X	
236	Quercus alba	Good	32	32	X	
237	Carya glabra	Good	12	12	X	
238	Prunus cerasus	Good	20	20		X
239	Prunus cerasus	Good	60	60	X	
240	Cupressaceae metasequoia	Good	30	30	X	
241	Ilex opaca	Good	16	16	X	
242	Lagerstroemia indica	Good	23	23	X	
243	Cupressaceae metasequoia	Good	14	14	X	
244	Quercus alba	Good	43	43	X	
245	Celtis occidentalis	Good	15	15	X	
246	Quercus velutina	Good	45	45	X	
247	Quercus phellos	Good	36	36	X	
248	Quercus velutina	Good	13	13	X	
249	Prunus serotina	Fair	12	12	X	
250	Quercus velutina	Fair	6	6	X	
251	Fraxinus pennsylvanica	Good	14	14	X	
252	Gleditsia triacanthos	Good	19	19	X	
253	Quercus velutina	Good	5	5	X	
254	Quercus velutina	Good	6	6	X	
255	Platanus occidentalis	Good	10	10	X	
256	Betula nigra	Good	29	29	X	
257	Pinus taeda	Excellent	22	22	X	



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Title	Botanical name	Condition	DBH (in.)	CRZ RADIUS (ft.)	Retain	Remove
258	Quercus velutina	Good	29	29	X	
259	Quercus velutina	Good	26	26	X	
260	Pinus taeda	Excellent	22	22	X	
261	Quercus velutina	Good	31	31	X	
262	Quercus velutina	Good	22	22	X	
263	Quercus velutina	Good	27	27	X	
264	Quercus velutina	Good	35	35	X	
265	Quercus velutina	Good	27	27	X	
266	Quercus velutina	Good	27	27	X	
267	Quercus velutina	Excellent	42	42	X	
268	Quercus velutina	Good	14	14	X	
269	Zelkova serrata	Good	14	14	X	
270	Zelkova serrata	Good	9	9	X	
271	Liriodendron tulipifera	Excellent	11	11	X	
272	Quercus velutina	Good	32	32	X	
273	Quercus falcata	Good	29	29	X	
274	Prunus serotina	Poor	14	14	X	
275	Quercus velutina	Good	26	26	X	
276	Ilex opaca	Good	9	9	X	
277	Prunus serotina	Good	7	7	X	
278	Prunus serotina	Good	12	12	X	
279	Quercus velutina	Good	32	32	X	
280	Quercus velutina	Good	26	26	X	
281	Quercus velutina	Good	27	27	X	
282	Quercus velutina	Poor	28	28	X	
283	Carya glabra	Good	19	19	X	
284	Zelkova serrata	Good	20	20	X	
285	Zelkova serrata	Good	20	20	X	
286	Prunus serotina	Excellent	8	8	X	
287	Carya glabra	Good	21	21	X	
288	Carya glabra	Good	32	32	X	
289	Prunus serotina	Good	6	6	X	
290	Quercus velutina	Good	35	35	X	
291	Ilex opaca	Excellent	15	15	X	
292	Carya glabra	Good	15	15	X	
293	Quercus velutina	Excellent	42	42	X	
294	Celtis laevigata	Good	10	10	X	
295	Quercus velutina	Good	36	36	X	
296	Quercus velutina	Good	29	29	X	
297	Pinus taeda	Good	22	22	X	
298	Quercus velutina	Good	34	34	X	
299	Quercus velutina	Good	37	37	X	
300	Quercus velutina	Good	27	27	X	



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Title	Botanical name	Condition	DBH (in.)	CRZ RADIUS (ft.)	Retain	Remove
301	Quercus velutina	Good	26	26	X	
302	Carya glabra	Good	15	15	X	
303	Quercus velutina	Good	31	31	X	
304	Quercus velutina	Good	28	28	X	
305	Quercus velutina	Good	31	31	X	
306	Quercus velutina	Good	36	36	X	
307	Quercus velutina	Good	25	25	X	
308	Carya glabra	Good	25	25	X	
309	Quercus velutina	Good	38	38	X	
310	Quercus velutina	Good	35	35	X	
311	Quercus velutina	Good	38	38	X	
312	Liquidambar styraciflua	Good	21	21	X	
313	Quercus velutina	Good	32	32	X	
314	Pinus taeda	Good	22	22	X	
315	Quercus velutina	Good	28	28	X	
316	Quercus velutina	Excellent	32	32	X	
317	Quercus velutina	Excellent	41	41	X	
318	Liquidambar styraciflua	Excellent	24	24	X	
319	Unknown	Good	15	15	X	
320	Quercus spp.	Good	11	11	X	
321	Morus spp.	Good	7	7	X	
322	Acer spp.	Fair	25	25	X	
323	Betula nigra	Good	12	12	X	
324	Betula nigra	Good	12	12	X	
325	Acer pennsylvanicum	Good	11	11	X	
326	Acer pennsylvanicum	Poor	45	45	X	
327	Acer pennsylvanicum	Fair	41	41	X	
328	Quercus lyrata	Excellent	56	56	X	

CALCULATIONS:

TOTAL TREES INVENTORIED : 328*
TOTAL TREES TO BE REMOVED : 5
TOTAL TREES TO BE RETAINED : 319

TOTAL DBH REMOVED : 143 (IN.)
TOTAL DBH RETAINED : 7,091 (IN.)



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In addition to the aforementioned tree inventory the City of Richmond Arborist has proposed the following guidelines for the construction phase:

- CHAIN LINK FENCE: Urban Forestry recommends 6 feet tall metal chain link fence set in metal frame panels on movable core drilled concrete blocks of sufficient size to hold the fence. *The existing specification does not outline a size requirement for tree protection fence.*
- Gates: plans should specify whom has access to inside the tree protection zones and how they can request access and who approves it.
- Tree removal plans shall be reviewed before work is conducted. The plans shall include measures to limit soil compaction of surrounding trees and mechanical damage from the tree removal operation. Use of thick mulching and heavy-duty matting designed for vehicle loading over tree roots such as Alturamats or approved equivalent.
- All roots over 1 inch shall be pruned by making clean cuts with a lopper, saw, or pruner to remove torn root ends from the tree side of the excavation and backfill the trench immediately.
- Schedule the trenching work to ensure it is completed immediately after the excavation. Do not let the roots dry out. Mist the roots several times during the day. If the excavated area must remain open over night, mist the roots and cover the excavation with black plastic.
- Restore soil within the trench as soon as the work is completed. Utilize soil of similar texture to the removed soil and lightly compact with hand tools. Leave soil mounded over the trench to a height of approximately 10% of the trench depth to account for settlement.
- Any remedial work on damaged existing plants recommended by the project manager shall be completed by the Contractor at no cost to the owner. Remedial work shall include but is not limited to: soil compaction remediation and vertical mulching, pruning and or cabling, insect and disease control including injections, compensatory watering, additional mulching.
- Plants that are damaged shall be considered as requiring replacement or appraisal in the event that the damage affects more than 25 % of the crown, 25% of the trunk circumference, or root protection area, or the tree is damaged in such a manner that the tree could develop into a potential hazard. Trees to be replaced shall be removed by the Contractor at their own expense.
- No soil work or other activity shall be permitted within the Location of Development when the volumetric soil moisture is above field capacity. The permanent wilt point and field capacity for each type of soil texture shall be defined as follows (numbers indicate percentage volumetric soil moisture).

Soil type	Permanent wilt point v/v	Field capacity v/v
Sand, Loamy sand, Sandy loam	5-8%	12-18%
Loam, Sandy clay, Sandy clay loam	14-25%	27-36%
Clay loam, Silt loam	11-22%	31-36%
Silty clay, Silty clay loam	22-27%	38-41%

1. Volumetric soil moisture shall be measured with a digital, electric conductivity meter. The meter shall be the Digital Soil Moisture Meter, DSMM500 by General Specialty Tools and Instruments, or approved equivalent meter.

The Contractor shall confirm the soil moisture levels with a moisture meter. If the moisture is too high, suspend operations until the soil moisture drains to below field capacity.

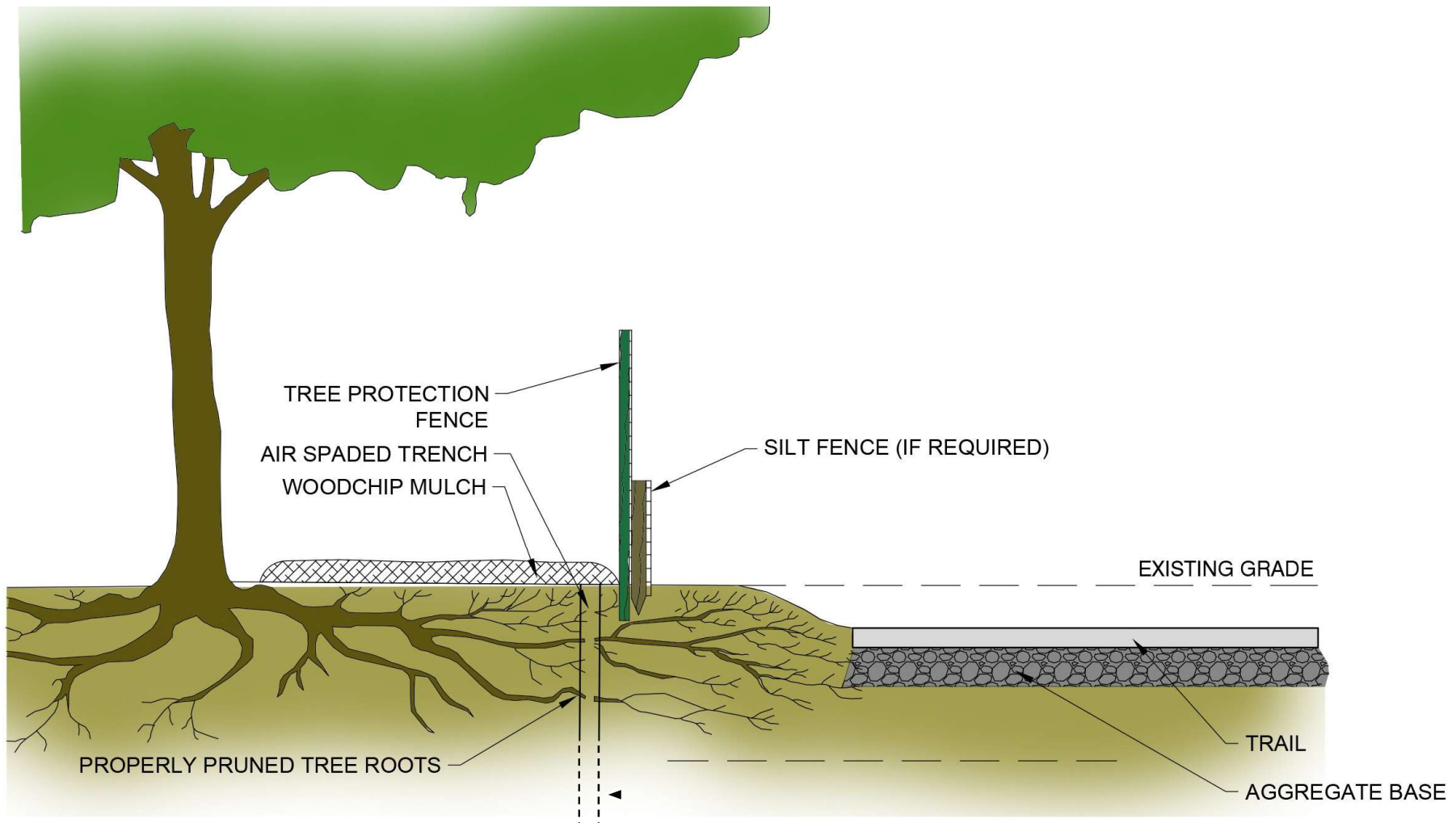


- Install Geogrids, Filter Fabric, matting, Wood Chips and or Mulch in areas and depths shown on the plans and details or as directed by the project manager. In general, it is the intent of this specification to provide the following levels of protection:

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1. All areas within the Tree Protection Zone provide a minimum of 5 inches of Wood Chips or Mulch.
 2. Areas where foot traffic or storage of lightweight materials is anticipated to be unavoidable provide a layer of Filter Fabric under the 5 inches of Wood Chips or Mulch.
 3. Areas where occasional light vehicle traffic is anticipated to be unavoidable provide a layer of Geogrids under 8 inches of Wood Chips or Mulch.
 4. Areas where heavy vehicle traffic is unavoidable provide a layer of Geogrids under 8 - 12 inches of Wood Chips or Mulch and a layer of matting over the Wood Chips or Mulch.
- a. The city project manager in conjunction with urban forestry will determine appropriate level of protection for trees.





During circumstances where the trail must be placed slightly higher than the existing grade, in order to maintain accessible grade standards, the general area directly under the trail and sub-base will be excavated using a specialized air spade and excavation technique. This process not only allows the removal of soil without impacting the tree's root system, but provides space to infill the required sub-base around tree roots promoting continued growth and development while ensuring the required sub-base and trail meet construction standards.

TREE REMOVAL
Quercus virginiana
Good condition, non-native
DBH = 3"

REMOVAL BY OTHERS
Quercus rubra
Poor condition
DBH = 35"

REMOVAL BY OTHERS
Quercus rubra
Poor condition
DBH = 29"

REMOVAL BY OTHERS
Quercus rubra
Poor condition
DBH = 28"

TREE REMOVAL
Lagerstroemia indica
Good condition, non-native
DBH = 48"

TREE REMOVAL
Lagerstroemia indica
Good condition, non-native
DBH = 36"

TREE REMOVAL
Lagerstroemia indica
Good condition, non-native
DBH = 36"

