

- User Interface for transit
 - Move transit to its own tool?
 - What is our plan for airports, seaports, and freight rail?
 - Mitch's proposal:
 - Tools
 - Query
 - Query
 - Demo
 - Issue Icons
 - Heatmaps (?)
 - City Info
 - Budget
 - Economic/Other Charts
 - Milestones
 - Transportation
 - Roads
 - Expressways
 - Mass Transit
 - Line planner
 - Pedestrian
 - Turnstiles?
 - Buses
 - Busway
 - Bus platform
 - Rail
 - Select system
 - Platform
 - (Build tramways by overbuilding/double clicking roads)
 - Delete Mass Transit Specific (Tram rails on road)
 - Bridges
 - Zones
 - Dezone
 - Infrastructure
 - Amenities
 - Education
 - University
 - Parks/Rec

- Zoo
 - Services
 - Outdoor Mall
 - Utilities
 - Global Connections
 - Airport
 - Seaport
 - Bulldozer (Terrain/delete/trees)
 - Terrain Modification
 - Add
 - Remove
 - Plant/Remove Trees
 - Delete (Anything)
 - Graph Element types
 - Ordinary road - 5 types (street, ave, blvd, one way 2/4)
 - Remove one way 2, add dirt road?
 - Upgrades:
 - Catenary (for trams/electric buses)
 - Rail (for trams)
 - Cable (for cable cars)
 - Station platform (for trams, but also buses/BRT)
 - HOV lane
 - BRT lane
 - Turnstiles on ordinary road? Would make tram/bus stations with turnstiles easier to build
 - Busway:
 - 2 lane, with sidewalk/platform
 - Express busway - pedestrians forbidden (for making turnstile-access bus stations, also high speed/75mph).
 - Guided busway - enforces timetables, improved timeliness
 - Expressway - 5 types (1-5 lanes)
 - BRT lane?
 - HOV lane?
 - Make the road building tool more amenable to closely packed graph elements. (Current version is too greedy to connect things)
 - Metered Access
 - Toll Booths (could leverage turnstiles system)
 - Railroad - 5+ types (single, double, quad, station, quad bypass station)
 - We could get more complicated than this. It would not significantly

[tyred metros](#) exist -- trying to capture the cost/versatility of buses while keeping the speed/capacity/timeliness of rail.

- BRT systems rarely if ever achieve their promise of timeliness, even when grade separated.
- How can we capture the cost/benefit of timeliness issues in a way that is meaningful and comprehensible to advanced players, while not adding complexity to novices?
- Current model: Two sliders to control headway, one for night and one for day. (There are no weekends in the game.) Each slider can be set as frequently as once a minute or as infrequent as once per hour.
- A contributor suggested [Clock-face scheduling](#). Proposal: each line can be scheduled in one of two ways. By default, they are scheduled using the simple two-slider model. But a detail-oriented player can turn on fine-grained scheduling, and schedule specific times for each station on a spreadsheet. The vehicles would wait at stations if they are ahead of schedule.
 - Is this too complicated? It would certainly come as a future feature, not a pre-launch feature.
 - <https://becomethesolution.com/images/metra-southwest-service-weekdays-weekends.png>
- Each line could be tracked for its timeliness, and penalized (less ridership) if not timely. Bus-based systems would get a special penalty, giving a benefit to guideway/rail systems. Non-grade-separated systems will already have time delays due to interactions with passenger cars.
- How do we measure timeliness for a system that doesn't have a specific timetable?
- Ticketing
 - By default, passengers pay as they enter the vehicle. This is slower (vehicles spend more time at stops) but cheap/easy.
 - By placing turnstiles, players can make passengers pay before the vehicle arrives, saving time.
 - Systems, Lines and stops could be marked as free/subsidized, meaning that the city pays the costs. This would increase ridership and might have other benefits (tourism, value, environmentalism, etc)
 - Alternatively, a system or line could be set up as a proof of payment system. This avoids the need for turnstiles, but reduces revenue (due to freeloading).
 - Players can configure a per-system or per-line price, plus a price to transfer between systems.
 - For simplicity, let's not implement region-based pricing at this time (tbh I don't ever want to implement it.)
- Depots
 - If we add depots now, we might limit our ability to do parking-based depots in the future, meaning no huge trainyards (what a shame)

- Parking will certainly be implemented with airports
 - If we don't add depots now, it might be harder to add them later
 - Rolling stock management
 - I'd like them to be per-system, not per-depo or per-line. It's not the mayor's job to shuffle trains from one depo to another.
 - Do we warn the player when there are insufficient vehicles? How not to be annoying? (CiM2 was hella annoying with this)
 - Could the player upgrade their appointment type when buying new rolling stock? Do they have to pay for a partial redesign?
 - Lines will be required to start and end at depots. No loops (for now).
 - Maintenance cost
 - Can players choose to skimp on maintenance? What's the consequence? (Slower vehicles? Breakdown mechanic? Value/ridership penalty?)
- Design-your-own-transit-system redux
 - Each city can have one or more "transit systems". Every city starts with a default configured ordinary bus system. When we implement connections to other cities, we can add a default configured "national rail system" (equivalent to Amtrak in the US).
 - To make a rail transit system (or anything other than the default bus system) players must pay a design fee. This adds a new system to the list of systems. A system can be in the "planned" state indefinitely, allowing the player to pre-plan using the planner tool. But these plans cannot be committed until the design fee is paid. Once the fee is paid, players are locked in and cannot make changes without redesigning and rebuilding.
 - Types
 - Bus
 - Cost: 1
 - Max speed: 60mph
 - Value effects: similar to freight trucks (negative)
 - Density effects: similar to cars (multiplied by number of passengers)
 - Can use ordinary roads or dedicated busways. Can make lane changes anywhere except a guideway.
 - Bad timeliness except on a guideway
 - Max 2 cars per vehicle (articulated bus)
 - Light rail
 - Basis of trams (rail on road) but can also be used separately
 - Cost: 2 (but higher for trams)
 - Max speed: 45mph
 - Value effects: slightly positive
 - Density effects: significant
 - Can it use heavy railroads?

- Good timeliness (but interactions on roadways will reduce the benefits)
 - Max 4 cars per vehicle
- Monorail (hanging/ordinary)
 - Cost: 3
 - Incompatible with everything - cannot intersect with roads
 - Max speed: 45mph
 - Value effects: positive
 - Density effects: significant
 - Great timeliness
 - Max 6 cars per vehicle
- Heavy rail
 - Cost: 4
 - Compatible with freight rail
 - Value effects: neutral
 - Density effects: highest
 - Max speed: 90mph
 - Good timeliness
 - Max 12 cars per vehicle
- MagLev
 - Cost: 5
 - Max speed: 200+mph
 - Incompatible with everything
 - Value effects: positive
 - Perfect timeliness
 - Max 12 cars per vehicle
- Power
 - Diesel
 - No infrastructure required.
 - Polluting,
 - moderate fuel costs.
 - Max speed 90mph.
 - Natural Gas
 - No infra.
 - Less polluting, value/environmentalism bonus
 - expensive fuel costs.
 - Max speed 90mph.
 - Electricity - Catenary
 - Catenary required
 - Energy cost is cheaper than fuel; maintenance might be cheaper.
 - No max speed
 - No pollution
 - Value effect?

- Want to enable San Francisco-style electric trolleybuses (rubber tires+catenary)
 - Electricity - third rail
 - Possible later addition
 - Different infra than catenary, not compatible
 - Less visible to the player.
 - What are the cons for the player?
 - Cable
 - No track limitations on grade, no acceleration penalty for grade.
 - Max speed is 30mph.
 - Cable required
 - Player visibility may be poor
 - I am surprised that there are not more exotic options in this area - nature does not give us a lot of good options for mobile power.
 - There are some options which are either too modern (21st not 20th century - [Online electric bus](#)) or are just impractical ([atmospheric railway](#), [gyrobus](#), [capabus](#))
 - The game is a fantasy, so I'm not opposed to implementing them in the future. A battery (gyro/capa) bus with limited range between stops is an interesting mechanic.
 - Possibility of linear motor with maglev (power comes from the track, not the train), although that does not eliminate the need for a catenary, which is why they are uncommon.
- Automation
 - No Automation - Cheap, max speed 30mph, or 60mph on roads/expressways.
 - Partially Automated - Faster, requires exclusive lane. Max speed 45mph
 - Fully Automated - Fastest, requires exclusive track. No Max speed. Moderately expensive.
 - Personal Rapid Transit - Single passenger cars. Cars are individually routed, so the player does not set up lines. No max speed. Vehicles can be bumper-to-bumper. High throughput, luxurious, versatile, expensive. Requires exclusive track.
- Appointment
 - Luxurious
 - Fancy
 - Plain
 - Utilitarian
- Choose engineering firm
 - Once the player has configured their system, the game generates random "bids" from engineering companies. The engineering companies are randomly named.

- Some engineering firms will increase top speed by 15mph (or more, for maglevs) and improve timeliness
 - Some engineering firms will make more beautiful, quiet designs, giving a bonus to Value and possibly increase Tourism and ridership.
 - Some engineering firms will have discounted construction costs
 - Some engineering firms will design systems that are cheaper to maintain, and have better fuel/energy economy.
 - Some engineering firms will just give you a discount on the bid itself.
 - Some engineering firms will have a bad reputation, or be newcomers. Their bids will be more enticing, but there is a random chance they over-charge or under-deliver.
- What are the actual costs and benefits of any particular system?
 - Financial Costs
 - Design cost
 - Construction cost
 - Maintenance cost
 - Fuel/energy cost (variable - gas price fluctuations are random)
 - Environmental Costs
 - Pollution (zero for electric, but see Noise)
 - Noise (is this a form of pollution, a penalty to value, or something else? New heatmap?)
 - Value (can be positive or negative - ancillary effect on tourism)
 - Density (usually positive)
 - Ridership - this is the player's real goal: reduce the number of cars on the road.
 - Ridership is affected by many factors. The most important question is, does this go where people need to go? But other factors play a role.
 - Comfort also plays a role
 - Speed
 - Timeliness
 - Versatility/Compatibility
 - Buses are more versatile
 - Monorails and maglevs have poor compatibility
- What needs to be completed before releasing initial mass transit?
 - Don't want to release an incomplete, unpolished system
 - Can pre-release buses once file format/featureset is finalized. Buses are a good canary because they will not be seen as the total system but have all the major features.
 - Want to have a bombshell rollout of mass transit with the most important, most impressive features implemented and well polished.
- Need to better engage fanbase and public (reddit) on mass transit.
 - Our core fanbase is on Discord, but our future market is probably seeing us through reddit, youtube.

- Make the fanbase feel like they contributed to the feature.
- Schedule for mass transit roll out
 - Conor would like to take a 7-day digital vacation sometime in the next 3 weeks
 - Buses before vacation, rest after?