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| To: | Robert Lucas SEFH of South Carolina | From: | Josh Mitchell, PE Stantec |
| File: | 171002697 | Date: | March 8, 2023 |

Reference: **The Preserve at Ravenel Traffic Summary Update**

Introduction

The purpose of this memorandum is to provide a traffic summary update to respond to concerns brought forth by the Public and the Planning Commission at the Town of Ravenel February 23rd Planning Commission Meeting.

The primary concerns raised at the meeting regarded the following items:

- ❖ Number/location of access points to the development;
- ❖ Trip generation of the proposed land use(s) of the development; and
- ❖ Operations of the signalized intersection at Davison Road & US 17/Savannah Highway.

In order to address these concerns, Stantec performed the following, the results of which are included in this memorandum:

- ❖ Re-evaluated the spacing, location, and potential benefits of the proposed multiple access points along Davison Road/County Line Road;
- ❖ Updated the trip generation estimate for the actual proposed land use for the site (previous trip generation estimates considered 390 Single-Family Detached Housing units and 110 Multifamily Housing (Low-Rise) units, whereas the actual proposed land use is 350 Senior Adult Housing – Single Family units); and
- ❖ Observed existing operations of the signalized intersection at Davison Road & US 17/Savannah Highway, noting queues, congestion, signal timing, and potential opportunities for improvement.

Existing Roadway Conditions

County Line Road is a two-lane major collector road which primarily serves residential land use. The posted speed limit along County Line Road is 45 mph and the 2022 AADT was 2,500 vehicles per day. Davison Road connects County Line Road with US 17/Savannah Highway and shares the same functional classification with County Line Road. The posted speed limit along Davison Road is 45 mph and the 2022 AADT was 3,900 vehicles per day. Based upon existing turning movement counts, the percentage of heavy vehicles along County Line Road/Davison Road is 7%.

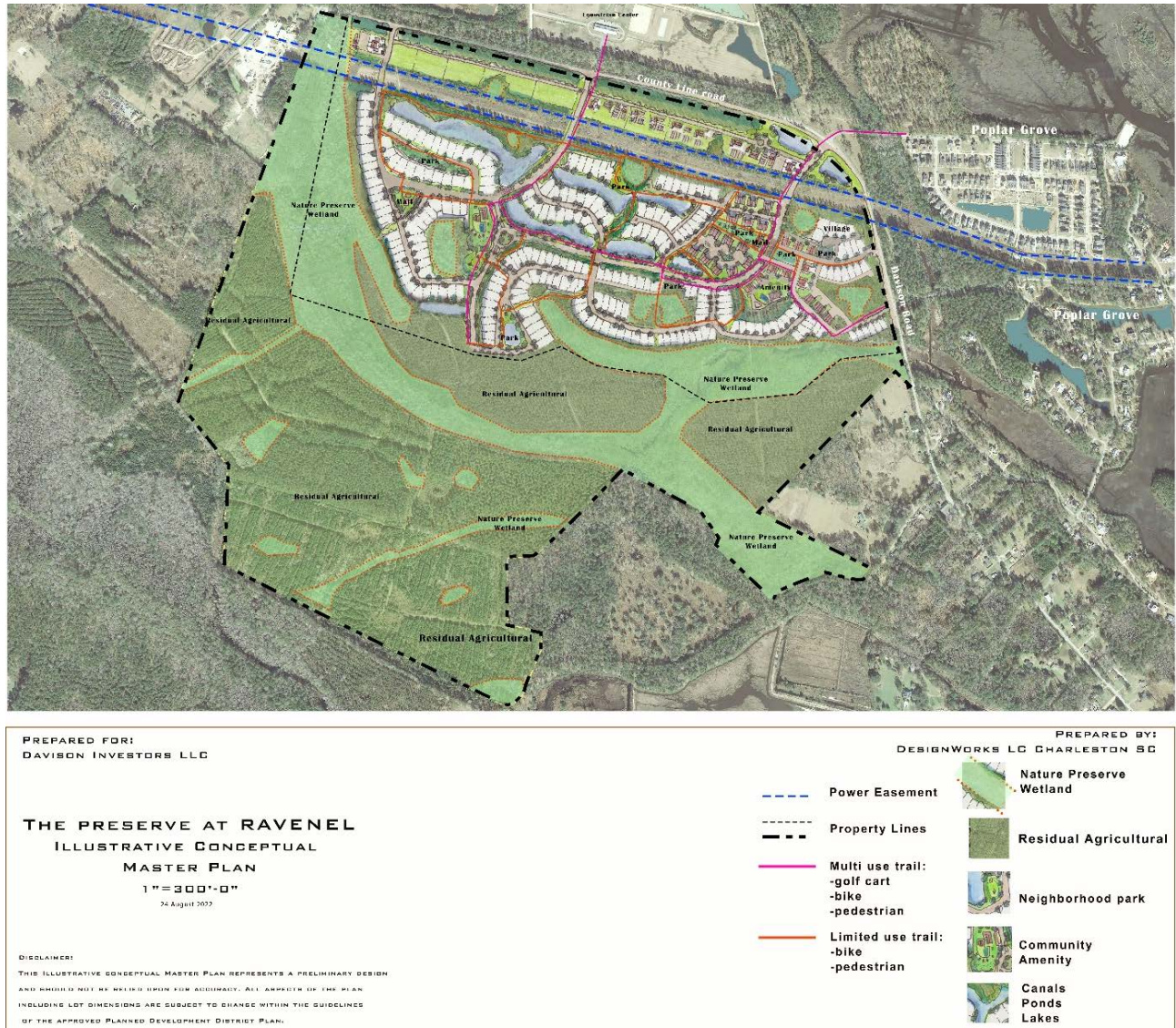
US 17/Savannah Highway is four-lane divided principal arterial which primarily serves residential, commercial and industrial land uses. The posted speed limit of the US 17/Savannah Highway in the vicinity of the proposed development is 55 mph and the 2022 AADT was 32,900 vehicles per day. Based upon existing turning movement counts, the percentage of heavy vehicles along US 17/Savannah Highway is 5%.

Proposed Development

The proposed Preserve at Ravenel Development will consist of 350 Senior Adult Housing – Single Family units and will be located along Davison Road/County Line Road. **Figure 1** illustrates the location of the project site, including the adjacent public roadway network.

Reference: The Preserve at Ravenel Traffic Summary Update

Figure 1 – Project Location Map/Site Plan



Access Point Evaluation

Access to the development is proposed to be provided through up to five (5) proposed full access driveway(s) along the western/southern side of Davison Road/County Line Road. The benefit of multiple driveway locations (as opposed to one main access point) is to distribute ingress and egress trips along the frontage of the site along Davison Road/County Line Road. This reduces trips and the resulting delay at each access point. As currently shown in the masterplan, each of the five project driveways meets SCDOT standards for minimum driveway spacing, per the *Access & Roadside Management Standards (ARMS)* manual (2008). However, it should be noted that the location of the proposed driveways will be pursuant to SCDOT approval, to verify appropriate spacing and to verify that appropriate sight distance is achievable at all driveway locations.

Reference: The Preserve at Ravenel Traffic Summary Update

Trip Generation Estimate Update

The trip generation potential for the development was previously estimated in the March 2021 traffic study assuming a buildout of 500 units (390 single-family housing units and 110 multifamily housing units) utilizing land use codes (LUC) 210 – Single Family Detached Housing and LUC 220 Multifamily Housing (Low-Rise) and were developed for the weekday daily, the weekday AM peak hour of the adjacent street, and the weekday PM peak hour of the adjacent street time periods.

However, since the completion of the March 2021 traffic study, the proposed land use scale and type has been updated to be 350 senior adult housing units; therefore, an updated trip generation potential estimate was performed utilizing LUC 251 – Senior Adult Housing – Single Family.

As shown in **Table 1** the trip generation potential for 350 Senior Adult Housing – Single Family units is less than that of 500 Single Family Detach Housing and Multifamily Housing (Low-Rise) units.

The comparison indicates that the currently proposed senior adult housing development is anticipated to generate 2,711 fewer daily trips (61%) than the previously evaluated single-family/multifamily development. Additionally, in the AM peak hour, it is expected to generate 50 fewer entering trips (60%) and 183 fewer exiting trips (73%); and in the PM peak hour, it is expected to generate 204 fewer entering trips (74%) and 117 fewer exiting trips (72%) than the previously evaluated single-family/multifamily development.

Overall, considering both AM and PM peak hours, the currently proposed senior adult housing development is expected to generate approximately 72% fewer trips than the previously considered single-family/multifamily development. Finally, considering the anticipated distribution of trips in the AM peak hour (the worst case for the Davison Road approach at the US 17 signal), the previously considered single-family/multifamily housing development would be anticipated to add 213 trips traveling along Davison Road towards US 17, whereas the currently proposed senior adult housing development is anticipated to add 58 new trips traveling along Davison Road towards US 17 – a 73% decrease.

Table 1: Trip Generation Estimates

| | Land Use | ITE LUC | Scale (Units) | Daily | AM Peak Hour | | PM Peak Hour | |
|-------------------------------|--------------------------------------|---------|----------------|---------------|--------------|-------------|--------------|-------------|
| | | | | | Enter | Exit | Enter | Exit |
| Previous Study (March 2021) | Single Family Detached Housing | 210 | 390 | 3,638 | 71 | 211 | 236 | 139 |
| | Multifamily Housing (Low-Rise) | 220 | 110 | 792 | 12 | 40 | 40 | 24 |
| | Total | | | 4,430 | 83 | 251 | 276 | 163 |
| Updated Land Use (March 2023) | Senior Adult Housing – Single Family | 251 | 350 | 1,719 | 33 | 68 | 72 | 46 |
| | Total | | | 1,719 | 33 | 68 | 72 | 46 |
| | | | Difference (%) | -2,711 (-61%) | -50 (-60%) | -183 (-73%) | -204 (-74%) | -117 (-72%) |

Additionally, per the developer, *“the commercial segment [of the development] is intended to be developed so as to support the needs of the surrounding community and will include services such as a neighborhood general store, restaurants, doctor’s offices, and perhaps a small design store. All commercial spaces will be designed to be within walking distance of the residential sections of the community, thereby reducing the number of trips generated overall.”*

Reference: The Preserve at Ravenel Traffic Summary Update

Davison Road & US 17/Savannah Highway Observations

One AM peak period was observed on Tuesday, March 7th, 2023 between 7:00 – 9:00 AM at the signalized intersection of Davison Road & US 17/Savannah Highway. The observation log is included in the attachments. Based on these observations, the peak hour (in which traffic volumes appeared to be greatest) occurred between approximately 7:15 – 8:15 AM. As shown in **Table 2**, during this peak hour, the maximum cycle length of the signal appeared to be 120 seconds (if all phases reached their maximum time), while the average cycle length appeared to be 92 seconds. The maximum Davison Road approach phase time appeared to be 35 seconds, while the average phase time appeared to be 31 seconds. So, of the maximum observed cycle length (120 seconds), it appears approximately 30% of the cycle time is allocated to Davison Road. The minimum queue observed (at the start of green) was 13 vehicles, the maximum queue observed was approximately 65 vehicles (to Old Tea Farm Road), and the average queue observed was approximately 32 vehicles. The minimum number of vehicles able to process through the intersection from Davison Road was 5 vehicles, the average was approximately 10 vehicles, and the maximum was 14 vehicles. The minimum number of cycles for the back of queue to process through the intersection was observed to be 2 cycles, the maximum was observed to be 7 cycles, and the average number of cycles need to process the back of queue was observed to be approximately 4 cycles.

Table 2: Observation Summary

| Peak Hour (7:15-8:15 AM) | Cycle Length (s) | Sidestreet Phase Length (s) | Back of Queue (veh) | Vehicles Processed (no. of veh) | Cycles to Process Queue (no. of cycles) |
|-----------------------------|---------------------|-----------------------------------|------------------------|---------------------------------------|---|
| Minimum | 60 | 15 | 13 | 5 | 2 |
| Average | 92 | 31 | 32 | 10 | 4 |
| Maximum | 120 | 35 | 65 | 14 | 7 |

Beginning at 7:00 AM, queues along Davison Road were minimal, such that only one (1) cycle was needed to clear the queue. By 8:30 AM, queues along Davison Road had dissipated to conditions similar to 7:00 AM. However, during the peak hour (approximately 7:15 – 8:15 AM), there was a consistent queue of vehicles along Davison Road, such that one (1) cycle was not sufficient to clear the queues. The following were observed as contributing factors to this queue:

- ❖ **Impacts of downstream congestion:** the intersection of US 17/Savannah Highway & Main Street is overcapacity such that queues from that signal extend to and beyond the intersection with Davison Road. At various points in the peak hour, this caused traffic from Davison Road to be unable to process through the intersection due to lack of available gaps on US 17/Savannah Highway.
- ❖ **Maximum green time for Davison Road not being realized:** there were various cycles for which the maximum green time for Davison Road was not realized (even though there was demand) – this occurred for two primary reasons: (1) drivers inattentive (texting) and (2) large trucks could or did not proceed at a reasonable pace such that the detector was not called within the gap extension interval, causing the Davison Road phase to reduce. In other words, due to excessive distances between consecutive vehicles, it appears to the detector there is no more demand.
- ❖ **Insufficient phase/green time for Davison Road:** as noted above, approximately 35 seconds (30%) of the maximum 120 second cycle length is allocated to Davison Road. Even when the full phase time was realized, the maximum number of vehicles processed was 14 vehicles during the peak hour. However, the average queue was over twice that number of vehicles. While not an uncommon condition during peak hours of the day, the available green time was not enough to process the demand in one cycle. Queues along US 17/Savannah Highway southbound (the competing movement for this green time) consistently cleared in one cycle and the maximum green time at the US 17/Savannah Highway southbound approach consistently served vehicles not present in queue at the start of green.

Reference: The Preserve at Ravenel Traffic Summary Update

Summary of Findings

The purpose of this memorandum is to provide a traffic summary update to respond to concerns brought forth by the Public and the Planning Commission at the Town of Ravenel February 23rd Planning Commission Meeting, regarding access point number and spacing, trip generation, and operations at the Davison Road & US 17/Savannah Highway signalized intersection:

- ❖ The access point reevaluation indicates that the benefit of multiple driveway locations (as opposed to one main access point) is to distribute ingress and egress trips along the frontage of the site along Davison Road/County Line Road. This reduces trips and the resulting delay at each access point. As currently shown in the masterplan, each of the five project driveways meets SCDOT standards for minimum driveway spacing, per the *Access & Roadside Management Standards (ARMS)* manual (2008). However, it should be noted that the location of the proposed driveways will be pursuant to SCDOT approval, to verify appropriate spacing and to verify that appropriate sight distance is achievable at all driveway locations.
- ❖ The trip generation update included an estimate for the currently proposed senior adult housing development, as compared to the previously proposed single family/multifamily housing development. This comparison indicates that the currently proposed senior adult housing development is anticipated to generate 2,711 fewer (61%) daily trips, 233 (70%) fewer AM peak hour trips, and 321 (73%) fewer PM peak hour trips than the previously proposed single family/multifamily housing development. Notably, in the AM peak hour the senior adult housing development is anticipated to generate 58 trips approaching US 17/Savannah Highway along Davison Road, 155 (73%) fewer trips than the proposed single family/multifamily housing development, reducing impacts to the traffic operations at the signalized intersection. Additionally, per the developer, *"the commercial segment [of the development] is intended to be developed so as to support the needs of the surrounding community and will include services such as a neighborhood general store, restaurants, doctor's offices, and perhaps a small design store. All commercial spaces will be designed to be within walking distance of the residential sections of the community, thereby reducing the number of trips generated overall."*
- ❖ Morning peak observations at the signalized intersection of Davison Road & US 17/Savannah Highway indicated that at 7:00 AM, queues along Davison Road were minimal, such that only one (1) cycle was needed to clear the queue, and by 8:30 AM, queues along Davison Road had dissipated to conditions similar to 7:00 AM. However, during the peak hour (approximately 7:15 – 8:15 AM), there was a consistent queue of vehicles along Davison Road, such that one (1) cycle was not sufficient to clear the queues, leading to an average of approximately four (4) cycles being necessary to clear the back of queue. This was due to downstream congestion at the US 17/Savannah Highway & Main Road intersection and insufficient gap extensions/phase time for the Davison Road approach. Conversely, there appeared to be excess capacity in the US 17/Savannah Highway southbound green time (the competing approach) throughout the peak hour.

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Conclusions & Recommendations

The number of access points for the site appear appropriate for the land use and site layout of the development, and in their current locations in the master plan. **However, it is recommended to coordinate locations with SCDOT to ensure acceptable spacing and sight distance prior to installation.**

The currently proposed senior adult housing development will generate 70% fewer AM peak hour trips and 73% fewer PM peak hour trips than the previously proposed single family/multifamily housing development. This will lead to reduced delay/level of service impacts noted in the previously completed March 2021 traffic study.

Observations at the Davison Road & US 17/Savannah Highway intersection indicate that there is an opportunity to retime the signal to mitigate current delay and as well as future impacts caused by the proposed Preserve at Ravenel development. It should be noted that this does currently meter the demand from Davison Road onto US 17/Savannah Highway; however, **it appears that a greater portion of the cycle length could be allocated to the Davison Road approach by increasing the maximum green time and increasing the gap extension for the phase. It is recommended to coordinate this potential retiming with SCDOT.**

If you have any questions regarding the analysis, please do not hesitate to contact me.

Regards,

Stantec Consulting Services Inc.



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Attachments: March 7th, 2023 Davison Road & US 17 Observation Log

March 8, 2023

Robert Lucas
Attachments

Reference: The Preserve at Ravenel Traffic Summary Update

ATTACHMENTS

March 8, 2023

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March 7th, 2023 Davison Road & US 17 Observation Log

| March 7th, 2023 Time | Cycle Length (s) | Sidestreet Phase Length (s) | Back of Queue (veh) | Vehicles Processed (no. of veh) | Cycles to Process Queue (no. of cycles) | Notes |
|-------------------------|---------------------|--------------------------------|------------------------|------------------------------------|--|---|
| 7:00 AM | | | | | | queues minimal along Davison Road |
| 7:05 AM | | | 13 | 10 | 2 | |
| 7:07 AM | | 35 | 16 | 13 | 2 | |
| 7:09 AM | | | 16 | 12 | 2 | |
| 7:10 AM | 80 | 35 | 12 | 12 | 1 | |
| 7:11 AM | | 20 | 6 | 6 | 1 | |
| 7:12 AM | | | 16 | 13 | 2 | |
| 7:13 AM | 80 | 35 | 19 | 12 | 2 | |
| 7:14 AM | 100 | | 18 | 10 | 2 | |
| 7:16 AM | | 35 | 15 | 10 | | |
| 7:17 AM | | | | | | queues along US 17 reaching Davison Road from Main Street |
| 7:20 AM | | 35 | 18 | 14 | 2 | |
| 7:21 AM | | | 20 | 9 | 2 | |
| 7:23 AM | | 35 | 17 | 8 | | congestion along US 17 prohibited vehicles from processing through intersection |
| 7:25 AM | | | | 10 | | |
| 7:27 AM | | 35 | | 9 | 3 | |
| 7:28 AM | | | | 14 | 2 | |
| 7:30 AM | | 35 | 13 | 9 | 2 | |
| 7:32 AM | | | 19 | 13 | 2 | |
| 7:35 AM | 100 | 30 | 24 | 12 | 3 | |
| 7:36 AM | 120 | 35 | 24 | 9 | 3 | congestion along US 17 prohibited vehicles from processing through intersection |
| 7:37 AM | | | 29 | 13 | 3 | |
| 7:39 AM | 120 | 30 | 29 | 13 | 3 | |
| 7:40 AM | 100 | 25 | | 5 | 5 | sidestreet gaped out prior to hitting max due to truck causing large gap between downstream vehicle |
| 7:41 AM | 100 | 15 | | | 6 | sidestreet gaped out prior to hitting max due to texting causing large gap between downstream vehicle |
| 7:42 AM | 100 | 15 | | 7 | 6 | sidestreet gaped out prior to hitting max due to truck causing large gap between downstream vehicle |
| 7:43 AM | | 35 | | | | |
| 7:44 AM | 60 | 30 | | | | |
| 7:45 AM | 80 | 30 | 30 | 14 | 3 | |
| 7:47 AM | 60 | 27 | 35 | 8 | 4 | |
| 7:48 AM | 90 | 30 | | 6 | 5 | congestion along US 17 prohibited vehicles from processing through intersection |
| 7:50 AM | 60 | 30 | | 11 | | |
| 7:50 AM | 120 | 30 | 30 | 10 | 3 | |
| 7:53 AM | | 30 | 30 | 11 | | |
| 7:56 AM | | 30 | 35 | 11 | 5 | |
| 7:58 AM | 70 | | | 10 | 4 | congestion along US 17 prohibited vehicles from processing through intersection |
| 7:59 AM | 90 | | | 10 | 5 | congestion along US 17 prohibited vehicles from processing through intersection |
| 8:00 AM | 100 | | | 6 | 4 | sidestreet gaped out prior to hitting max due to truck causing large gap between downstream vehicle |
| 8:02 AM | | | | 7 | 4 | sidestreet gaped out prior to hitting max due to texting causing large gap between downstream vehicle |
| 8:03 AM | 120 | 35 | | 10 | 5 | sidestreet gaped out prior to hitting max due to truck causing large gap between downstream vehicle |
| 8:06 AM | 100 | 35 | | 10 | 5 | sidestreet gaped out prior to hitting max due to truck causing large gap between downstream vehicle |
| 8:09 AM | 70 | 35 | 65 | 9 | | queue back to Old Tea Farm Road (per google maps), based on 35' per vehicle (per visible count/distance) |
| 8:10 AM | | | 65 | 8 | 6 | queue back to Old Tea Farm Road (per google maps), based on 35' per vehicle (per visible count/distance), congestion along US 17 prohibited vehicles from processing through intersection |
| 8:12 AM | | | 65 | 10 | 6 | queue back to Old Tea Farm Road (per google maps), based on 35' per vehicle (per visible count/distance) |
| 8:13 AM | | | 65 | 13 | 7 | queue back to Old Tea Farm Road (per google maps), based on 35' per vehicle (per visible count/distance) |
| 8:16 AM | | | 65 | 11 | | queue back to Old Tea Farm Road (per google maps), based on 35' per vehicle (per visible count/distance) |
| 8:17 AM | | | 50 | 9 | 5 | queue back to Messervy Road (per google maps), based on 35' per vehicle (per visible count/distance) |
| 8:18 AM | | | 50 | 6 | 5 | queue back to Messervy Road (per google maps), based on 35' per vehicle (per visible count/distance) |
| 8:19 AM | 80 | | 50 | 10 | 5 | queue back to Messervy Road (per google maps), based on 35' per vehicle (per visible count/distance) |
| 8:21 AM | 90 | 35 | | 10 | 5 | |
| 8:23 AM | 60 | | | 16 | 5 | |
| 8:24 AM | 100 | | 13 | 13 | 2 | |
| 8:25 AM | | | | 15 | 1 | |
| 8:26 AM | 60 | | 0 | 0 | 1 | |
| 8:27 AM | 70 | | 3 | 3 | 1 | |
| 8:30 AM | | | | 0 | 1 | queues dissipated by 8:30 AM such that queues were minimal (<10 veh) and processed in 1-2 cycles consistently |

| Peak Hour (7:15-8:15 AM) | Cycle Length (s) | Sidestreet Phase Length (s) | Back of Queue (veh) | Vehicles Processed (no. of veh) | Cycles to Process Queue (no. of cycles) |
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